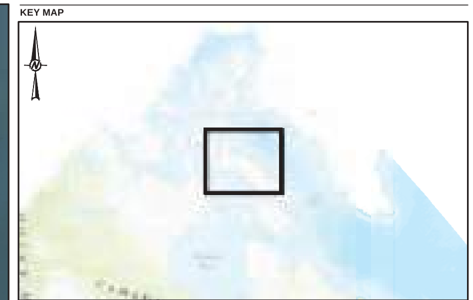
KEY MAP



SCALE 1:60,000,000

LEGEND

- SITE LOCATION
- REGIONAL CLIMATE STATIONS
- HYDROMETRIC STATION
- LOCAL HYDROMETRIC STATION

STATION NAME	CLIMATE STATION ID
MARY RIVER MINE	ON-SITE
ARCTIC BAY CS	AHCCD 2400404
CLYDE A	AHCCD 2400800
CLYDE A	2400800
CLYDE RIVER A	AHCCD 2400804
CLYDE RIVER A	2400804
CLYDE RIVER CLIMATE	2400802
CLYDE AWOS	2400801
HALL BEACH A	AHCCD 2402350
LONGSTAFF BLUFF	AHCCD 2402684
LONGSTAFF BLUFF	2402684
NANISIVIK A	AHCCD 2402730
POND INLET	2403200
POND INLET A	2403201
POND INLET A	2403206
POND INLET CLIMATE	ACHDD 2403204
POND INLET CLIMATE	2403204
SANIRAJAK	AHCCD 2402353
SANIRAJAK	2402353

STATION NAME	HYDROMETRIC STATION ID
MARCIL CREEK NEAR ARCTIC BAY	10UB001

0 29,000 58,000 116,000
1:3,000,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. IMAGERY CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
2023 WASTE ROCK MANAGEMENT PLAN

TITLE
REGIONAL CLIMATE AND HYDROMETRIC STATIONS

CONSULTANT
wsp

YYYY-MM-DD	2023-07-12
DESIGNED	AL
PREPARED	JJ
REVIEWED	AP
APPROVED	KDV

PROJECT NO.	CONTROL	REV.	FIGURE
22572750	0001	0	4

Table 3: List of climate stations

Station Name	Climate ID	Coordinates	Distance to Site (km)	Elevation (m)	Time Period
Site Station					
Mary River Mine	On-Site	71.31°N, 79.28°W	—	202-237	2013-2022
Regional Stations[(a)]					
CLYDE A	AHCCD 2400800	70.49°N, 68.52°W	401.4	26.5	1946-2002
CLYDE A	2400800	70.49°N, 68.52°W	401.4	26.5	1933-2008
CLYDE RIVER A	AHCCD 2400804	70.49°N, 68.52°W	401.4	26.5	1946-2022
CLYDE RIVER A	2400804	70.49°N, 68.52°W	401.4	26.5	2013-2021
CLYDE RIVER CLIMATE	2400802	70.48°N, 68.52°W	401.8	26.5	2004-2021
LONGSTAFF BLUFF	AHCCD 2402684	68.9°N, 75.14°W	310.3	160.8	1958-2022
LONGSTAFF BLUFF	2402684	68.9°N, 75.14°W	310.3	160.8	1957-2021
POND INLET	2403200	72.68°N, 77.98°W	158.8	35.5	1922-1965
POND INLET A	2403201	72.68°N, 77.97°W	158.9	61.6	1922-1965
POND INLET A	2403206	72.69°N, 77.97°W	159.9	61.6	2013-2021
POND INLET CLIMATE	ACHDD 2403204	72.69°N, 77.96°W	160	64.7	1922-2022
POND INLET CLIMATE	2403204	72.69°N, 77.96°W	160	64.7	2005-2021

a) Operated by Environment Canada Climate Change (ECCC)

Both the Adjusted and Homogenized Climate Data (AHCCD) and non-AHCCD versions of regional climate stations are considered due to limited data availability in the AHCCD data. AHCCD stations are favoured over non-AHCCD stations as it has been adjusted to account for discontinuities from non-climatic factors such as instrument changes or station relocation.

Reanalysis data from ERA5 was used to infill and extend the on-site data. Bias corrections were applied to the ERA5 data using observed data from the Pond Inlet Climate stations.

The daily gapless dataset developed from 1940 to 2022 was used in the updated water balance. The results for temperature and precipitation are presented in sections 5.1.1 and 5.1.2 respectively. Section 5.1.3 summarizes the methodology implemented in the water balance to calculate evaporation losses.

5.1.1 Temperature

Annualized average monthly temperatures for the on-site station, selected regional climate stations and ERA5 reanalysis data are presented in Figure 5. All stations show a similar seasonal pattern, with greater variability being present during the winter months, particularly for the regional climate stations. Pattern differences could be due to geographical differences at the station locations (i.e., elevation and proximity to water bodies). The on-site station has higher average monthly temperatures in the summer.

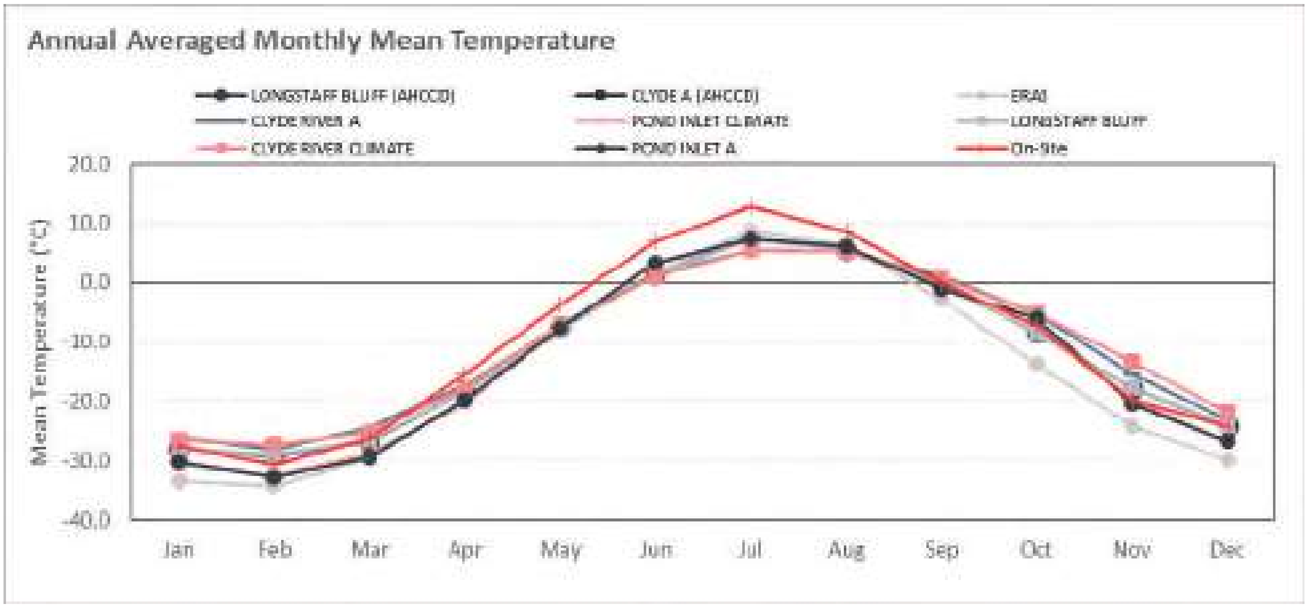


Figure 5: Average Monthly Temperatures for Climate Stations

The Pond Inlet stations were considered the base station to represent the Mary River mine site. The long-term record of average monthly temperatures for the gapless dataset generated from 1940 to 2022 based on the combined long-term records from the Pond Inlet climate stations is presented in Figure 6. The average temperature for the gapless long-term record is -15.4˚C with an average monthly minimum of -34.3˚C in February and with an average monthly maximum of 5.4˚C in July.

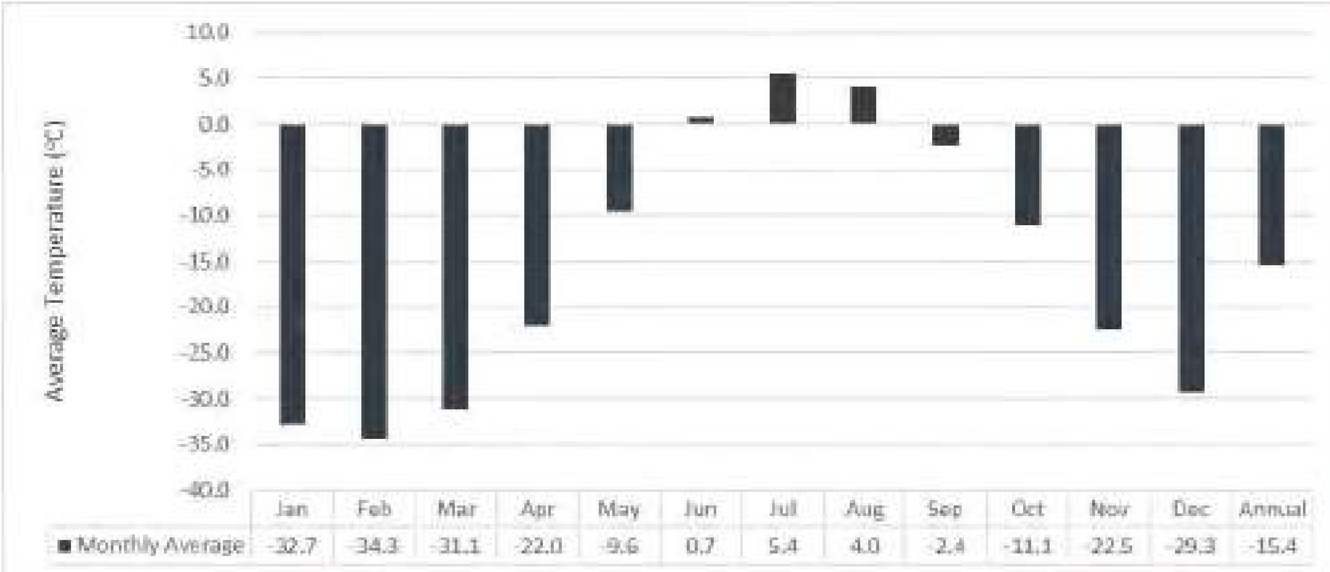


Figure 6: Average monthly and average annual temperature for the long-term record dataset

The daily temperature for the representative average, wet and dry years presented in Table 4 were used in the water balance. The representative average, wet and dry years were selected based on the closest annual precipitation values to the precipitation frequency analysis results Table 5.

Table 4: Selected years for climate conditions for various return periods

Scenario	Return Period	Year
Wet	100-year	1959
	50-year	2007
	25-year	1993
	10-year	2000
	5-year	2012
Average	2-year	2014
Dry	5-year	2005
	10-year	2002
	25-year	1974
	50-year	1972
	100-year	1972

5.1.2 Precipitation

The annual average monthly total precipitation for the on-site station, selected regional climate stations and ERA5 reanalysis data are presented in Figure 7. There is variability between the stations, particularly during the fall. The on-site station does not show precipitation during the winter, which is due to the station not capturing snowfall during this period. The period of highest precipitation is thus shifted to the summer for the on-site station as compared to the other stations which see their highest average precipitation in early fall. The ERA5 reanalysis data overestimates the precipitation when compared to the other stations. This could be attributed to the resolution of the data, given the grid size covers approximately 25 km^2. The ERA5 data was corrected to the site condition prior to using for infilling data from regional stations.

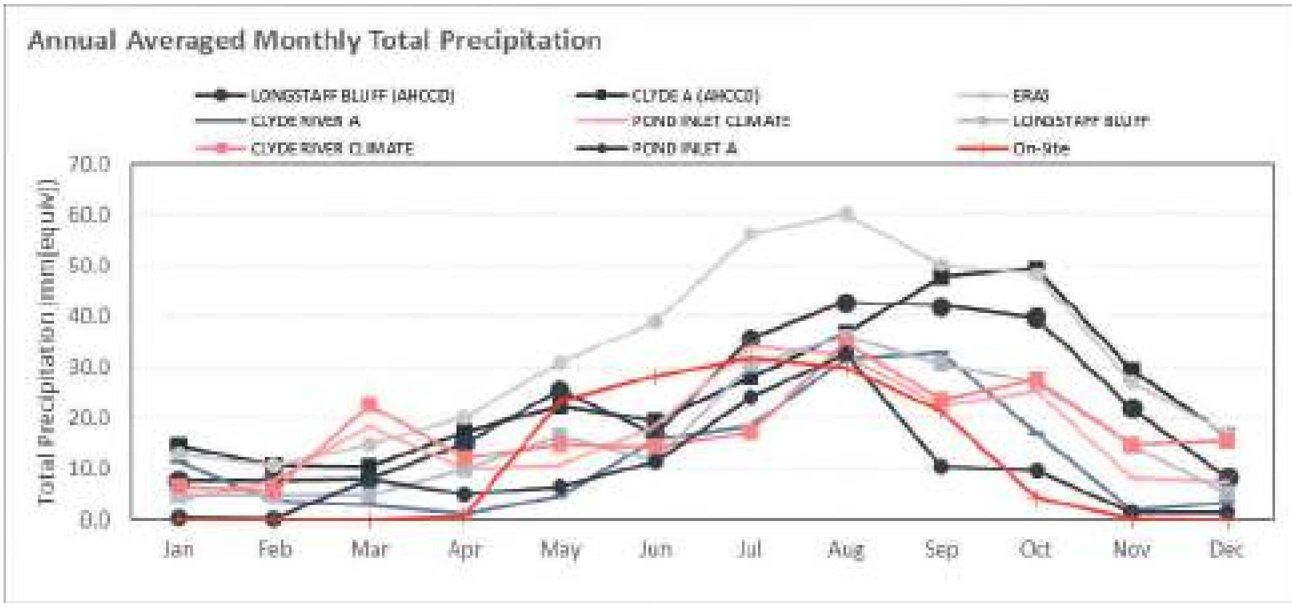


Figure 7: Annual Average Monthly Precipitation for selected climate stations

The Pond Inlet stations were considered the base station to represent the Mary River mine site. The long-term record of average monthly precipitation for the gapless dataset generated from 1940 to 2022 is presented in Figure 8. The average annual total precipitation for the long-term record is estimated at 211.3 mm/year. Maximum monthly precipitation tends to occur in August with 35.2 mm and minimum monthly precipitation tends to occur in January with 6.0 mm.

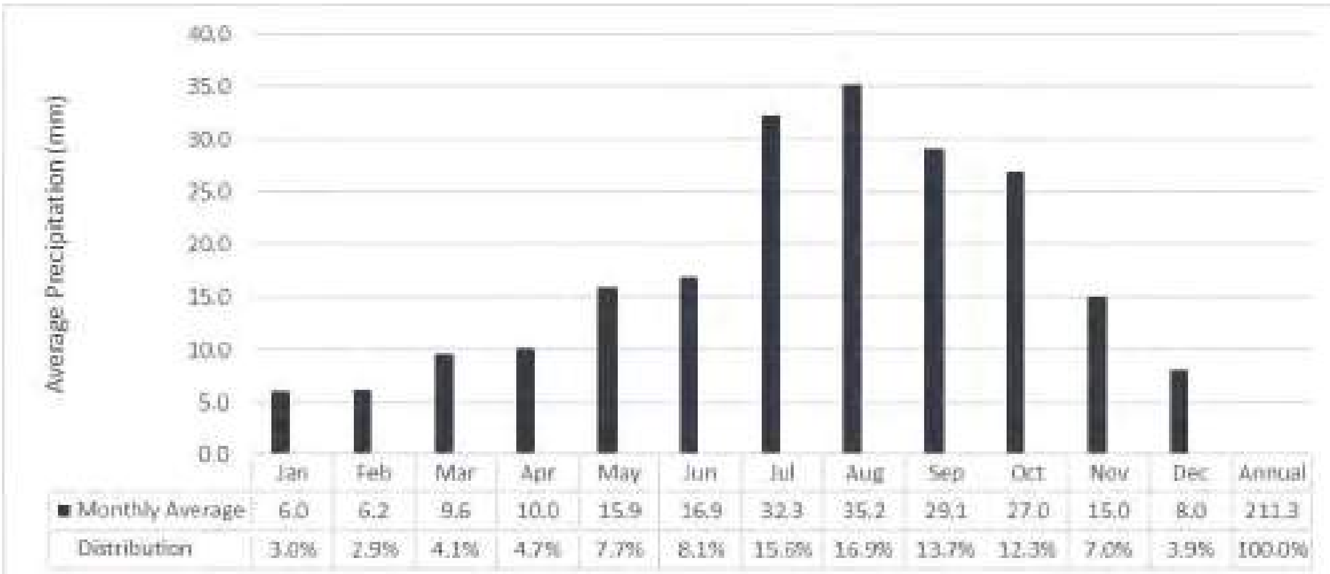


Figure 8: Average monthly and annual total precipitation for the long-term record

A frequency analysis was conducted on the long-term dataset from 1940 to 2022 to develop annual precipitation values for wet and dry years with different return periods. The frequency analysis results are presented in Table 5. The hydrological frequency analysis distribution that best fit the long-term precipitation data was Gumbel with a correlation coefficient of 0.98.

Table 5: Annual total precipitation for various return periods

Scenario	Return Period	Annual Precipitation (mm/yr)
Wet	100-year	487.6
	50-year	439.6
	25-year	391.3
	10-year	326.2
	5-year	274.6
Average	2-year	196.8
Dry	5-year	138.9
	10-year	114.3
	25-year	91.3
	50-year	77.9
	100-year	66.7

Monthly distribution of representative average, wet and dry years with various return periods from the long-term dataset have similar trends with spring/summer months showing the highest amounts of total precipitation, while precipitation is generally lowest in the winter/fall. Based on this analysis it was decided to use the distribution from the representative average year 2014 (197 mm) for all return periods. The monthly distribution for all return periods is shown in Table 6.

Table 6: Monthly Distribution for Various Return Periods

Years	Return Period (years)	Monthly Precipitation (mm)												Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wet	100	9.2	8.7	4.5	18.6	45.8	23.8	89.3	178.9	53.2	23.8	25.5	6.4	**487.6**
	50	8.3	7.8	4.0	16.7	41.3	21.4	80.6	161.3	48.0	21.4	23.0	5.8	**439.6**
	25	7.3	7.0	3.6	14.9	36.7	19.1	71.7	143.6	42.7	19.1	20.5	5.2	**391.3**
	10	6.1	5.8	3.0	12.4	30.6	15.9	59.8	119.7	35.6	15.9	17.1	4.3	**326.2**
	5	5.2	4.9	2.5	10.5	25.8	13.4	50.3	100.8	30.0	13.4	14.4	3.6	**274.6**
Average		3.7	3.5	1.8	7.5	18.5	9.6	36.1	72.2	21.5	9.6	10.3	2.6	**196.8**
Dry	5	2.6	2.5	1.3	5.3	13.0	6.8	25.5	51.0	15.2	6.8	7.3	1.8	**138.9**
	10	2.1	2.0	1.0	4.4	10.7	5.6	21.0	42.0	12.5	5.6	6.0	1.5	**114.3**
	25	1.7	1.6	0.8	3.5	8.6	4.5	16.7	33.5	10.0	4.5	4.8	1.2	**91.3**
	50	1.5	1.4	0.7	3.0	7.3	3.8	14.3	28.6	8.5	3.8	4.1	1.0	**77.9**
	100	1.3	1.2	0.6	2.5	6.3	3.3	12.2	24.5	7.3	3.3	3.5	0.9	**66.7**

Note:
Annual Total Precipitation is shown as the sum of the monthly values. The annual numbers show minor differences due to rounding.

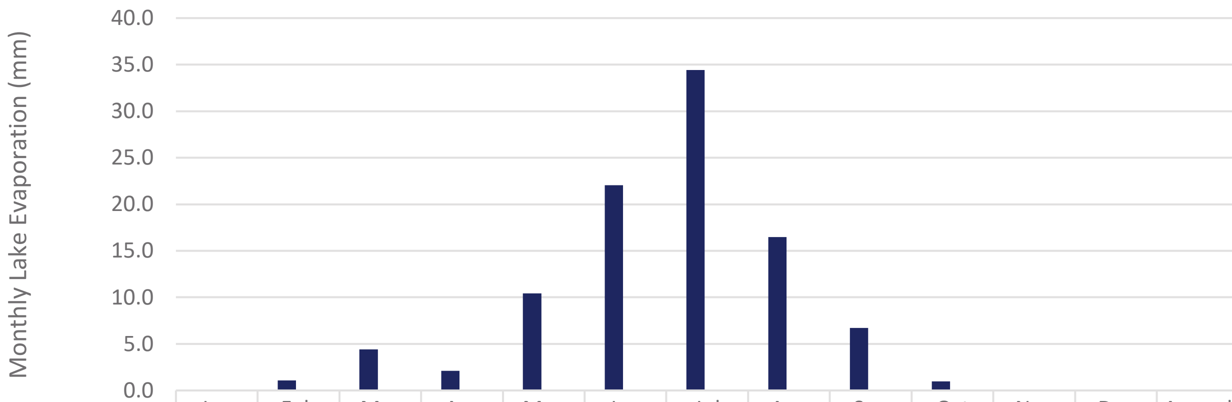
5.1.3 Evaporation

Evaporation and evapotranspiration are important hydrologic processes that influence the amount of runoff from a watershed. Several terms are commonly used to describe evaporation and evapotranspiration losses and for clarity these are defined below:

- Evaporation is the process by which water is changed from liquid to a vapour:
  - Potential evaporation is the maximum amount of water that can be evaporated from a surface (e.g., ground, vegetation) if surface moisture is not limited
  - Lake evaporation is the evaporation that occurs from a lake or pond surface and is lower than potential evaporation because blowing air has a cooling effect over a large lake surface
  - Potential evapotranspiration (PET) if the maximum quantity of water capable of being evaporated from the soil and transpired from the vegetation of a specified region in a given time interval under existing climatic conditions and without limiting available surface moisture

The lake evaporation is used in the water balance model to represent losses from pond surfaces.

Since the on-site meteorological climate station does not measure pan evaporation, monthly potential evapotranspiration (PET) for the Site was estimated using the Hargreaves-Samani (1982) method using daily minimum and maximum air temperatures and site latitude (with the day of the year) to approximate solar radiation. In the model, the lake evaporation was calculated using a correction factor of 0.90 from the calculated PET. The lake evaporation calculated for the site under the average climate year was 98,7 mm. Figure 9 shows the monthly distribution of the lake evaporation for the representative average year.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Year	0.0	1.1	4.4	2.1	10.4	22.1	34.4	16.5	6.7	1.0	0.0	0.0	98.7
Distribution	0.0%	1.1%	4.5%	2.1%	10.6%	22.3%	34.9%	16.7%	6.8%	1.0%	0.0%	0.0%	100.0%

Figure 9: Average monthly and annual total precipitation for the long-term record

The Hydrological Atlas of Canada (Natural Resources Canada 1978) provides annual lake evaporation iso-contours for the country from compilation of meteorological data from 1941 to 1970 and indicates that the Project site has an annual lake evaporation of approximately 0 to 100 mm. The calculated lake evaporation presented in Figure 9 is within the range provided by the Atlas of Canada.

5.2 Catchment Areas

In support of the water quality model, the water balance was setup to calculate flows generated over the following land types:

- Prepared ground (the treatment plant pad and WRF Pond wall)
- Unclassified waste rock (existing placed waste rock where survey is not available to differentiate PAG and non-AG materials)
- Non-AG waste rock
- PAG waste rock and
- Direct precipitation to the WRF Pond

The surface area of each land type changes with time based on the WRF waste rock deposition plan and expansion of the WRF ditch system. The catchment areas by land type were calculated based on surveys provided by Baffinland and are presented in Table 7. The treatment pad was assumed to be entirely on prepared ground. The distribution of waste rock was provided by Baffinland from May 31, 2020, to March 25, 2023 (Baffinland, 2023a). For dates before this range, the distribution of waste rock of the closest date was used. The expected waste rock deposition plan from June 2023 to June 2026 was provided by Baffinland (2023b) and was implemented into the water balance. The expected Non-AG and PAG areas were provided and the remaining land type distribution from June 2023 to 2026 assumed the total area remained the same and the pond and prepared ground surface areas remained the same from March 25, 2023.

Table 7: Catchment areas by land type

Date	Prepared Ground (m^2)	Pond Area (m^2)	Waste Rock (m^2)			Total (m^2)
			Unclassified	Non-AG	PAG	
2018-10-09	19,409	20,137	77,239	94,966	20,259	232,011
2019-09-13	14,581	20,137	79,177	97,349	20,768	232,011
2020-05-31	30,771	30,133	119,048	146,370	31,226	357,548
2020-09-30	30,771	30,133	116,504	147,832	32,308	357,548
2021-05-31	59,068	30,133	150,928	295,778	38,492	574,398
2021-09-30	59,068	30,133	156,698	285,077	43,422	574,398
2022-05-31	35,469	30,133	152,441	294,983	61,372	574,398
2022-09-30	35,469	30,133	172,835	276,731	59,230	574,398
2023-03-25	35,469	30,133	172,835	276,731	59,230	574,398
2023-06-01	35,469	30,133	262,671	221,564	24,561	574,398
2023-10-01	35,469	30,133	183,364	307,894	17,538	574,398
2024-06-01	35,469	30,133	175,321	316,377	17,098	574,398
2024-10-01	35,469	30,133	163,689	327,903	17,204	574,398
2025-06-01	35,469	30,133	163,662	323,163	21,971	574,398
2025-10-01	35,469	30,133	163,689	325,555	19,552	574,398
2026-06-01	35,469	30,133	163,689	325,572	19,535	574,398

5.3 WRF Pond

The WRF Pond is fully lined with a geomembrane, and therefore, the seepage losses are assumed to be zero.

The water level in the WRF Pond is controlled by the inflow from the upstream catchment, pumping from the Deposit 1 sump, and the discharge rate to the WTP. Treatment rate data provided from 2018 to 2022 indicates a maximum capacity of approximately 8,000 m^3/d for the WTP (Baffinland, 2023c).

Following completion of the WRF Pond raise (Golder, 2018a) in January 2020 the design WRF Pond operating parameters are defined as follows:

- Crest elevation of 579.7 masl
- Geomembrane elevation of 579.3 masl
- Emergency spillway invert elevation of 578.9 masl
- Maximum operating water level (MOWL) of 578.3 masl and
- Minimum operating water level of 574.0 masl (1 m of dead storage above lower point of pond floor)

The WRF Pond stage-storage curve is provided in Figure 10, and represents the as-built capacity following construction of the WRF Pond expansion and based on the survey topographic information provided by Baffinland (2023c).

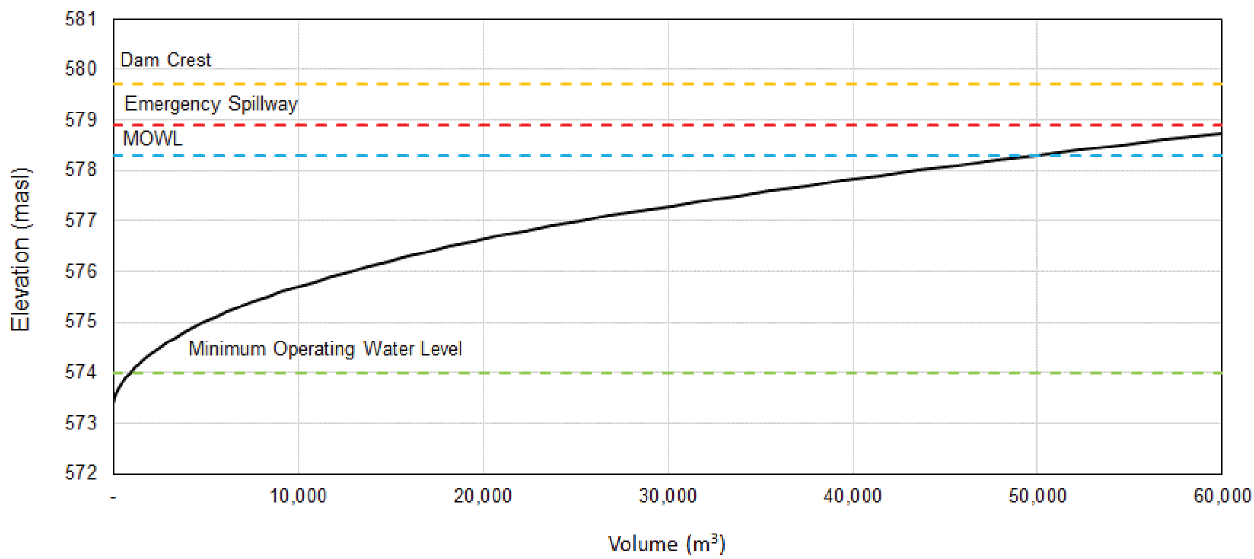


Figure 10: Stage-storage curve for the WRF Pond

Following completion of the WRF Pond expansion the design capacity at the MOWL is 50,000 m^3 and the capacity at spillway activation 65,000 m^3.

5.4 Runoff Model

Snow Runoff Model (SRM) is a semi-distributed-conceptual model designed to simulate daily streamflow that support snow cover and associated snowmelt processes on a seasonal basis. SRM has been successfully implemented in watersheds of varying size and elevation (Martinec et al. 2008).

SRM is considered computationally simple, given that the model has comparatively minimal data requirements. The primary input variables for the model are temperature, precipitation, and snow cover area. The model uses this information, along with several other input parameters (i.e., temperature lapse rate, runoff coefficient [for rain and snow], degree-day factor, recession coefficient, critical temperature, rainfall-contributing area, and lag time) to compute runoff and evaluate snow accumulation (Abudu et al. 2012).

Runoff is estimated through the SRM hydrology module for the following land types:

- Natural Ground: The natural land type category includes natural and undisturbed areas
- Prepared Ground: The prepared ground land cover includes hard-packed areas such as roads and plant site area
- Waste rock: Includes the unclassified, non-AG and PAG waste rock types. Additional considerations are included in the water balance to calculate toe seepage within the waste rock that contributes to the flow reporting to the WRF Pond

Snow accumulation (into snowpack) and snowmelt calculations are based on degree day methods. The snowmelt sub-module is developed based on the SRM by Rango and Martinec (2007). Within the SRM, for each modelled day, the water produced from snowmelt and rainfall is computed, superimposed on the calculated recession flow and transformed into daily discharge from the basin. The input parameters, such as recession factors (i.e., parameters associated with controlling the recession (falling limb) of the hydrograph) and runoff coefficients are derived from a combination of judgement and calibration exercises that are based on a comparison of observed and simulated discharges on the Water Survey of Canada regional station Marcil Creek (Figure 4).

For the WRF land type, there are three components determined in the water balance. These are the direct runoff which reports to the WRF pond, seepage which infiltrates into the waste rock and reports to the toe of the waste rock facility, and infiltration which is assumed to be a loss in the model (assumed zero as the WRF is lined). The amount of precipitation that converts into direct runoff and seepage is dependent on characteristics of the WRF such as the stockpile porosity and climate conditions (snow cover and temperature). The rate of interflow is dependent on stockpile infiltration, ground infiltration, evapotranspiration, storage potential (tied to porosity), and drawdown rate. These variables are estimated based on WSP’s experience with similar projects, and input from the Project’s technical team. During the winter (October to May), it was assumed that there was no infiltration into the waste rock and any precipitation is accumulated in a snowpack that is melted during the spring/summer months (June to September).

Considerations that factor into the choice of reference hydrometric station include: the period of available data, continuity of the data, the drainage area that reports to the station and geographic location of the station. Given the location of the Project site, there is minimal available hydrometric data within close proximity of the site and therefore the Water Survey of Canada regional hydrometric Marcil Creek (10UB001) station was chosen to calibrate the SRM natural runoff model. This is a station in Nunavut approximately 200 km northwest of the site. Of the other stations within a similar distance to the site, this station has one more year of flow data. The majority of the hydrometric stations in northern Canada are limited to flow data before 2000. The runoff coefficients and recession coefficients were adjusted until the observed and calculated flows were similar. The calculated monthly runoff coefficients for natural ground are presented in Table 8. The results of the natural ground calibration are presented in Figure 11.

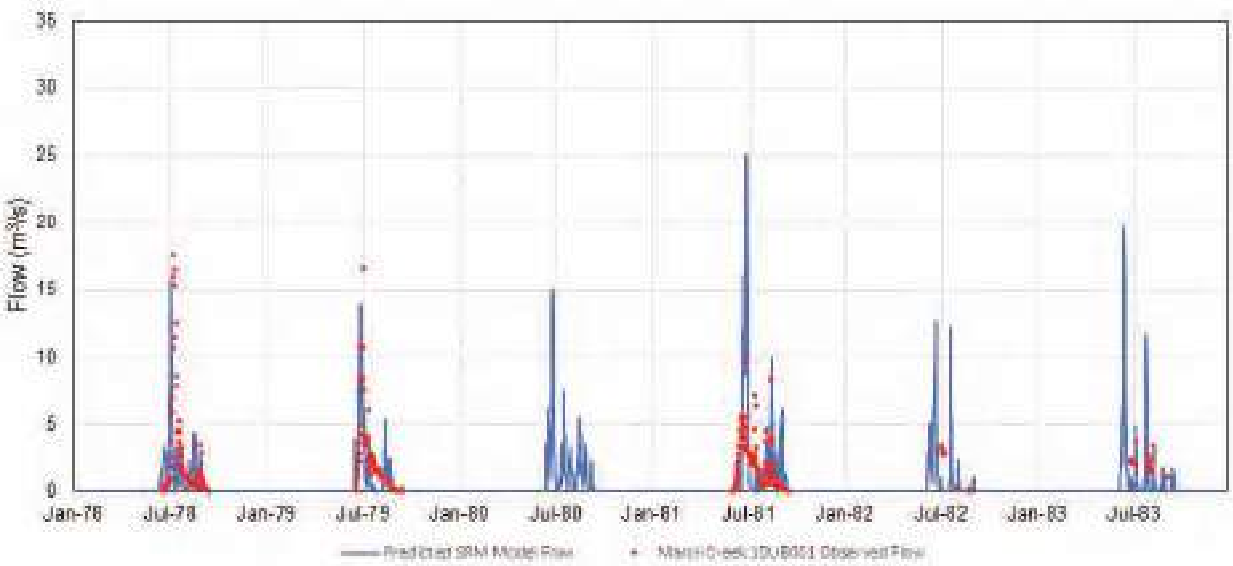


Figure 11: Water Balance SRM Natural Runoff Calibration to Marcil Creek hydrometric station

The runoff coefficients for each land type were assumed to vary depending on the time of year. For natural ground and waste rock, the runoff coefficients were assumed to be greater during the winter and for the prepared ground they were assumed to be constant throughout the year. The runoff coefficients for prepared ground and waste rock were adjusted during the calibration process described in Section 6.0 based on range of values from WSP Golder's experience with similar projects and input from the Project's technical team. Table 8 below provides a summary of the runoff coefficients used in the water balance.

Table 8: Summary of Water Balance Runoff Coefficients

Month	Natural Ground	Prepared Ground	Waste Rock
January	0.7	0.9	0.9
February	0.7	0.9	0.9
March	0.7	0.9	0.9
April	0.7	0.9	0.9
May	0.6	0.9	0.9
June	0.6	0.9	0.7
July	0.6	0.9	0.7
August	0.6	0.9	0.7
September	0.6	0.9	0.7
October	0.7	0.9	0.9
November	0.7	0.9	0.9
December	0.7	0.9	0.9

6.0 WATER BALANCE CALIBRATION

The water balance model was calibrated using the data collected from Baffinland between June 2020 until September 2022.

The calibration approach considered the following information:

- Daily precipitation from the Mary River site climate station
- Daily minimum and maximum temperature from the Mary River site climate station
- Daily lake evaporation was then calculated using the minimum and maximum daily temperatures from the Mary River site climate station and site latitude
- Monthly measured flows between the following facilities:
  - Pumping rate from Deposit 1 sump
  - Pumping rate from WRF Pond to WTP

The WRP Pond observed water levels recorded by Baffinland were used to adjust runoff coefficients for prepared ground and waste rock land types (Table 8) to match observed water levels. The simulated and observed WRF Pond water levels are shown in Figure 12.

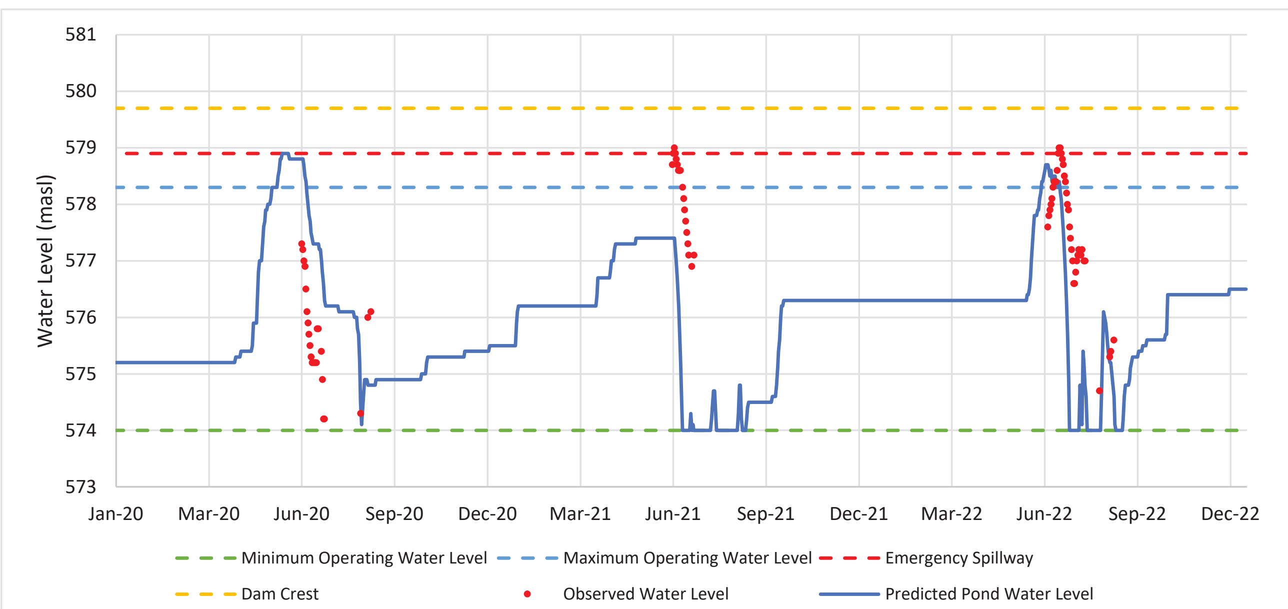


Figure 12: Predicted water balance water levels in WRF Pond (2020-2022)

For 2021, the predicted water levels are below the observed water levels. This is attributed to the Deposit 1 sump inflow reported by Baffinland by month instead of daily values. In the water balance a constant pumping rate was assumed for each month in 2021, therefore missing some of the peak inflows from the Deposit 1. For 2022, the water balance predicts water levels below the observed water levels during the summer with a similar trend.

7.0 MODEL LIMITATIONS

The water balance model prepared for this study carries assumptions and limitations that shall be taken into consideration during interpretation of results. Several limitations impact the results of the water balance and are listed below:

- The on-site meteorological station does not capture precipitation during the winter months and as such, the long-term dataset of precipitation was based on regional climate station data of different distances from the project site
- Historical hydrometric data of close proximity to the project site was limited. The dataset used for calibration of the natural runoff was from 1978 to 1983 based on available data approximately 200 km from the project site. Calibration to a more recent set of hydrometric data would require data from a local station

8.0 WATER BALANCE FUTURE RESULTS

The results from the water balance under the three climate scenarios considered (100-yr wet, average and 100-yr dry) are presented as monthly flows in Figure 13, Figure 14 and Figure 15, respectively.

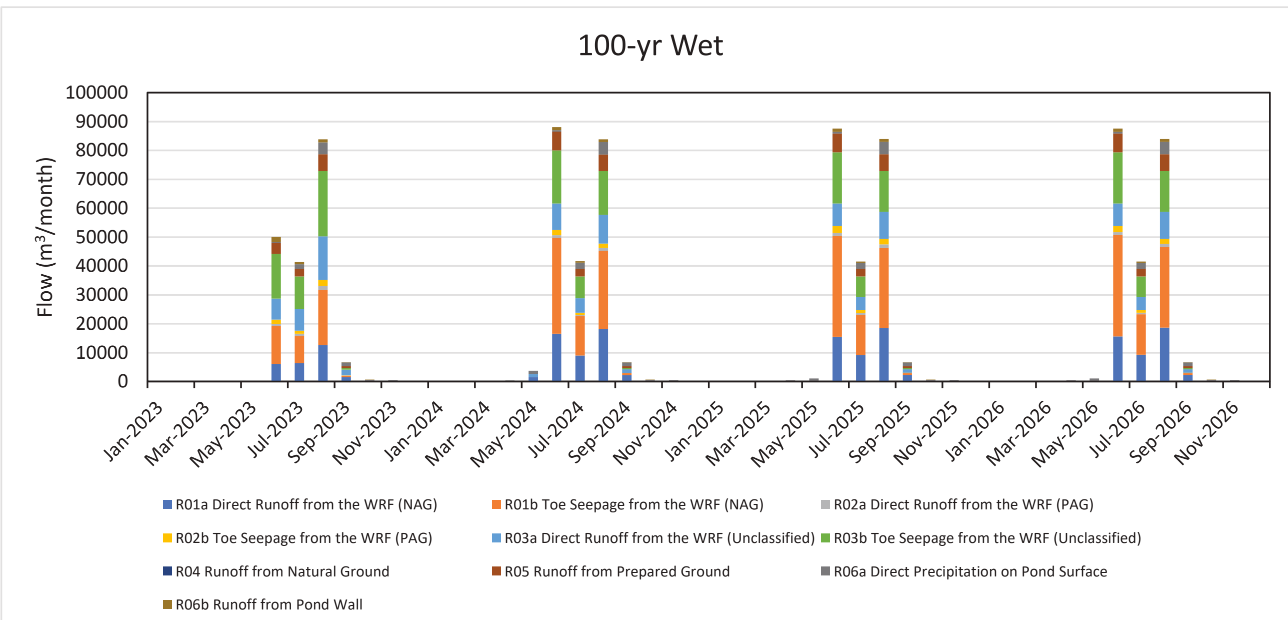


Figure 13: Monthly inflow to the WRF Pond by catchment type for the 100-yr wet scenario (2023 – 2026)

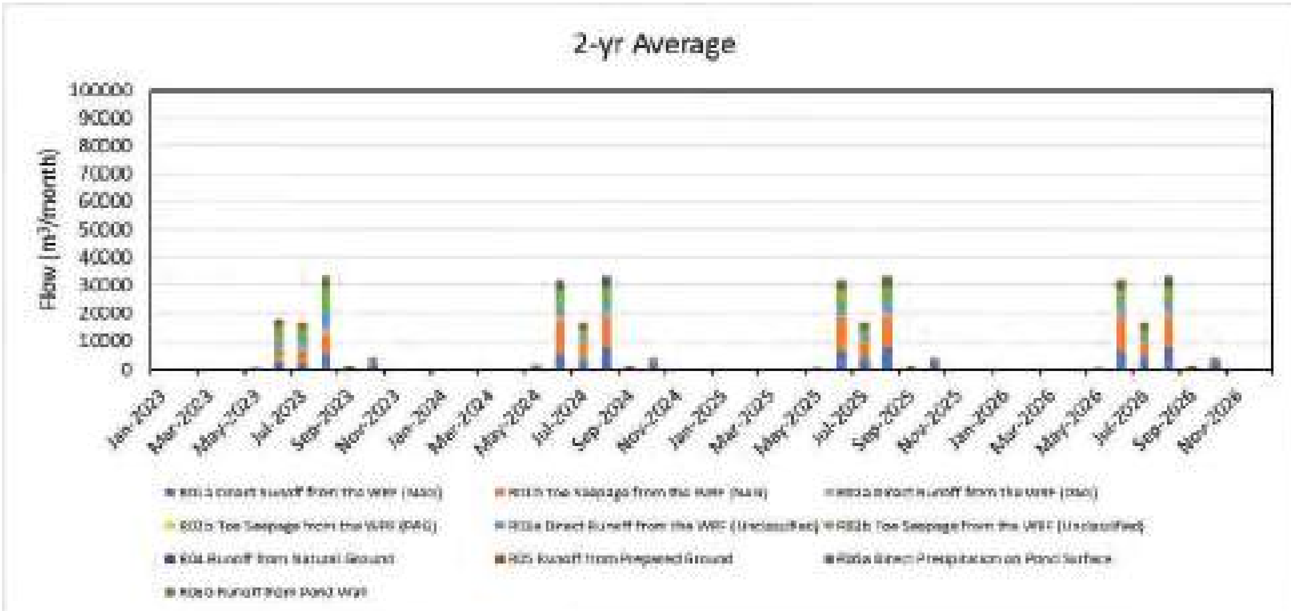


Figure 14: Monthly inflow to the WRF Pond by catchment type for the 2-yr average scenario (2023 – 2026)

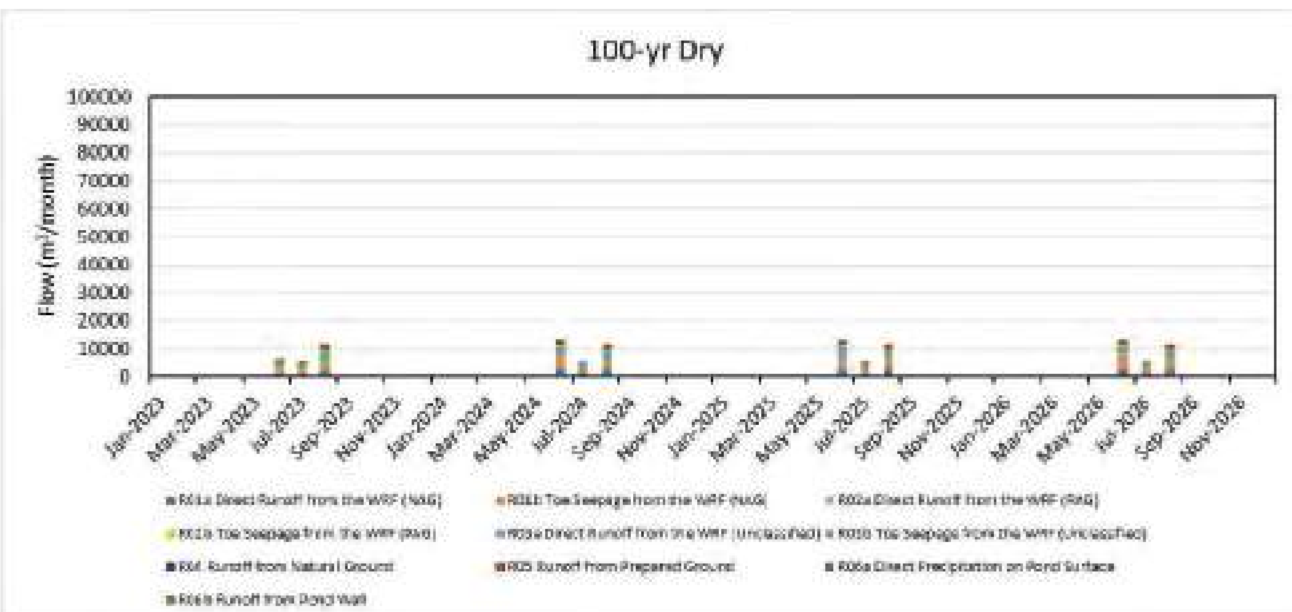


Figure 15: Monthly inflow to the WRF Pond by catchment type for the 100-yr dry scenario (2023 – 2026)

9.0 CONCLUSIONS AND RECOMMENDATIONS

Overall, the updated water balance model was able to capture general trends and patterns with the WRF pond given the predicted waste rock deposition plan for the short future. The results predicted flow patterns and magnitudes from 2023 to 2026 under different climate scenarios.

Recommendations for the future include the following:

- Continue collection of monitoring data from the WRF water management system
- Continue collection of climate data at the Mary River station
- Collection of hydrometric data (ex. Staff gauge) for the east and west ditches for development of ditch rating curves and
- Investigate methods for collecting snowfall and snowpack within the WRF pond catchment and then implement

10.0 CLOSURE

We trust that the information provided in this technical memorandum meets your present needs. Should you have any questions or require clarification, please do not hesitate to contact the undersigned.

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APPENDIX A4

2023 Water Quality Model Update, Waste Rock Facility Report

REPORT

2023 Water Quality Model Update, Waste Rock Facility

Baffinland Iron Mines Mary River Project

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December 18, 2023

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1.0 INTRODUCTION

Baffinland Iron Mines Corporation's (Baffinland) Mary River Project (the Site) is an operational iron mine on Baffin Island in Nunavut, Canada. Baffinland has retained WSP Canada Inc. (WSP) to assist with developing an updated Waste Rock Management Plan (WRMP) for deposition of Potential Acid Generating (PAG) and Non-AG waste rock currently being deposited in the Waste Rock Facility (WRF) at the Site. As part of this planning a mass balance water quality model was originally prepared in 2019 (Golder 2019a) to estimate water quality of WRF for the period of January 2020 – September 2021. This is the 2023 water quality model update report which covers the time period from 2023 through 2026.

The mitigation strategy defined for prevention of acid generation and metal leaching from the WRF centers around freezing of the PAG waste rock during winter, with deposition of additional rock in summer to keep the frozen rock isolated from the active zone, which is subject to seasonal freeze and thaw. The water quality model assumes that flow from the WRF only occurs via direct runoff or as shallow interflow within the waste rock active layer and that water infiltrating deeper into the WRF becomes frozen due to permafrost aggradation.

The objectives of the 2023 water quality model update are to:

- Identify key drivers (i.e., loadings) of WRF Pond chemistry. Note that water quality measurements at the WRF were also reviewed for potential metal leaching and acidity trends − these results are included in the geochemistry report (WSP 2023b);
- Forecast future WRF pond chemistry based on recent water balance model updates and mine planning information;
- Evaluate WRF pond chemistry estimates over time to support assessment regarding the requirement for continued water treatment; and
- Constrain uncertainty in model inputs using conservative assumptions and by performing sensitivity analyses.

The intention of the model is to assess the potential impact of the waste rock pile design on runoff water quality and inform any necessary modifications.

2.0 MODEL DEVELOPMENT

This 2023 water quality model update report includes discussion on the assumptions, inputs, and results with respect to the following model updates:

- Integration of the 2023 water balance update (WSP 2023a) and 2023 geochemistry waste rock investigation results (WSP 2023b). The reader is referred to these reports for a summary and discussion of the relevant water balance and geochemistry details;
- Updated catchment areas and land type proportions as provided by Baffinland and estimated from survey; and
- Update of the waste rock material balance to reflect the 2023 through 2026 Waste Rock Depositional Plan for the Project (BIM 2023a; BIM 2023b).

The current model as presented is not intended to predict overall final WRF closure.

2.1 Conceptual Model

The water quality model was developed using a mass-balance in GoldSim (Version 14.0) to estimate the concentrations and transport of chemical species as a function of time at the WRF. GoldSim is a graphical, object-oriented mathematical code where all input components and functions are defined by the user and are built as individual objects or elements linked together by mathematical expressions. The generalized mass balance equations are:

$$C_{A+B\,i} = \frac{(C_{A\,i} \times Q_A + C_{B\,i} \times Q_B)}{(Q_A + Q_B)} \quad \text{[Equation 1]}$$

Where:

C_{Ai} and C_{Bi} are the concentrations of chemical species *i* in waters A and B, respectively; and

Q_A and Q_B are the flow rates or volumes of water in waters A and B, respectively; $C_{A+B\,i}$ is the concentration of chemical species *i* in the mixed body of waters A and B.

$$\sum (\text{Mass Loading In})_i - \sum (\text{Mass Loading out})_i = \Delta C_i \times V \quad \text{[Equation 2]}$$

Where:

ΔC_i is the change in concentration of chemical species *i* in a body of water; V is the volume of the body of water

$\sum$(Mass Loading In)$_i$ and $\sum$(Mass Loading out)$_i$ are the sum of masses of chemical species *i* added to, and removed from, the body of water, respectively.

Within the Goldsim platform, the water quality model is integrated into the 2023 water balance model for the site (WSP 2023a), such that flows and chemical loadings entering and leaving the following site components are represented:

- Waste rock stockpile (referred to as the WRF);
- Perimeter ditch system around the WRF;
- WRF Pond; and
- Inflow from Deposit 1 Sump to the WRF Pond.

Loadings assumed to report to the WRF Pond in the model are:

- Non-AG waste rock seepage and runoff;
- PAG waste rock seepage and runoff;
- Unclassified waste rock (existing placed waste rock where survey is not available to differentiate PAG and non-AG materials), subdivided as non-AG and PAG based on the overall relative proportions of non-AG and PAG rock removed from the deposit as identified in WSP 2023a;
- Inflow from Deposit 1 Sump to the WRF;
- Natural ground within the boundary of the WRF perimeter ditching; and
- Prepared ground from the WTP pad.

Figure 1 presents a flow schematic of the contact flows integrated into the water model that are assumed to report to the WRF. The surface water quality of WRF Pond over time is the primary output from the water quality model and, conceptually, will vary overtime as:

- Surface area of each land type changes based on the WRF waste rock deposition plan and expansion of the WRF ditch system; and
- Relative proportions of non-AG versus PAG material deposited in the WRF change.

2.2 Data Inputs and Assumptions

2.2.1 General Inputs and Assumptions

Water quality model results are dependent on several inputs, including meteorological conditions, availability of contact water quality and site hydrological data, as well as mine development planning. Where uncertainty exists, professional knowledge and experience was used to develop a conservative approach, or a sensitivity analyse was completed (Section 2.3 for model cases).

The general properties and assumptions for the 2023 water quality model are:

- The model is a deterministic mass balance modelling that is conducted on a daily time-step;
- A concentration-based approach was used with total concentrations assigned as source terms (inputs) to the water quality model;
- For source term derivation from water quality monitoring results, the reported detection limit was employed for source terms if a chemical species was below the detection limit of the applied analytical method;
- Initial condition of the WRF pond is equivalent to 75th percentile concentrations for water quality parameters of the east and west ditch inflows;
- Project operational and engineering components turn on and off instantaneously;
- Precipitation and evaporation are assumed to be neutral inputs and outputs with no associated geochemical loads; and
- Surface water quality parameters behave conservatively and are not reduced by mechanisms such as secondary mineral formation, attenuation through sorption process, or biogeochemical reactions (e.g., assimilation, biodegradation).
- Modelled parameters are: concentration of metals (mg/L: aluminium, antinomy, arsenic, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, silver, uranium, vanadium, zinc) and concentration of ions (mg/L: sulphate, calcium, magnesium, sodium, potassium).

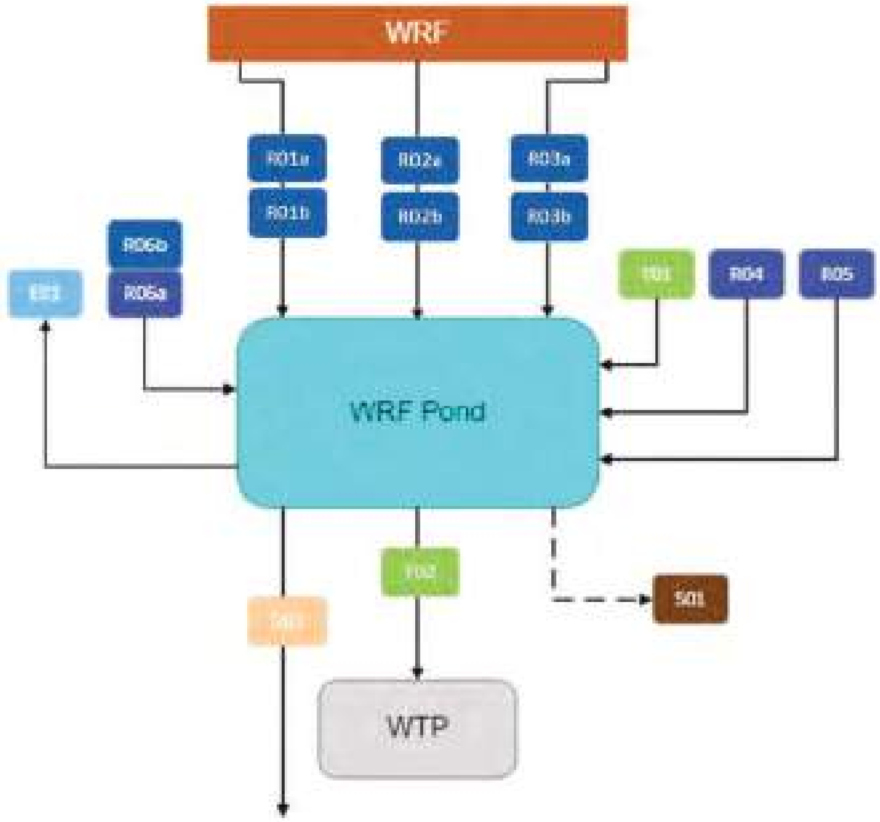
2.2.2 Source Loading Areas

In support of the water quality model, the water balance model (2023a) established the following discrete source loading areas at the WRF:

- Natural ground;
- Prepared ground (the treatment plant pad and WRF Pond wall);
- Unclassified waste rock (existing placed waste rock where survey is not available to differentiate PAG and non-AG materials);

- Non-AG waste rock;
- PAG waste rock; and
- Direct precipitation to the WRF Pond.

The surface area of each “loading area type” changes with time based on the WRF waste rock deposition plan and expansion of the WRF ditch system. The catchment areas by loading area type were calculated based on surveys provided by Baffinland and are presented in Table 1. The treatment pad was assumed to be entirely on prepared ground. The distribution of waste rock was provided by Baffinland from May 31, 2020, to March 25, 2023 (Baffinland, 2023a). For dates before this range, the distribution of waste rock of the closest date was used. The expected waste rock deposition plan from June 2023 to June 2026 was provided by Baffinland (2023b) and was implemented into the model. The expected non-AG and PAG areas were provided and the remaining land type distribution from June 2023 to 2026 assumed the total area remained the same and the pond and prepared ground surface areas remained the same from March 25, 2023.



Flow ID	Description
R01a	Runoff from Non-AG waste rock
R01b	Toe seepage from Non-AG waste rock
R02a	Runoff from PAG waste rock
R02b	Toe seepage from PAG waste rock
R03a	Runoff from unclassified waste rock
R03b	Toe seepage from unclassified waste rock
R04	Runoff from natural ground
R05	Runoff from prepared ground
R06a	Direct precipitation on WRF Pond
R06b	Runoff from WRF Pond wall
T01	Deposit 1 Sump inflow
T02	Total outflow from the WRF Pond to the WTP
E01	Evaporation from the WRF Pond surface
S01	Seepage and interflow losses from the WRF Pond
D01	Overflow from the WRF Pond via Emergency Spillway

Figure 1: Conceptual Schematic of Flows reporting to the WRF Pond

Table 1: Source Loading Areas (Catchment Areas) at the WSF

Date	Natural Ground (m^2)	Prepared Ground (m^2)	Pond Area (m^2)	Waste Rock (m^2)			Total (m^2)
				Unclassified	Non-AG	PAG	
2018-10-09	-	19,409	20,137	77,239	94,966	20,259	232,011
2019-09-13	-	14,581	20,137	79,177	97,349	20,768	232,011
2020-05-31	-	30,771	30,133	119,048	146,370	31,226	357,548
2020-09-30	-	30,771	30,133	116,504	147,832	32,308	357,548
2021-05-31	-	59,068	30,133	150,928	295,778	38,492	574,398
2021-09-30	-	59,068	30,133	156,698	285,077	43,422	574,398
2022-05-31	-	35,469	30,133	152,441	294,983	61,372	574,398
2022-09-30	-	35,469	30,133	172,835	276,731	59,230	574,398
2023-03-25	-	35,469	30,133	172,835	276,731	59,230	574,398
2023-06-01	-	35,469	30,133	262,671	221,564	24,561	574,398
2023-10-01	-	35,469	30,133	183,364	307,894	17,538	574,398
2024-06-01	-	35,469	30,133	175,321	316,377	17,098	574,398
2024-10-01	-	35,469	30,133	163,689	327,903	17,204	574,398
2025-06-01	-	35,469	30,133	163,662	323,163	21,971	574,398
2025-10-01	-	35,469	30,133	163,689	325,555	19,552	574,398
2026-06-01	-	35,469	30,133	163,689	325,572	19,535	574,398

Notes:

Non-AG: Not potentially acid generating

PAG: Potentially Acid Generating

WRF: Waste Rock Facility

2.2.3 Source Terms

In support of the water quality model, source terms values in mg/L were developed for parameters for each discrete source loading area. Source terms were developed through a review of geochemical data and site water quality observations as provided in WSP 2023. Data inputs to the water quality model are summarized in Table 2 and presented in Appendix A (Table A1). The data set from which the values are derived includes 459 water quality measurements collected between 2018 and 2022 located in collection ditches and runoff locations in the vicinity of the WRF (Appendix C of WSP 2023b). Influencing factors and rationale for each source term are as follows:

- The pH is based on the pH observed in the relevant on-site water quality measurements. Values of pH less than 4.5 were ascribed to PAG rock whereas values greater than 6.5 were ascribed to non-AG material.
- Runoff and Seepage from Non-AG Waste Rock – Non-AG waste rock runoff and seepage was assumed to be represented by observed site concentrations where pH was greater than 6.5. Expected conditions (Non-AG Expected) were based on the median values on a parameters by parameter basis, whereas upper bound conservative case (Non-AG Upper Bound) values were based on the 95th percentile values on a parameter by parameter basis.

- Runoff and Seepage from PAG Waste Rock – PAG waste rock runoff and seepage was assumed to be represented by observed site concentrations where pH was less than 4.5. Expected conditions (PAG (Acidic) Expected) were based on the median values on a parameters by parameter basis. There was insufficient data to develop a 95th percentile value so an average concentration was used on a parameter by parameter basis to represent the upper bound conservative case (PAG (Acidic) Upper bound). This is considered conservative for key parameters as the values are skewed upward substantially by the presence of a few samples with very high concentrations.
- Runoff and seepage from unclassified waste rock – for the rock where information on classification was unavailable the rock was subdivided based on the overall geochemical proportions observed in the remainder of the pile and assigned as Non-AG (Expected or Upper Bound) water quality or PAG (Acidic) (Expected or Upper bound) water quality based on the relative proportion of rock observed and model scenario.
- Inflow from Deposit 1 sump – in 2019 and at other times during the mine life in 2020 and 2021 as defined in WSP 2023a flow was pumped from the sump at the base of the open pit into the East ditch. Water quality entering from the sump was best represented by the average concentration for nine sampling events from the East Ditch that occurred in 2020 where sump water was the dominant source of water in the East Ditch. The values were kept constant during the sensitivity analyses / conservative cases.
- Runoff from prepared ground – inflow from prepared ground was assigned water quality based on the average concentrations from eleven (11) data points from the inflow location MS-08 before the sump inflow to east ditch was applied. The values were kept constant during the sensitivity analyses / conservative cases.
- Runoff from natural ground – inflow from upstream natural ground was assigned water quality based on the average concentrations from three data points from the upstream sampling location WRP-S71. The values were kept constant during the sensitivity analyses / conservative cases.
- Initial WRF pond chemistry – is defined as the 75 percentile concentrations for water quality parameters from East and West inflows to the pond as observed in 2019.

Table 2: 2023 Water Quality Model Source Terms for Key Parameters

Source Loading Area/Site Feature	Description	Expected Case	Conservative Case
Runoff and seepage from Non-AG waste rock		▪ pH (6.6 to 7.4) ▪ Copper (0.005 mg/L) ▪ Nickel (0.0221 mg/L) ▪ Sulphate (832 mg/L)	▪ pH (6.6 to 7.4) ▪ Copper (0.030 mg/L) ▪ Nickel (0.160 mg/L) ▪ Sulphate (3032 mg/L)
Runoff and seepage from PAG waste rock		▪ pH (4.0 to 4.2) ▪ Copper (0.172 mg/L) ▪ Nickel (1.33 mg/L) ▪ Sulphate (5433 mg/L)	▪ pH (4.0 to 4.2) ▪ Copper (0.262 mg/L) ▪ Nickel (4.78 mg/L) ▪ Sulphate (14,805 mg/L)
Runoff and seepage from unclassified waste rock[2]	Non-AG and PAG not specified in survey information subdivided based on geochemical proportions of the overall pile	▪ Calculated by Model ▪ Split between non-AG and PAG values of Expected Case	▪ Calculated by Model ▪ Split between non-AG and PAG values of Conservative Case
Inflow from Deposit 1 sump	Corresponds to the average of 9 data points for East ditch in 2019 while sump water inflowing	▪ pH (7.6 to 8.0) ▪ Copper (0.004 mg/L) ▪ Nickel (0.022 mg/L) ▪ Zinc (0.021 mg/L)	▪ pH (7.6 to 8.0) ▪ Copper (0.015 mg/L) ▪ Nickel (0.022 mg/L) ▪ Sulphate (0.021 mg/L)

Source Loading Area/Site Feature	Description	Expected Case	Conservative Case
Runoff from prepared ground	All (11) data points of East ditch from 2019 before sump inflow	▪ pH (6.1 to 8.1) ▪ Copper (0.015 mg/L) ▪ Nickel (0.11 mg/L) ▪ Zinc (0.036 mg/L)	▪ pH (6.1 to 8.1) ▪ Copper (0.015 mg/L) ▪ Nickel (0.11 mg/L) ▪ Zinc (0.036 mg/L)

Notes:

[1-]To support summarization here, inputs provided for only key parameters only. Input values for all site features are provided in Appendix A.

[2-]Loading from unclassified rock is calculated as proportional to the Non-AG and PAG rock as per the Waste Deposition Plan.

Inputs for initial pond chemistry and runoff from natural ground provided in Appendix A.

Non-AG: Not potentially acid generating

PAG: Potentially Acid Generating

WRF: Waste Rock Facility

2.3 Model Cases

Surface water quality estimates were generated for the Expected Case based on the following conditions:

- Average year hydrological conditions (WSP 2023a);
- Expected Case source terms (Table 2, Appendix A);
- The proportion of PAG and non-AG classified rock changes as per the mine planning information provided by Baffinland;
- Geochemistry of the exposed waste rock will be consistent with existing conditions at site over the modelled timeframe; and
- Unclassified WRF materials were assigned PAG or non-AG source term on percentages of the overall WRF, as per the mine planning information provided by Baffinland.

In addition to the Expected Case, the following sensitivity cases were performed, as follows:

- **Misclassification of Non-AG, 0.5%**: Assume that 0.5 % of all Non-AG material is misclassified, and provides mass loading as if it were PAG material.
- **Misclassification of Non-AG, 5.0%**: Assume that 5.0 % of all Non-AG material is misclassified, and provides mass loading as if it were PAG material.
- **Conservative Loading**: Uses upper bound source terms for PAG and Non-AG rock (Table 2 Conservative Case, Appendix A). In this instance all exposed PAG rock is assumed to be actively producing acidic leachate with pH <4.5 and elevated metal loadings relative to median concentrations.

3.0 RESULTS

The water quality of the WRF Pond is the primary output from the water quality model; WRF pond quality for Expected Case and the three sensitivity cases are presented in Tables 3 through 6. Water quality results are benchmarked against effluent criteria prescribed by the Metal and Diamond Mine Effluent Regulations (MDMER; July 2021). While the values meet MDMER requirements for the WRF pond, prior to discharge to the environment requires the effluent to pass acute toxicity testing and would require downstream assessment which is not included in this evaluation.

Key results from the model are:

- Predicted water quality concentrations are within the range of observed field values during the summer month predictions.
- During the winter month water would not be released and predicted values are generally less relevant due to changes in the water balance brought about by freezing conditions.
- The most important overall mass load (in mg/s) to the Pond on a percent basis is sourced from Non-AG rock based solely on the larger proportion of the Non-AG material in the WRF.
- The range of pH of the materials is assigned based on observed site conditions, considering the available neutralization potential and acidification potential of the relevant rock component blends (WSP, 2023b). The pH in the Expected Case ranges from 6.6 to 7.4 whereas in the conservative case a lower pH range of 4.5 to 6.5 is more likely. The actual pH values will vary substantially based on mitigation practices and site conditions, in particular mitigation measures in place to segregate and freeze the PAG rock and soluble sulphate minerals.
- Nickel is the most relevant parameter with respect to potential for exceedance of MDMER, however remains below the MDMER (2021) value of 0.25 mg/L for expected condition, with an expected median value of 0.1 mg/L.
- In general, WRF chemistry improves as a function of the proportion of available Non-AG rock, thus as the proportion of non-AG rock increases over time the water quality improves.
- Assuming up to 5% of material is misclassified as Non-AG rock when it is actually PAG rock (all other conditions remaining as expected) results in increase in nickel concentration from 0.1 mg/L to a median predicted Nickel value of 0.14 mg/L which is still below the MDMER guideline values.
- Nickel is the limiting parameter with respect to MDMER exceedances, with the next-most important/driving parameter being Copper. The conservative loading case is the only sensitivity analysis that exceeds the more recent 2021 MDMER guideline value of 0.25 mg/L nickel, with a the median nickel concentration of 0.4 mg/L. The current operational MDMER value of 0.5 mg/L nickel is only exceeded for brief periods of time under this conservative scenario.
- Results indicate that the model is sensitive to the acidity and elevated metals that resulting from PAG materials, should strongly acidic conditions develop in all of the exposed PAG materials (not currently observed ore expected under current mitigation practices). Under those acidic conditions for all PAG materials, then the MDMER criteria for nickel will be exceeded, with a predicted median nickel concentration of 0.4 mg/L and treatment would likely be required.
- The model results suggest additional consideration should be given to parameters sulphate, beryllium, cadmium, cobalt and copper. These parameters could occur at levels that require additional review within the context of the assimilative capacity of the environment, and/or to confirm no acute toxicity occurs as may be required under MDMER, prior to untreated environmental release to a water body.

Figure 2 provides an example of the results over time for key parameters sulphate and nickel for the expected case scenario. Appendix B includes additional graphical results for additional parameters and for the sensitivity analyses. In general the results for each of the sensitivity analyses follow the same trends as those provided in Figure 2, with the trends being primarily driven by hydrology (assumed the same between the mass loading scenarios). The differences in the sensitivity analysis results are only evident for predictions beyond 2023 when the conditions in the WRF differ based on selected mass loading conditions in the pile (e.g. different proportion of Non-AG to PAG, or different source term concentrations). Tables 4 and 5 show that additional PAG materials in the Non-AG areas of the pile will result in increasing concentrations in the WRF Pond. Table 6 shows that should the PAG materials all release strongly acidic water there would be a large influence on observed results. The conditions as presented in Table 6 are currently mitigated through management practices.

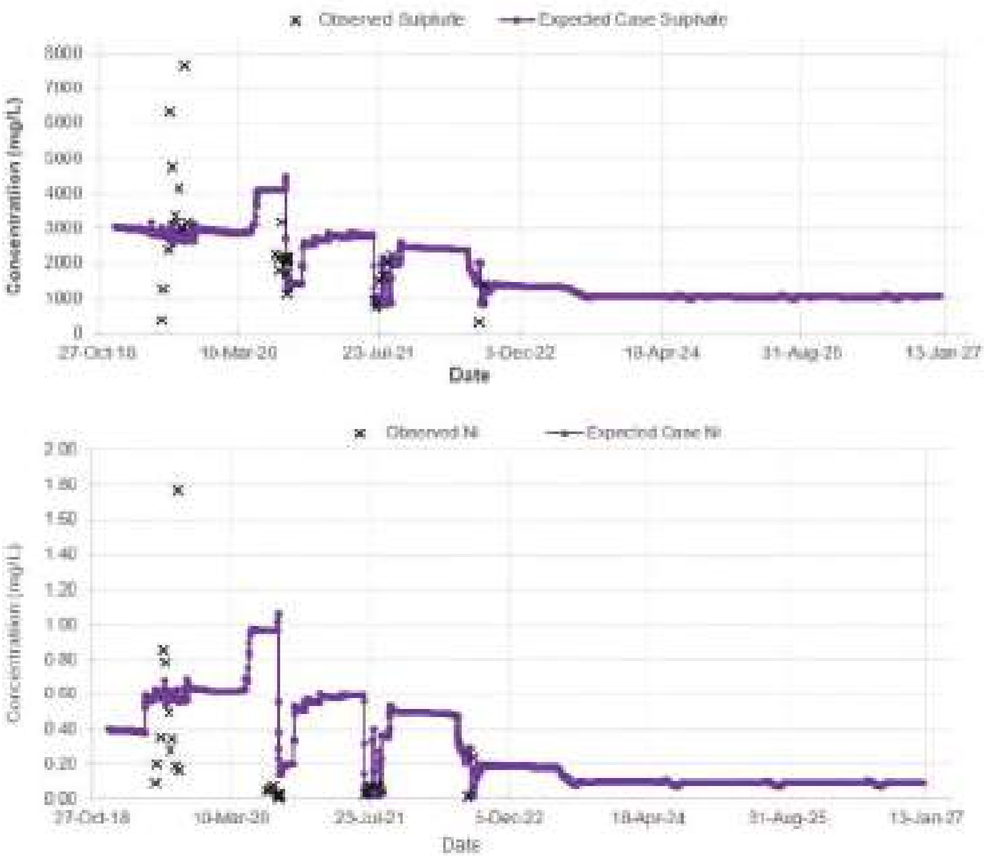


Figure 2: WRF Pond - Time Series Model Results for Sulphate and Nickel - Expected Case

Table 3: Expected Case Concentrations in WRF Pond, 2023 through 2026 Period

Parameter	MDMER [1]	25th	Median	75th	95th
pH		Range from pH 6.6 to 7.4			
Sulphate		1050	1050	1060	1340
Ag		0.000676	0.000681	0.000696	0.001
Al		1.45	1.46	1.52	2.50
As	0.1	0.00137	0.00138	0.00141	0.00201
B		0.137	0.138	0.141	0.200
Ba		0.0322	0.0325	0.0331	0.035
Be		0.00136	0.00137	0.0014	0.002
Ca		75.5	76.4	78.0	84.5
Cd		0.000131	0.000132	0.000136	0.000228
Co		0.0952	0.0963	0.0999	0.184
Cr		0.00721	0.00726	0.00744	0.0107
Cu	0.1	0.0141	0.0142	0.0147	0.0254
Fe		10.7	10.9	11.3	21.6
Hg		3.2E-06	3.23E-06	3.32E-06	4.16E-06
K		6.16	6.20	6.27	6.50
Mg		226	228	230	289
Mn		5.54	5.59	5.77	9.84
Mo		0.00236	0.00238	0.00241	0.00246
Na		4.53	4.57	4.66	4.98
Ni	0.25	0.0961	0.0971	0.101	0.183
P		0.679	0.684	0.699	1.00
Pb	0.08	0.000853	0.000859	0.000885	0.00128
S		349	352	355	447
Sb		0.00136	0.00137	0.0014	0.002
Se		0.00437	0.00439	0.00444	0.00484
Si		3.44	3.46	3.51	4.15
Sn		0.00136	0.00137	0.0014	0.002
Tl		0.000139	0.00014	0.000143	0.000203
U		0.00648	0.00661	0.0068	0.00791
V		0.00697	0.00703	0.00718	0.0103
Zn	0.1	0.0412	0.0415	0.0424	0.0607

Notes

pH is unitless, all other units are mg/L

1 MDMER: Metal and Diamond Mine Effluent Regulations for Maximum Authorized Monthly Mean Concentration

Table 4: Misclassification of PAG as Non-AG (+ 0.5%), Concentrations in WRF Pond, 2023 through 2026 Period

Parameter	MDMER [1]	25th	Median	75th	95th
pH		Range from pH 6.6 to 7.4			
Sulphate		1060	1070	1080	1340
Ag		0.000689	0.000695	0.000709	0.001
Al		1.48	1.50	1.56	2.50
As	0.1	0.00139	0.0014	0.00143	0.00201
B		0.140	0.141	0.144	0.200
Ba		0.0322	0.0324	0.033	0.035
Be		0.00138	0.0014	0.00142	0.002
Ca		75.7	76.5	78.2	84.7
Cd		0.000135	0.000136	0.000141	0.000228
Co		0.0991	0.1	0.104	0.184
Cr		0.00734	0.0074	0.00757	0.0107
Cu	0.1	0.0146	0.0147	0.0152	0.0254
Fe		11.2	11.3	11.8	21.6
Hg		3.2E-06	3.23E-06	3.32E-06	4.16E-06
K		6.16	6.20	6.28	6.50
Mg		229	230	233	289
Mn		5.73	5.78	5.96	9.84
Mo		0.00236	0.00238	0.00242	0.00246
Na		4.53	4.57	4.66	4.98
Ni	0.25	0.0999	0.101	0.105	0.183
P		0.692	0.698	0.712	1.00
Pb	0.08	0.000866	0.000872	0.000898	0.00128
S		354	356	360	447
Sb		0.00138	0.0014	0.00142	0.002
Se		0.00439	0.00442	0.00446	0.00484
Si		3.46	3.48	3.53	4.15
Sn		0.00138	0.0014	0.00142	0.002
Tl		0.000142	0.000143	0.000146	0.000203
U		0.00652	0.00665	0.00683	0.00794
V		0.0071	0.00716	0.00731	0.0103
Zn	0.1	0.042	0.0423	0.0432	0.0607

Notes

all units are mg/L

1 MDMER: Metal and Diamond Mine Effluent Regulations for Maximum Authorized Monthly Mean Concentration

Using expected case assumes that an additional 0.5% of Non-AG rock is misclassified and is assigned PAG rock mass loading properties

Table 5: Misclassification of PAG (+ 5.0%), Concentrations in WRF Pond, 2023 through 2026 Period

Parameter	MDMER [1]	25th	Median	75th	95th
pH		Range from pH 6.6 to 7.4			
Sulphate		1180	1190	1200	1340
Ag		0.000807	0.000814	0.000829	0.001
Al		1.82	1.84	1.9	2.5
As	0.1	0.00163	0.00164	0.00167	0.00201
B		0.164	0.165	0.168	0.200
Ba		0.032	0.032	0.033	0.035
Be		0.002	0.002	0.002	0.002
Ca		77.0	77.8	79.4	85.7
Cd		0.0002	0.0002	0.0002	0.0002
Co		0.134	0.136	0.14	0.184
Cr		0.00852	0.0086	0.00878	0.0107
Cu	0.1 (0.3)	0.019	0.0192	0.0197	0.0254
Fe		15.4	15.6	16.1	21.6
Hg		3.2E-06	3.23E-06	3.32E-06	4.16E-06
K		6.2	6.2	6.3	6.5
Mg		254	256	258	289
Mn		7.43	7.5	7.69	9.84
Mo		0.00243	0.00244	0.00248	0.00252
Na		4.55	4.59	4.68	5.00
Ni	0.25	0.134	0.136	0.139	0.183
P		0.81	0.818	0.832	1.00
Pb	0.08	0.000984	0.000992	0.00102	0.00128
S		394	397	401	447
Sb		0.00162	0.00164	0.00166	0.002
Se		0.00459	0.00461	0.00466	0.00485
Si		3.64	3.66	3.71	4.15
Sn		0.00162	0.00164	0.00166	0.002
Tl		0.000165	0.000167	0.00017	0.000203
U		0.00687	0.007	0.00718	0.0082
V		0.00828	0.00835	0.00852	0.0103
Zn	0.1 (0.5)	0.049	0.0495	0.0504	0.0607

Notes

all units are mg/L

1 MDMER: Metal and Diamond Mine Effluent Regulations for Maximum Authorized Monthly Mean Concentration

Using expected case assumes that an additional 5% of Non-AG rock is misclassified and is assigned PAG rock mass loading properties

Table 6: Conservative Loading Case, Concentrations in WRF Pond, 2023 through 2026 Period

Parameter	MDMER 1	25th	Median	75th	95th
pH		Range from pH 4.5 to 6.5			
Suphate		2830	2860	2930	4010
Ag		0.000835	0.000843	0.000865	0.00135
Al		9.85	9.96	10.3	14.1
As	0.1	0.00251	0.00253	0.0026	0.00376
B		0.169	0.171	0.175	0.271
Ba		0.072	0.072	0.073	0.078
Be		0.002	0.002	0.002	0.003
Ca		160.0	162.0	163.0	173.0
Cd		0.0004	0.0004	0.0004	0.0007
Co		0.29	0.294	0.305	0.556
Cr		0.0301	0.0304	0.0312	0.0403
Cu	0.1	0.0337	0.034	0.0351	0.0539
Fe		54.2	54.9	57	104
Hg		3.2E-06	3.23E-06	3.32E-06	4.16E-06
K		11.2	11.3	11.4	12.3
Mg		610	616	630	860
Mn		17.8	18	18.7	31.5
Mo		0.00928	0.00937	0.00954	0.011
Na		9.27	9.33	9.42	10.1
Ni	0.25	0.361	0.365	0.379	0.687
P		0.839	0.846	0.868	1.35
Pb	0.08	0.00613	0.00619	0.00636	0.00789
S		946	955	977	1340
Sb		0.00168	0.00169	0.00174	0.00271
Se		0.00996	0.01	0.0102	0.0122
Si		14.2	14.3	14.7	17.7
Sn		0.00168	0.00169	0.00174	0.00271
Tl		0.00025	0.000252	0.000259	0.000378
U		0.0157	0.0158	0.0159	0.0181
V		0.0179	0.0181	0.0185	0.0252
Zn	0.1	0.0672	0.0678	0.0697	0.108

Notes

all units are mg/L

1 MDMER: Metal and Diamond Mine Effluent Regulations for Maximum Authorized Monthly Mean Concentration

The Conservative loading case assumes that all PAG rock mass is not internally buffered and releases low pH waters with elevated metal concentrations.

4.0 CONCLUSIONS

The purpose of the model is to forecast future WRF pond chemistry for the time period 2023 through 2026 based on recent water balance model updates, geochemical source term updates and mine planning information. This 2023 water quality model update report includes discussion on the assumptions, inputs, and results related to integration of the 2023 water balance update (WSP 2023a) and 2023 geochemistry waste rock investigation results (WSP 2023b).

The mitigation strategy defined for prevention of acid generation and metal leaching from the pile is predicated on freezing of the PAG waste rock during winter, with deposition of additional rock in summer to keep the frozen rock isolated from the active zone, which is subject to seasonal freeze and thaw. The water quality model assumes that flow from the WRF only occurs via direct runoff or as shallow interflow within the waste rock active layer. Water that infiltrates the WRF will become frozen due to permafrost aggradation and no deeper seepage occurs. Updated catchment areas and land type proportions as provided by Baffinland and estimated from survey were included as was an update of the waste rock material balance to reflect the 2023 through 2026 Depositional Plan for the Project.

The conclusions based on the 2023 water quality model update are:

- Key drivers of WRF Pond chemistry are the quantity and quality of the runoff and seepage of the WRF, particularly the acidity and metal loading. Nickel concentration is a key driver with respect to MDMER potential for exceedance and requirement for treatment prior to discharge.
- The WRF pond chemistry was evaluated as a function of expected non-AG vs PAG material placement over time and indicates that the requirement to treat to meet MDMER guideline values diminishes with the reduction in the amount of PAG materials available to react or provide source term loading in the pile. The required reductions in availability of PAG materials are expected to be achievable through ongoing mitigation efforts that primarily involve material segregation and freezing in the pile as demonstrated by improving observed conditions in ongoing water quality monitoring as presented in WSP 2023b.
- The potential uncertainty within the model was investigated through use of conservative assumptions and by performing sensitivity analyses. The results of these analysis show that it is necessary to limit the potential for development of strongly acidic conditions in the pile through material segregation and freezing. Provided strongly acidic conditions are not allowed to develop, some misclassification of PAG materials as non-AG (up to 5%) and placement of PAG materials in non-AG areas is not expected to result in MDMER exceedances for specified parameters.
- Based on the conservative case assessment it is necessary to limit the potential for generation of acidity within the pile through continued mitigation measures. Further, the possibility of generation of acidity, particularly within the thermally active zone at the final edges and surface of the pile must be minimized through strict adherence to operational guidelines that consider the geochemistry of the placed materials.
- Treatment is not predicted to be required when strictly considering the MDMER defined parameters arsenic, copper, nickel, lead and zinc. Although the model results are compared to MDMER, the results are not representative of discharge to the receiving environment or the final discharge point regulated under MDMER. Additional review of the assimilative capacity of the environment and desktop evaluation and/or to confirm no acute toxicity would be required under MDMER prior to environmental release to a water body.

5.0 LIMITATIONS

Care was taken to incorporate known processes into the water quality model, as understood during model development. However, in natural systems and complex man-made systems, observed conditions will almost certainly vary with respect to estimated conditions. Water quality modelling requires the use of many assumptions due to the uncertainty related to determining the physical and geochemical characteristics of a complex system. Given the inherent uncertainties and assumptions of the model approach, the results of the model should be used as a tool to aide in the design of the WRF and to outline potential risks rather than to provide absolute values.

This model was constructed based on the conceptualization of sources and release mechanisms, combined with data interpretation, to describe water quality conditions at the WRF. Where uncertainty exists in model input values, conservative inputs and assumptions have been applied. Climatic controls, which may limit infiltration, geochemical processes and flow within the catchment, were not modelled. Therefore, the model could potentially overestimate the predicted concentrations in the catchment.

The purpose of the model is to forecast future WRF pond chemistry for the time period 2023 through 2026 based on recent water balance model updates, geochemical source term updates and mine planning information. The model does not consider closure conditions, downstream water discharge toxicity, or environmental assimilative capacity. The model results are based on the input data collected from WRF runoff during 2018 through 2022 by Baffinland. Changes in the WRF conditions, input data, or assumptions regarding the WRF conditions will necessarily result in changes to water quality model predictions.

6.0 CLOSURE

The reader is referred to the study Limitations presented in Section 5.0 which form an integral part of this report.

We trust that this report meets your current needs. Should you have any comments or questions this document, please do not hesitate to contact the undersigned.

WSP Canada Inc.

ORIGINAL SIGNED

Amy Elliott, Ph.D.
Lead Geoscientist

ORIGINAL SIGNED

Ken De Vos, P.Geo (NAPEG)
Fellow, Senior Geochemist,
Project Director

7.0 REFERENCES

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BIM. 2023b. Personal communication with Trevor Brisco including DXF vector files of water rock deposition plan by season, “Water Balance and Thermal Model”, provided on August 11, 2023.

Golder. 2019a. “Baffinland Waste Rock Facility Water Balance”. Technical Memorandum No. 1790951-001-Rev0. December 31, 2019.

WSP 2023a. “Baffinland Waste Rock Facility – 2023 Water Balance Update. December 2023.

WSP 2023b. 2020 to 2022 Waste Rock Geochemistry. December 2023.

APPENDIX A

Source Terms

Table A1: Source Term Chemistry

Parameter	MDMER [1]	Non-AG, Expected [2]	Non-AG Upper Bound [2]	PAG (Acidic) Expected [2]	PAG (Acidic) Upper Bound [2]	Sump Input [3]	Prepared Ground [4]	Natural Ground [5]	Initial Pond [6]
pH Range		6.6 - 7.4	6.6 - 7.5	4.0 - 4.5	4.0 - 4.2	7.6 - 8.0	6.1 - 8.1	6.1 - 8.2	6.8
Suphate		832	3030	5430	14800	835	921	47.5	3030
Ag		0.0005	0.0005	0.005	0.008	0.000337	0.0005	0.00035	0.0005
Al		0.788	12.8	13.4	38.9	0.208	3.36	6.63	6.43
As	0.1	0.001	0.00233	0.01	0.0168	0.00071	0.0011	0.000867	0.00158
B		0.100	0.100	1.000	1.600	0.076	0.100	0.070	0.100
Ba		0.032	0.098	0.025	0.036	0.043	0.033	0.034	0.046
Be		0.001	0.001	0.010	0.019	0.001	0.001	0.001	0.002
Ca		67.0	207.0	116.0	147.0	110.0	60.5	13.4	137.0
Cd		0.0001	0.0003	0.0015	0.0042	0.0000	0.0002	0.0000	0.0004
Co		0.0164	0.118	1.35	3.89	0.0211	0.127	0.00864	0.403
Cr		0.005	0.0411	0.05	0.0826	0.00343	0.0116	0.0189	1000000
Cu	0.1	0.005	0.0302	0.172	0.262	0.00421	0.0146	0.0107	0.0388
Fe		1.94	24.8	162	724	0.931	11.6	10.1	193
Hg		0.000005	0.000005	0.000005	0.000005	0	0	0	0.00005
K		6.4	14.6	6.8	10.9	7.1	4.8	3.1	6.5
Mg		185	665	1140	3080	175	204	19	595
Mn		1.62	11.1	66.3	193	2.07	8.23	1.08	29
Mo		0.00227	0.0138	0.005	0.00804	0.0026	0.00184	0.000873	0.00157
Na		4.39	11.9	5	10.1	6.22	3.22	0.65	4.99
Ni	0.25	0.0221	0.16	1.33	4.78	0.0219	0.107	0.0184	0.4
P		0.5	0.5	5	8	0.35	0.5	0.35	0.50
Pb	0.08	0.0005	0.00921	0.005	0.00832	0.000363	0.00307	0.00408	0.00373
S		278	1010	1820	4950	279	308	15.9	1010
Sb		0.001	0.001	0.01	0.016	0.0007	0.001	0.0007	0.001
Se		0.00436	0.013	0.0118	0.022	0.00403	0.00285	0.000494	0.0068
Si		3.1	20.7	10	18.6	2.54	6.95	10.6	10.3
Sn		0.001	0.001	0.01	0.016	0.0007	0.001	0.0007	0.001
Tl		0.0001	0.000221	0.001	0.00175	0.0000766	0.000123	0.000137	0.000368
U		0.00365	0.0162	0.0167	0.0471	0.0125	0.00845	0.00186	0.0102
V		0.005	0.0208	0.05	0.0806	0.0035	0.00772	0.0104	0.0143
Zn	0.1	0.03	0.0481	0.3	0.589	0.021	0.0365	0.021	0.0958

Notes

pH is unitless, all other units are mg/L

pH range based on observed range or defined range of pH values for data used to develop respective water qualtiy inputs

1 MDMER: Metal and Diamond Mine Effluent Regulations for Maximum Authorized Monthly Mean Concentration

2 Water quality values used for calculation provided in Appendix C of Geochemistry Report WSP 2023b

3 Sump water quality based on average of 9 samples (L2496103-2; L2496104-1; L2496047-3; L2496049-2; L2496120-2; L2496140-2; L2496140-3; L2496705-2; L2497356-2) from the East Ditch where pumped sump water dominated the flow in the ditch.

4 Prepared ground values developed based on an average of 11 samples (L2290598-3; L2294118-3; L2303578-3; L2306761-1; L2312016-1; L2320850-1; L2323296-1; L2327989-6; L2337960-3; L2340461-5; L2345723-3) from East Ditch prior to sump discharge expected to be represenative of prepared ground prior to placement of waste rock.

5 Natural ground avalues developed based on an average of 3 samples ((L2290620-7; L2303565-1; L2306749-5) expected to receive least amount of influence from the WRF

6 Initial pond water chemistry set at the 75th percentile concentratiosn from East Ditch and West Ditch inflows - this is an initial value only and is replaced by caclulated model values

APPENDIX B

Time-Series Model Results

Figure B1: WRF Pond - Time Series Model Results for Sulphate, Zinc, Nickel, Copper, Aluminum, Zinc - Expected Case

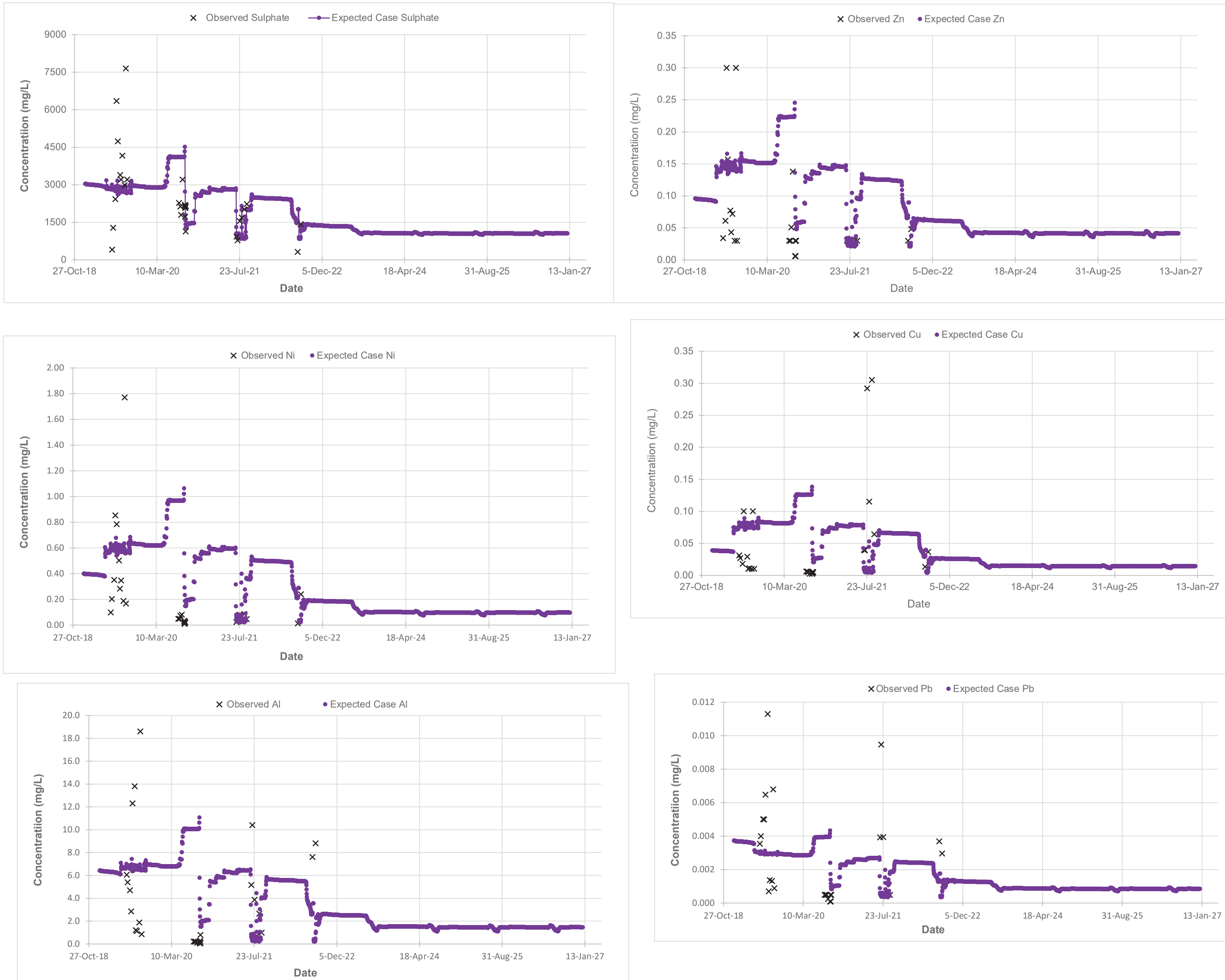


Figure B2: WRF Pond - Time Series Model Results for Sulphate, Zinc, Nickel, Copper, Aluminum, Zinc - Expected Case with 0.5% PAG Misclassfication

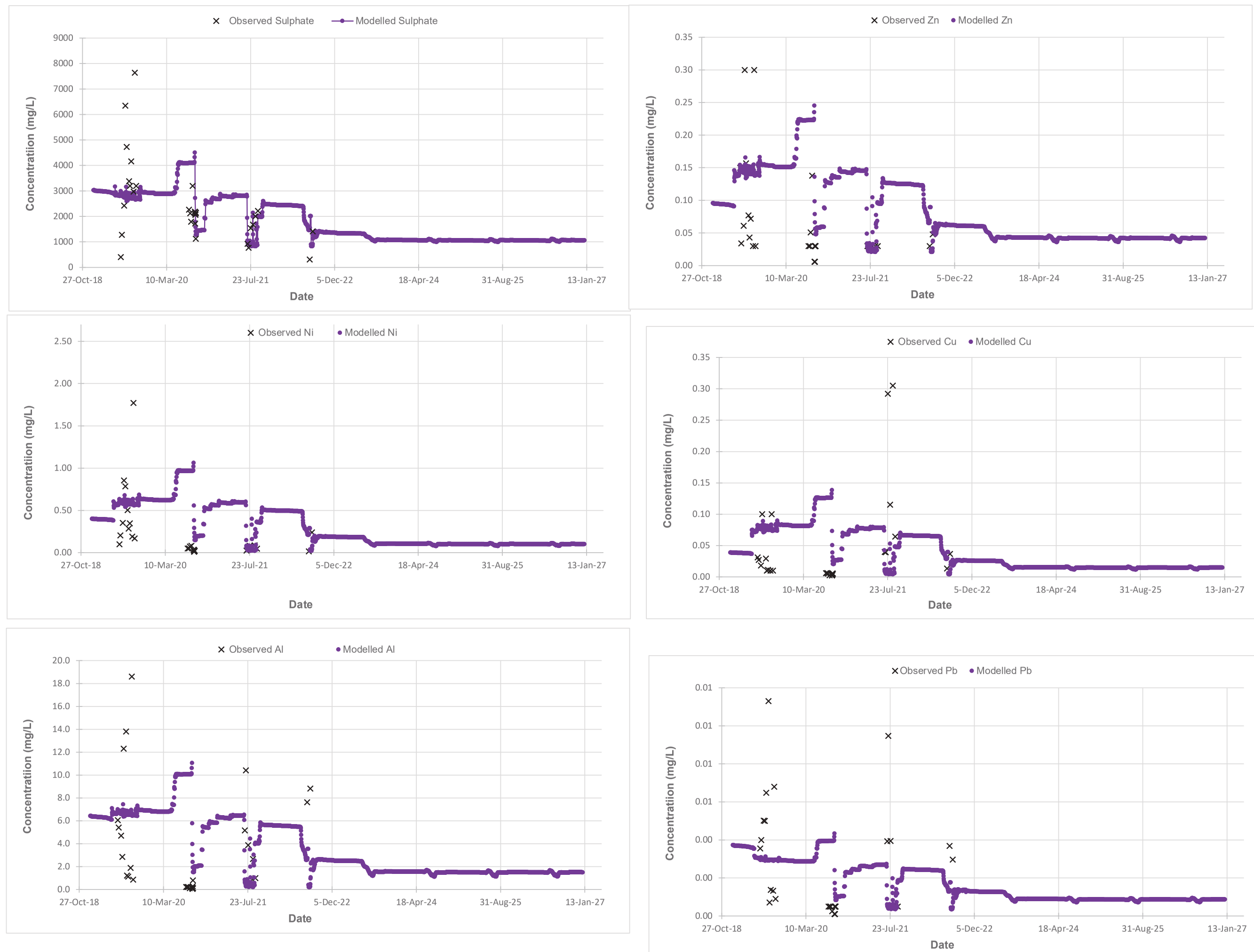


Figure B3: WRF Pond - Time Series Model Results for Sulphate, Zinc, Nickel, Copper, Aluminum, Zinc - Expected Case with 5% PAG Misclassfication

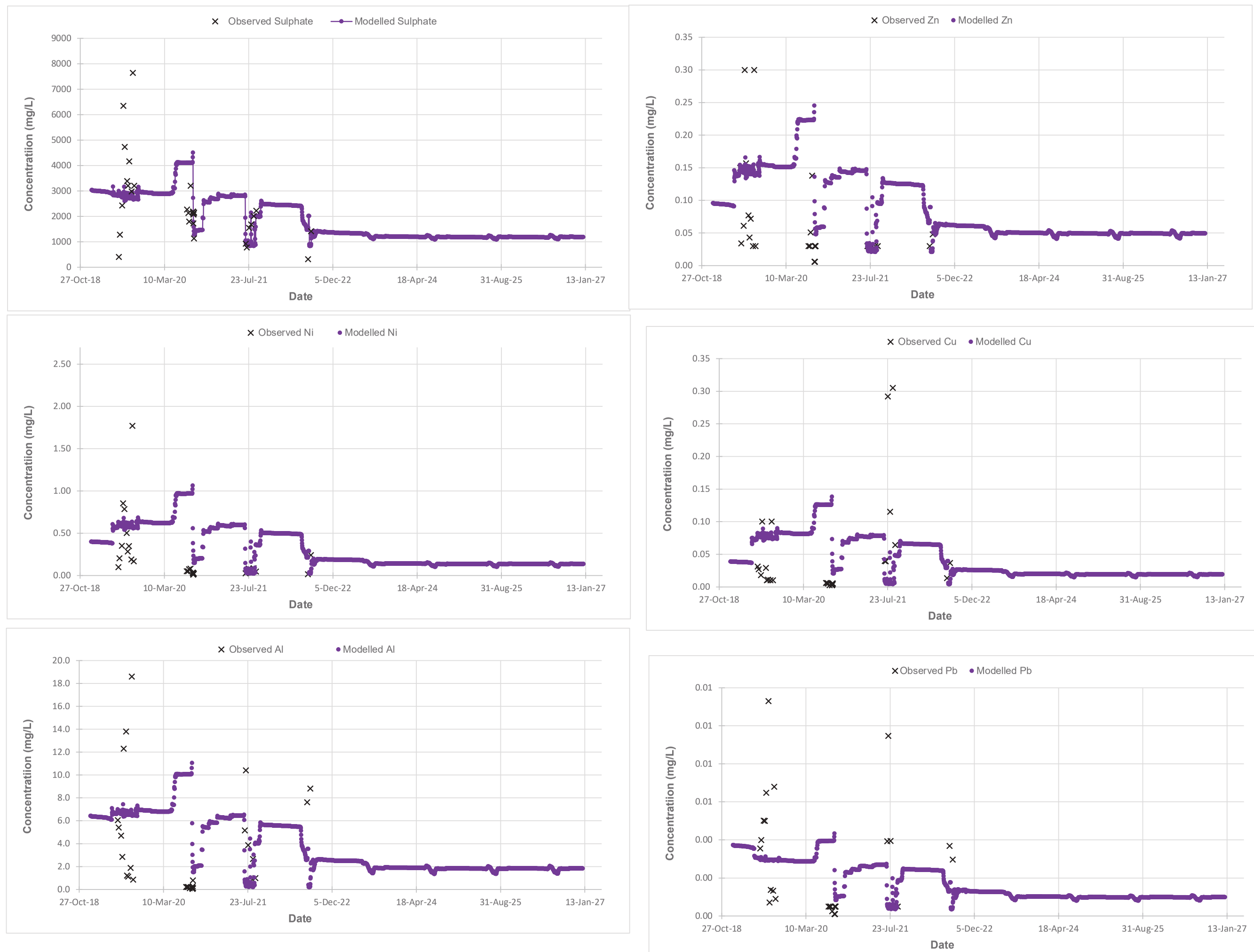
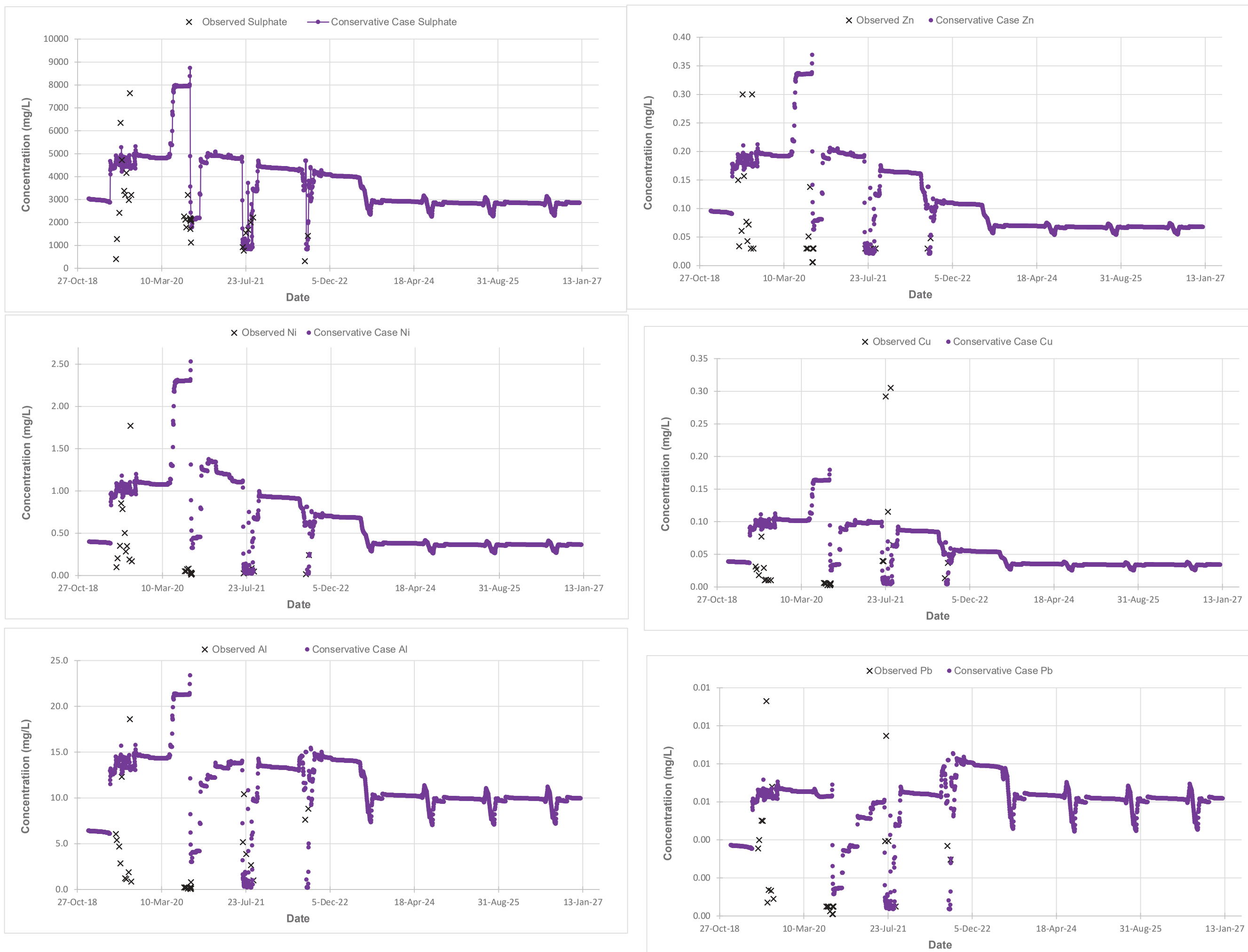
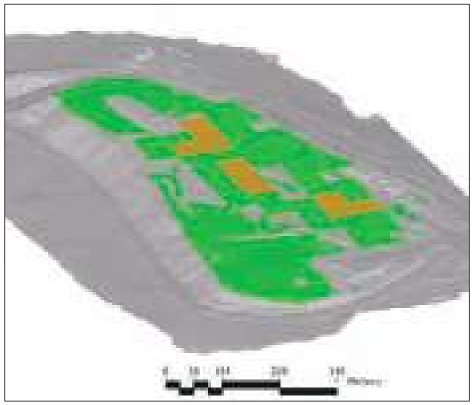


Figure B4: WRF Pond - Time Series Model Results for Sulphate, Zinc, Nickel, Copper, Aluminum, Zinc - Conservative Case

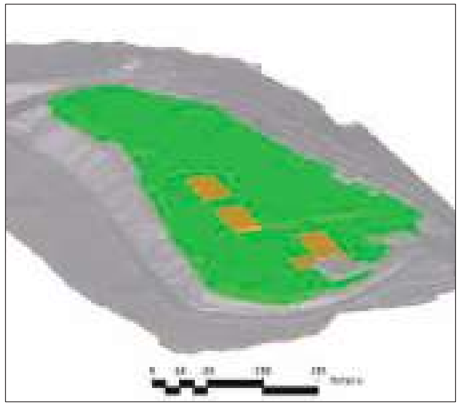


APPENDIX B

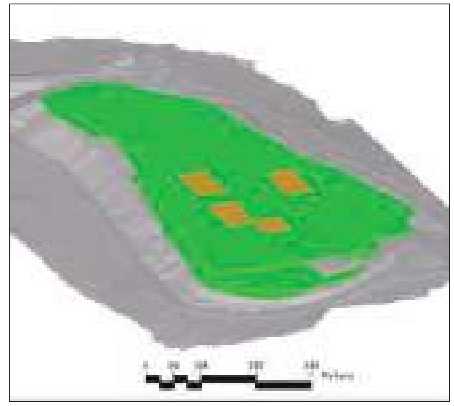
Baffinland Conceptual Waste Rock Deposition Plans



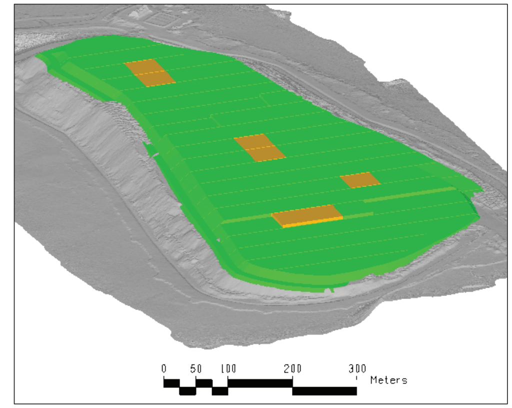
September 30th 2023



May 31st 2024



Sept 30th 2024



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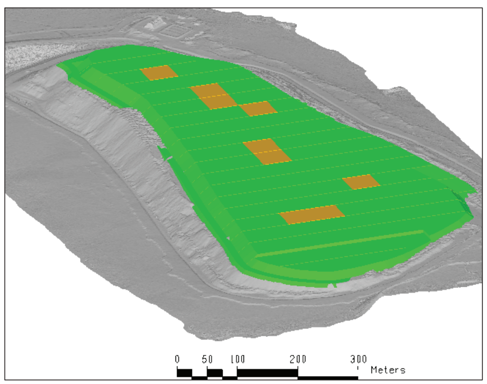

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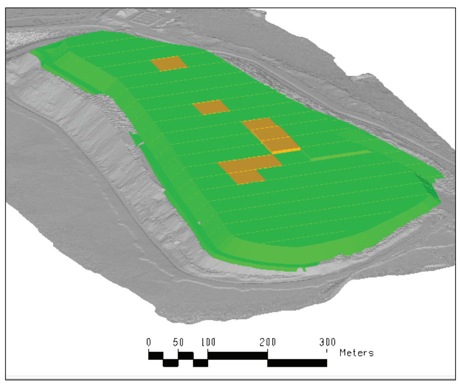

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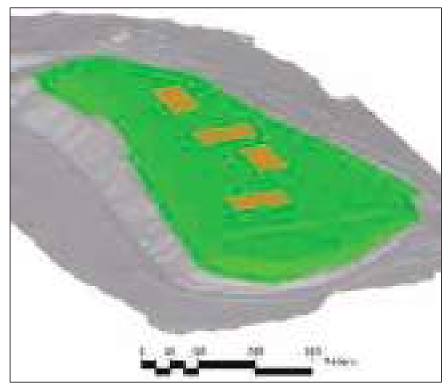

Sept 30th 2026

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APPENDIX B: WASTE ROCK FACILITY QAQC MONITORING PLAN

Baffinland Iron Mines Corporation

Waste Rock Facility QAQC Monitoring Plan

BAF-PH1-340-P16-0004

Rev 2

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Date:	March 25, 2024	March 25, 2024
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1 PURPOSE & SCOPE

Baffinland's Phase 1 Waste Rock Management Plan (WRMP) provides criteria for defining potentially acid generating (PAG) waste and non-acid generating (Non-AG) waste, as well as criteria for placing these different material types in the Waste Rock Facility (WRF). The objective of these criteria is to minimize the potential for acid rock drainage (ARD) and metal leaching (ML). A quality assurance and quality control (QAQC) program is required to ensure compliance with these criteria, and to ensure the WRMP is working as intended. The purpose of this document is to outline that QAQC program.

As well, this document outlines the processes for planning, tracking and reporting progressive reclamation and installation of a Non-AG waste cover at the WRF. The objective is to achieve and maintain an exposed PAG waste footprint of 15 % of total surface area, which would require cover in a temporary or permanent closure scenario.

2 RESPONSIBILITIES

2.1 Technical Services Superintendent / Manager

- Ensure compliance to Mining Dig Map Creation Procedure (BAF-PH1-340-PRO-0054).
- Ensure the Mining Dig Map Creation Procedure (BAF-PH1-340-PRO-0054) is compliant with the WRMP.
- Review and approve any changes, corrections, or updates to this procedure.
- Designate responsible persons within their department for implementing the Plan.
- Provide training to ensure all Technical Services personnel understand the Plan.
- Implement corrective actions in the event of identified non-conformances.
- Designate qualified personnel to produce NAPEG stamped drawings, on a quarterly basis, that show the extents of the Non-AG cover over the WRF.
- Designate qualified person for annual review and reporting of thermistor and water quality data and waste placement at the data.

2.2 Medium Term Planner / Short Term Planner

- Execute short and long term planning of Non-AG and PAG waste placement at the WRF.
- Ensure waste placement planning is compliant with criteria outlined in the WRMP.
- Ensure waste placement planning targets the smallest possible exposed PAG waste footprint.
- Perform frequent WRF field visits and monitoring to ensure compliance to the Plan.
- Reconcile actual waste placement against WRMP criteria for annual reporting.

2.3 Mine Geologist / Product Quality Geologist

- Identify Non-AG and PAG waste in the pit and create dig plans.
- Ensure material classification is compliant with criteria outlined in the WRMP.
- Monitor daily dig advance to confirm Non-AG and PAG are separated and routed to appropriate destinations at the WRF.
- Compile blasthole geochemical data for quarterly reporting.

2.4 Mine Surveyor

- Stake dump limits as well as Non-AG and PAG dumping locations.
- Monitor lift thickness and provide elevation stakes to meet design requirements.
- Pick-up as-built surveys of WRF deposition using drones and / or RTK GPS on a weekly frequency.
- Produce weekly and end-of-month (EOM) WRF surfaces.

2.5 Geotechnical Engineer / Mine Technician

- Download WRF instrumentation data.
- Maintain WRF instrumentation.

2.6 Environmental Superintendent / Manager

- Designate responsible persons within their department for implementing water sampling.
- Provide training to ensure all Environmental personnel understand the Plan.
- Complete annual review and reporting of water quality data, or assign task to a trained designate.

2.7 Environmental Coordinator / Environmental Technician

- Perform water sampling at the WRF.
- Maintain a database of water chemistry results for all samples collected from the WRF.

2.8 Operations manager

- Designate responsible persons within their department for implementing the Plan.
- Provide equipment requirements to execute the Plan.
- Ensure execution is in compliance to the Plan.
- Implement corrective actions in the event of identified non-conformances.

2.9 Mine Superintendent

- Ensure daily operations are in-line with the short-range plans provided by Technical Services.
- Ensure supervisors and operators are trained and understand the Plan.
- Coordinate resources to achieve the Plan.

2.10 Load and Haul Supervisor

- Communicate mine dig plans to operators.
- Communicate WRF placement plans to operators.
- Ensure all workers and operators are trained and understand placement plans.
- Inspections of the active digs and WRF and reporting of all non-conformances.

2.11 Haul Truck Operator

- Ensure material type loaded is recorded in Fleet Management System.
- Ensure Blast ID loading from is recorded in Fleet Management System.
- Report non-compliances to their supervisor.
- Contact their supervisor if uncertain about any of the tasks.

2.12 Push Unit Operator

- Follow grade stakes to respect designated lift heights.
- Follow dumping limits, cut and fill, and all other survey guidance provided.
- Warn their supervisor when dumping/pushing approaches the area limits or if additional survey guidance is required.
- Report non-compliances to their supervisor.
- Contact their supervisor if uncertain about any of the tasks.

3 PROTOCOL

The sections below outline the process to identify, delineate and track Non-AG and PAG waste from their origin in the pit to their final placement for storage at the WRF. Two methods are used to track the position of material: (1) the origin (loading point) and destination (dumping point) of each truck load are tracked using the BIM Fleet Management System (FMS) and (2) surveyors complete pickups of face progression in the pit and at the WRF using RTK GPS and/or drone. These processes ensure adequate material characterization and subsequent placement in the correct location at the WRF (i.e. PAG to PAG dump and Non-AG to Non-AG dump).

A QAQC program is in place with the objective of controlling and monitoring waste placement, as well as monitoring WRF performance with respect to thermal and chemical stability.

3.1 In-Pit Material Identification & Delineation

This section summarizes the process used to identify and delineate Non-AG and PAG waste in the pit as per the Mining Dig Map Creation Procedure (BAF-PH1-340-PRO-0054):

- Waste blasthole samples are taken on a ~11 m x 11 m grid (based on blast design parameters).
- Waste blasthole samples are analyzed for: Moisture, Al_2O_3, CaO, Fe, Fe_2O_3, K_2O, MgO, Mn, Na_2O, P, SiO_2, TiO_2, LOI, Magnetics, FeO, S and paste pH.

- Waste blasthole samples are randomly selected for ABA and SFE analysis at a frequency of 1 sample per 40,000 t of blasted waste. Waste blasthole samples are classified as PAG or Non-AG using criteria outlined in the WRMP, Section 6, Waste Rock Classification and Geochemical Sampling.
- Blastholes are grouped together to create minable units called Dig Blocks.
- Dig Blocks must conform to criteria outlined in Mining Dig Map Creation Procedure, with some of the key points noted below.
    1. Dig Blocks located within blasts:
        - All sides of the dig block are ≥ 9 m.
        - Minimum surface area is 160 m^2.
        - The shape is angular.
        - All angles are ≥ 90°.
    2. Dig Blocks located at the edge of blasts:
        - The side that intersects the blast edge can be 5.5 m in width (i.e. the distance between each blast hole).
        - Minimum surface area is 120 m^2..
        - The shape is angular.
        - All angles are ≥ 90°.
- All Dig Blocks are staked and flagged in the field according to their assigned material type.
- The Mine Geologist monitors the mining advances daily to ensure Non-AG and PAG are separated and routed to the appropriate destinations at the WRF.
- All waste rock geochemical information is spatially referenced and stored in Baffinland's internal databases, allowing for auditing and confirmation of appropriate material identification.
- Records supporting in-pit material identification will be reviewed and compiled by the Mine Geologist on a quarterly basis for regulatory reporting (see section 3.6).

Refer to Appendix A, Material Classification Project Activities for Performance Indicators, Conditions and Pre-defined Response(s) related to waste identification and delineation.

3.2 WRF Material Placement Planning

Planning and scheduling of Non-AG and PAG waste placement at the WRF is required to meet two objectives. The first objective is to adhere to the waste rock deposition criteria outlined in Baffinland's WRMP. These criteria are designed to permanently freeze PAG waste and minimize the potential for ARD and ML. The second objective is to achieve and maintain an exposed PAG waste footprint of 15 % of the total surface area.

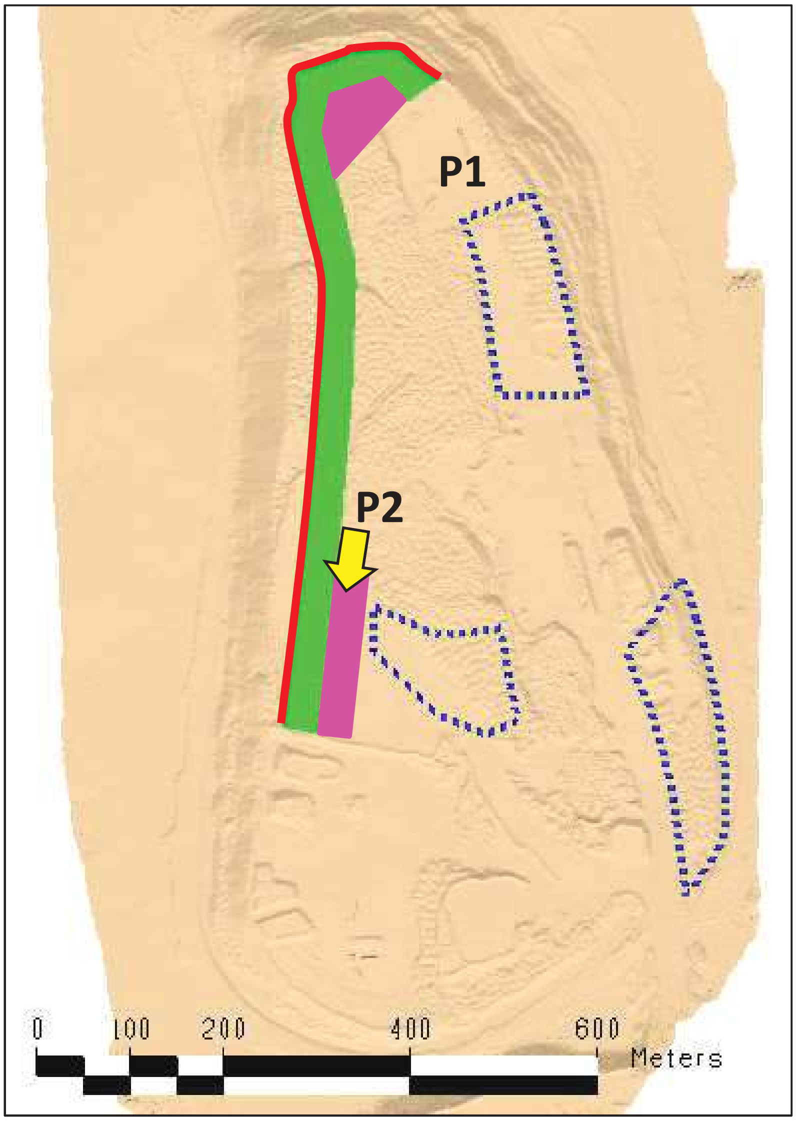
3.2.1 Medium and Long Range Planning

It is the responsibility of the Medium Term Planning Engineer to develop medium and long range placement plans for Non-AG and PAG waste at the WRF that conform to the deposition criteria outlined in the WRMP. Placement plans will demonstrate progressive covering of exposed PAG waste at the WRF with 4.0 m (minimum) of Non-AG waste, to achieve and then maintain an exposed PAG waste footprint that is as small as operationally feasible. These plans must consider the overall stockpile design as well as locations of any installed WRF instrumentation (see section 3.4). 3-month placement plans will be provided to regulators on a quarterly basis (see section 3.6).

3.2.2 Short Term Planning

The Short Term Planner is responsible for preparing the weekly business plan, which includes a drawing of the WRF and instructions for placement of Non-AG and PAG material with target elevations and / or lift thicknesses. In addition to primary dump locations, auxiliary dump locations will always be planned for and available in the case that the primary areas are unusable. It is the responsibility of the Mine Superintendent to ensure Mine Operations adhere to the weekly placement plans issued by Technical Services. An example weekly placement plan is shown in Figure 1.

FIGURE 1: EXAMPLE OF WEEKLY WASTE ROCK PLACEMENT PLAN FOR OPERATIONS



1. Do not dump inside the blue outlined areas (staked in field, call for re-staking if required)
2. Do not dump outside the red line (staked in field)
3. If a push unit is available, dump at P1 working North
4. If a push unit is unavailable, free-dump at P2 working South
5. Place **ONLY** Non-AG waste (4.0m thick) inside the green solid (staked in field), **no PAG**
6. Place **ONLY** PAG waste inside the pink solid (staked in field)
7. All lifts must conform to 5m max lift thickness
8. Do not dump in areas not designated by survey or map

3.2.3 Survey Identification

- Survey stakes identify the destination and dumping limits for Non-AG and PAG waste. Target lift elevation (lift thickness) is recorded on survey stakes.
- Surveyors conduct daily field inspections to ensure necessary controls are in place and to refresh stakes as needed.
- Mine Operations Supervisors are responsible to audit the dumping locations at least once per shift and notify Survey if controls need to be re-established. Shift dump checklist includes field controls for Non-AG and PAG dumping areas/limit.
- Surveyors will notify the Planning team if/when dump limits have been reached.
- The complete WRF surface is surveyed monthly using drone imagery (approximately 5 cm accuracy) or RTK GPS.
- RTK GPS is used to collect incremental advance daily.
- Prior to any WRF expansion onto original ground, the original ground will be surveyed. The first lift of Non-AG waste rock will subsequently be surveyed to confirm thickness.

Refer to Appendix A, Execution Control Project Activities for Performance Indicators, Conditions and Pre-defined Response(s) related to waste placement planning.

3.3 WRF Material Placement Execution and Controls

3.3.1 FMS System

- Haul trucks are outfitted with GPS and tablets, which connect to the Fleet Management System (FMS) via the on-site LTE network.
- Operators indicate on their tablets the material type which is loaded at the dig face.
- Note the PAG waste material type is locked to destination Waste Rock Dump and the system will not allow to dump at other locations.

Dispatch monitoring occurs at all times throughout load, haul and dump operations, see Figure 2. Examples of truck operators tablet interface are shown in Figures 3 + 4. Monitoring includes, but is not limited to, material type (i.e. PAG, Non-AG), load locations, dump locations, load times, dump times, and equipment status (i.e. operating, delayed, standby or down).

FIGURE 2: FLEET MANAGEMENT SYSTEM INTERFACE

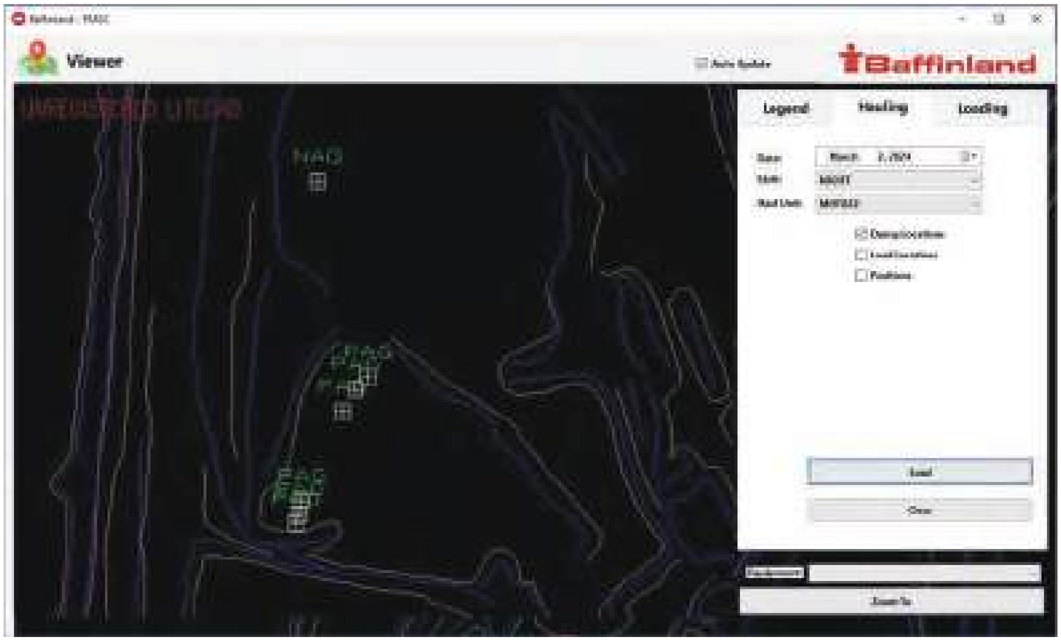


FIGURE 3: MINE HAUL TRUCK TABLET HAUL INTERACE

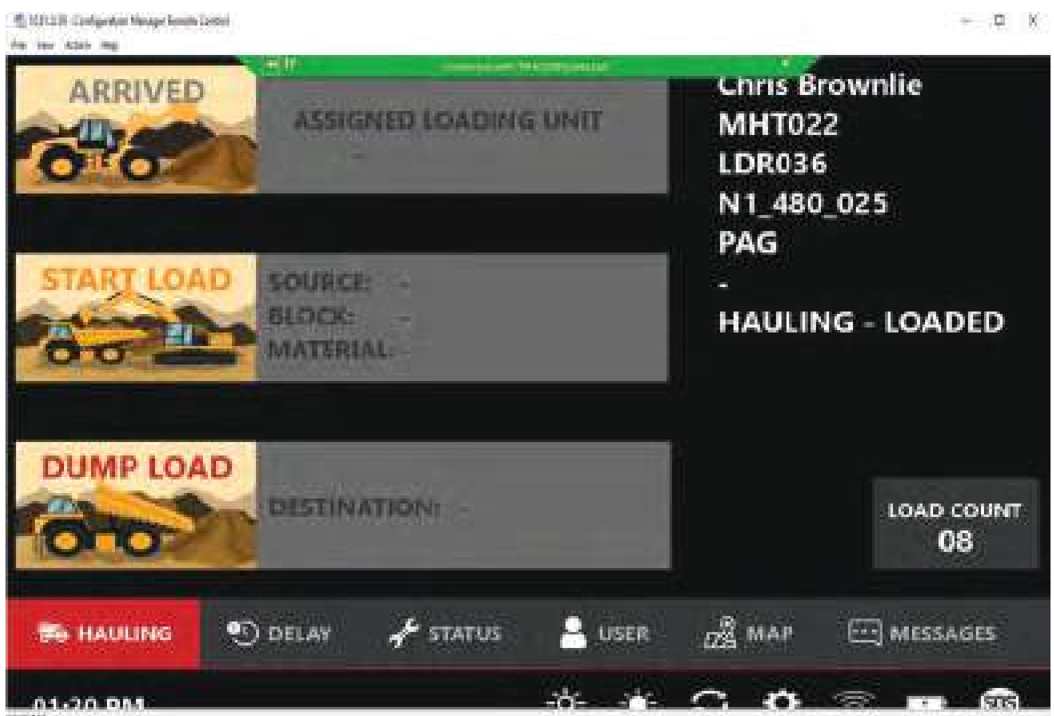
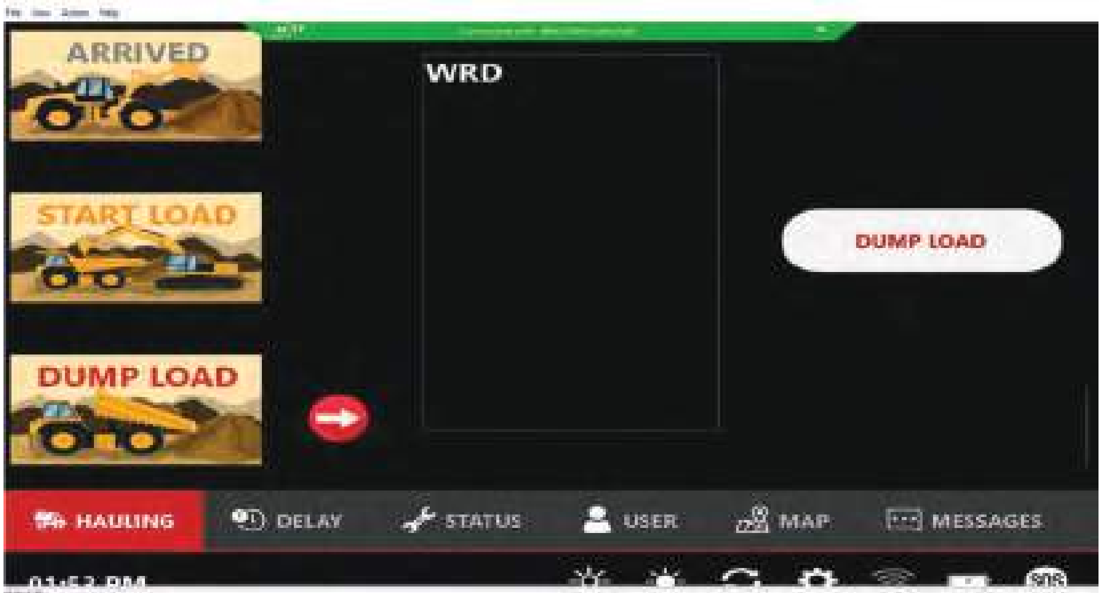


FIGURE 4: MINE HAUL TRUCK TABLET DUMP INTERFACE



3.3.2 Field Controls

Field controls are in place for both placement and pushing at the WRF. Dump and push unit locations for placed waste rock are demarcated on the WRF via signage and staking for each material type. PAG placement zones are delineated with signage stating “PAG DUMP”, and entrance to PAG placement zone is restricted using tires, see Figure 5.

FIGURE 5: PAG PLACEMENT ZONE SIGNAGE

Refer to Appendix A, Execution Control Project Activities for Performance Indicators, Conditions and Pre-defined Response(s).

3.4 WRF Material Placement Tracking & Reconciliation

Tracking material placement in the WRF and reconciling this placement against the waste depositional criteria outlined in the WRMP is required to facilitate: (1) interpretation of thermistor data and water quality data, (2) calibration of future thermal and water quality models; (3) assessment of conformity to the WRMP; and (4) implementation of corrective actions, if required. The following sections outline the protocols for waste placement tracking and waste placement reconciliation.

3.4.1 WRF Material Placement Tracking

- Waste placement is tracked via FMS: each load origin and dumping location is recorded on the haul trucks and all relevant information is stored in Baffinland's internal database, including, but not limited to, material type (i.e. PAG, Non-AG), tonnage, origin, destination, load time and dump time. Evidence of material movement for Non-AG and PAG waste is traced from exact dump location to the original pit location where waste rock geochemical information was collected to support the material type classification.
- All material movement is compared against the weekly placement plan and verified by the Technical Services team.
- The WRF as-built surface is updated regularly. The full WRF surface is collected at least monthly using drone imagery (5 cm accuracy, dependent on weather and daylight) or RTK GPS. Incremental advance surveys are collected using RTK GPS when dumping areas are active.
- Drawings stamped by a NAPEG registered engineer will be produced and provided to Regulators on a quarterly basis, showing the extents of the Non-AG cover over the WRF, and the area of PAG exposure remaining to be covered (see section 3.6).

3.4.2 WRF Material Placement Reconciliation

Actual WRF material placement will be reconciled against the criteria outlined in the WRMP. This reconciliation will occur on a quarterly basis. The criteria for evaluation are provided in Table 2. If a non-conformance is identified, it will be recorded and appropriate corrective actions will be taken.

TABLE 1: CRITERIA FOR QUARTERLY RECONCILIATION OF WRF MATERIAL PLACEMENT

Category	Criteria
Footprint Expansion	The first lift of the WRF on native ground shall be Non-AG waste rock.
Footprint Expansion	Waste rock placement over native ground shall be carried out in the winter to the extent practical (defined to be Oct 1 – May 31). At a minimum, the lift will be allowed to freeze prior to the deposition of subsequent lifts.
Material Separation	Non-AG and PAG waste rock placement locations at the WRF shall be documented. Non-AG material that may be intermixed with PAG material shall follow the waste rock deposition strategies for PAG material.
Stockpile Exterior Face	Exclusively Non-AG waste rock shall be placed within a minimum of 4.0 m from stockpile faces.
Lift thickness	Waste rock placement to target a maximum thickness of 5.0 m during a single deposition event.
Successive lift placement	When waste rock temperature is greater than 0°C (defined to be June 1 – Sept 30), successive lifts may be placed to a maximum thickness of 7.0 m (no single lift can be greater than 5.0 m).
Capping PAG	Any PAG zone in the WRF must be covered with a minimum of 4.0 m of Non-AG waste within 24 months of initial placement.

Refer to Appendix A, Execution Control Project Activities for Performance Indicators, Conditions and Pre-defined Response(s).

3.4.3 WRF Non-AG Cover Placement Verification Testing

The following outlines the methodology for conducting verification testing for the placement of non-AG and PAG materials at the WRF. The purpose of this testing is to verify the acid generating potential of placed materials and ensure compliance with the WRMP procedures. Where applicable, procedures and methodologies have been extracted from the Mine Environment Neutral Drainage (MEND) Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Mend Report 1.20.1, December 2009).

Sample Collection

Due to frozen ground conditions, obtaining samples during winter months may be difficult using typical test pitting methods. As such test pitting or drilling will be used to obtain the sample. Further details are recorded below.

- The target sample size will be 5 kg.
- The sample will be taken between 0.5 m – 2.0 m below ground surface.

- The following information will be collected with each sample:
  - Unique name and sample number;
  - Sampling date;
  - Sampling location (GPS coordinates);
  - Length over which the sample was taken;
  - Sample size;
  - Geological material;
  - Type of sampling (e.g. test pit vs. drilling)

Sample Frequency

- A sample grid of 80 m by 80 m will be used. This is equivalent to a sample every 60,000 tonnes of placed cover material (which will be approximately ~52 samples for the 2024 progressive reclamation).

Sample Testing

- 30% of all samples will be collected and sent to an accredited laboratory for modified Sobek acid base analysis. The remaining samples will be retained for two years.
- All samples will be tested for paste pH and total sulphide content.
- As samples will be obtained by drill and by test pitting it is expected that sample size gradations will be different in the field (drill cuttings vs. dug material). To maintain consistency, each full sample will be sent to the laboratory and crushed for testing.

Sample Reporting

- Baffinland will compile the results from the QAQC sampling program and include them as part of the quarterly WRF monitoring report.

3.5 WRF Instrumentation Monitoring & Reporting

Various instrumentation, including thermistors and vibrating wire piezometers, have been installed throughout the WRF with a primary purpose to characterize the thermal conditions of the waste rock, and confirm the waste placement strategy is working to keep the WRF in a perpetually frozen state. Current instrumentation locations are shown in Figure 6, as well as instrumentation planned for installation in 2024. Supplementary details on WRF instrumentation and results can be found in the WRMP (WSP 2023).

Additional thermistors (BH4, BH5, and T6) are to be installed in 2024 in select locations targeting current Non-AG capping on the active layers, i.e. 620 m - 630 m elevations.

3.5.1 Instrument Monitoring & Data Collection

The following procedure is provided for existing instrumentation (and any future instrumentation) to ensure data is continuously collected and archived for later interpretation. It is the responsibility of the geotechnical engineer, mine technician or trained designate to ensure this procedure is followed.

- Instrument inspections are completed weekly, and the following is recorded:
  - Name of person(s) completing the inspection & date of inspection
  - Battery status of each instrument
  - Whether or not any instrument extensions are required: if extension is required, a notification will be sent to the Technical Services Manager or Superintendent
  - Whether or not any instrument damage has occurred. If damage is noted, a photograph will be taken and a notification will be sent to the Technical Services Manager or Superintendent
- Instrument data is downloaded once a quarter, and the data is stored in an on-site database (Figure 7). Completeness of data will be verified after upload into the site database, and validity of data will be confirmed by plotting and reported quarterly, looking for any outlier measurements. If there are any newly damaged nodes or issues with data integrity, a notification will be sent to the Technical Services Manager.

FIGURE 6: MAP OF THE WRF SHOWING INSTRUMENT LOCATIONS

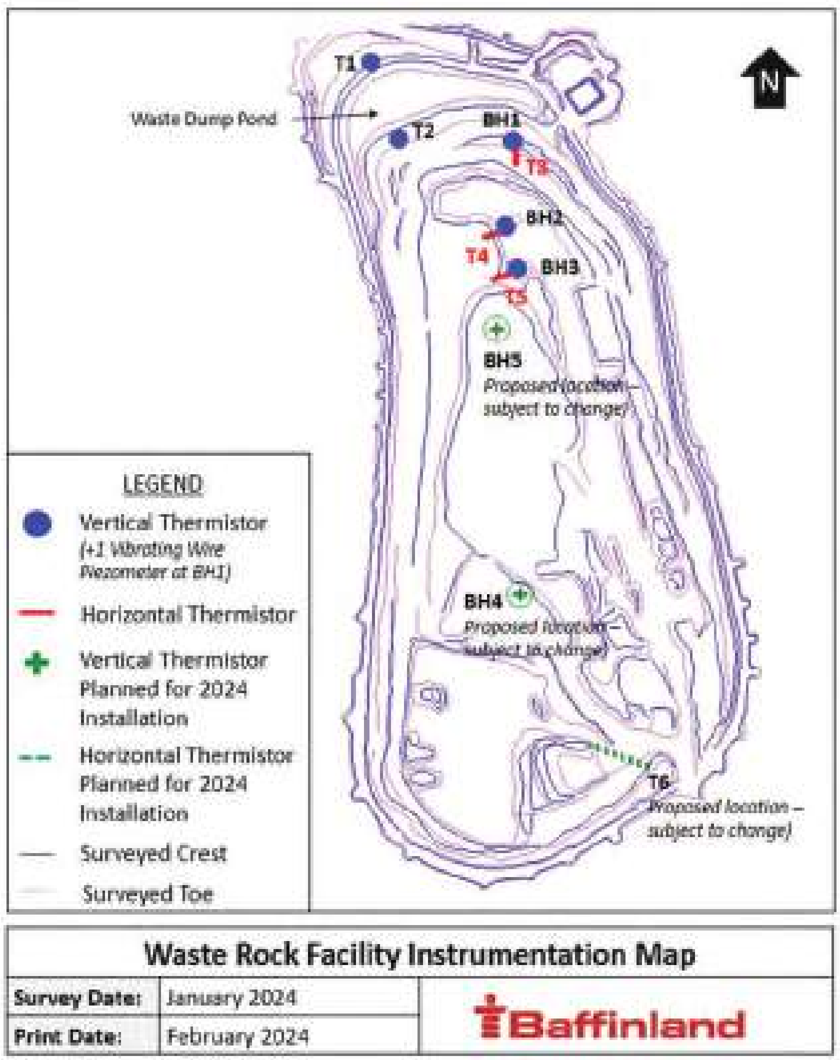


FIGURE 7: EXAMPLE OF THERMISTOR READINGS UPLOADED TO THE ON-SITE DATABASE

TIMESTAMP	RECORD	BATTERY	Therm 1	Therm 2	Therm 3	Therm 4	Therm 5	Therm 6	Therm 1	Therm 2	Therm 3	Therm 4	Therm 5	Therm 6	LOGGER TEMP
		Volts	deg C	deg C	deg C	deg C	deg C	deg C	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	deg C
2018-12-07 18:00	1	3.55	2.64	3.61	1.98	1.9	3.58	3.35	6072.61	8414.5	8081.342	8896.898	8276.182	8270.965	1.9
2018-12-08 0:00	2	3.57	1.87	1.7	2.02	2	1.98	2.32	8505.512	8989.912	8882.100	8833.448	8888.241	8822.608	1
2018-12-08 8:00	3	3.55	5.02	5.16	4.74	4.80	5.16	5.39	7816.67	7464.774	7726.900	7742.152	7487.561	7406.61	5
2018-12-08 16:00	4	3.56	4.54	4.82	4.26	3.82	4.7	3.66	7798.324	7869.118	7567.880	6880.655	7736.985	7597.123	4.5
2018-12-09 0:00	5	3.55	4.02	3.85	3.98	3.77	3.73	4.02	7819.27	7876.838	7888.268	8090.448	7724.816	7885.846	4.3
2018-12-09 8:00	6	3.55	4.55	4.74	4.42	3.47	4.64	4.77	7871.631	7730.908	7842.265	8022.341	7758.512	7766.565	4.3
2018-12-09 16:00	7	3.55	5.18	5.50	5.16	4.82	5.5	5.45	7584.772	7401.562	7481.277	7851.148	7412.86	7409.752	5.1
2018-12-10 0:00	8	3.55	3.50	4.17	4.14	3.60	3.68	4.17	8038.763	7935.757	7951.665	8317.613	8056.877	7941.742	3.6
2018-12-10 8:00	9	3.50	1.12	1.80	2.18	0.82	1.56	2.66	8255.158	8821.762	8679.781	9099.119	8585.877	8881.828	1.9
2018-12-10 16:00	10	3.45	-16.21	-13.11	-12.18	-11.25	-15.95	-11.72	13440.66	13856.22	16710.26	17856.98	17480.57	18237.53	-20.8
2018-12-11 0:00	11	3.45	-11.08	-7.36	-5.52	-4.38	-4.65	-4.76	16180.56	14188.74	12915.12	12124.71	12348.6	12528.48	-20.2
2018-12-11 8:00	12	3.45	-11.05	-6.75	-4.80	-4.33	-4.00	-4.31	17576.85	13922.92	12680.81	12287.14	12838.86	12350.91	-20.4
2018-12-11 16:00	13	3.45	-10.00	-6.69	-4.8	-4.15	-3.96	-4.15	17069.29	13992.51	12565.15	12148.94	12695.13	12144.65	-18.9
2018-12-12 0:00	14	3.45	-10.67	-6.72	-4.65	-4.35	-3.97	-4.15	17215.46	13914.75	12568.66	12144.97	12829.50	12154.68	-17.9
2018-12-12 8:00	15	3.45	-10.56	-6.76	-4.88	-4.36	-3.97	-4.13	17291.17	13961.18	12610.34	12118.07	12829.50	12111.52	-17.3
2018-12-12 16:00	16	3.45	-10.65	-6.81	-4.90	-4.38	-3.97	-4.13	17815.42	13979.8	12617.22	12196.88	12851.17	12151.92	-17.1
2018-12-13 0:00	17	3.44	-10.36	-6.85	-4.96	-4.21	-3.99	-4.13	16937.65	14018.57	12686.46	12185.45	12842.89	12134.08	-17.1
2018-12-13 8:00	18	3.45	-10.25	-6.91	-5.05	-4.34	-4	-4.16	16880.85	14055.71	12754.66	12202.57	12851.21	12156.26	-16.8
2018-12-13 16:00	19	3.44	-10.22	-6.96	-5.11	-4.27	-4.01	-4.16	16801.16	14090.07	12777.22	12221.02	12859.33	12161.29	-16.9
2018-12-14 0:00	20	3.44	-10.18	-7	-5.17	-4.3	-4.03	-4.15	16745.66	14119.63	12815.15	12244.41	12869.55	12148.34	-16.4
2018-12-14 8:00	21	3.45	-10.11	-7.04	-5.25	-4.34	-4.05	-4.16	16709.4	14154.52	12856.67	12265.29	12881.24	12153.59	-15.8
2018-12-14 16:00	22	3.44	-10.07	-7.1	-5.29	-4.37	-4.07	-4.17	16666.55	14178.62	12896.77	12285.73	12892.89	12158.62	-15.1
2018-12-15 0:00	23	3.45	-10.03	-7.15	-5.35	-4.4	-4.08	-4.18	16945.55	14186.28	12919.03	12307.98	12194.67	12165.18	-14.9
2018-12-15 8:00	24	3.46	-10	-7.20	-5.40	-4.45	-4.11	-4.19	16861.04	14261.42	12979.46	12359.49	12216.08	12171.94	-14.5
2018-12-15 16:00	25	3.46	-9.97	-7.22	-5.47	-4.48	-4.13	-4.2	16669.75	14288.75	13020.66	12358.54	12231.83	12178.65	-14.3
2018-12-16 0:00	26	3.45	-9.91	-7.26	-5.52	-4.52	-4.15	-4.21	16630.16	13818.13	13057.12	12355.02	12245.97	12185.45	-13.9
2018-12-16 8:00	27	3.45	-9.85	-7.28	-5.58	-4.55	-4.17	-4.22	16469.57	14337.28	13096.19	12408.18	12256.44	12192.91	-13.8
2018-12-16 16:00	28	3.46	-9.8	-7.31	-5.65	-4.55	-4.15	-4.24	16425.42	14368.57	13131.48	12401.2	12275.43	12208.66	-13.7
2018-12-17 0:00	29	3.45	-9.75	-7.36	-5.68	-4.60	-4.22	-4.24	16370	13779.06	13169.33	12400.03	12233.83	12209.13	-13.4
2018-12-17 8:00	30	3.45	-9.7	-7.37	-5.72	-4.68	-4.24	-4.30	16332.54	14402.92	13201.06	12486.15	12282.37	12215.09	-13.6
2018-12-17 16:00	31	3.45	-9.66	-7.39	-5.78	-4.72	-4.26	-4.27	16296.85	14417.56	13215.17	12512.44	12217.43	12218.42	-13.7
2018-12-18 0:00	32	3.45	-9.62	-7.41	-5.83	-4.75	-4.28	-4.28	16260.88	14433.5	13249.17	12515.32	12241.61	12232.91	-13.9

3.5.2 INSTRUMENT DATA REPORTING & INTERPRETATION

Instrument data is reviewed and reported on quarterly, with purpose to confirm the waste rock pile continues to freeze progressively, as intended by the WRMP.

3.6 WRF WATER QUALITY MONITORING & REPORTING

MONITORING WATER QUALITY IS REQUIRED TO ASSESS THE CHEMICAL STABILITY OF THE WRF AND TO ENSURE PROCESSES OUTLINED AS PART OF THE WRMP ARE ADEQUATE WITH RESPECT TO LIMITING ARD AND ML. WATER QUALITY SAMPLING IS ALSO REQUIRED TO SUPPORT

FUTURE UPDATES TO THE WATER QUALITY MODEL. WATER QUALITY MONITORING LOCATIONS ARE SHOWN IN . FIGURE 8: WRF WATER QUALITY MONITORING LOCATIONS

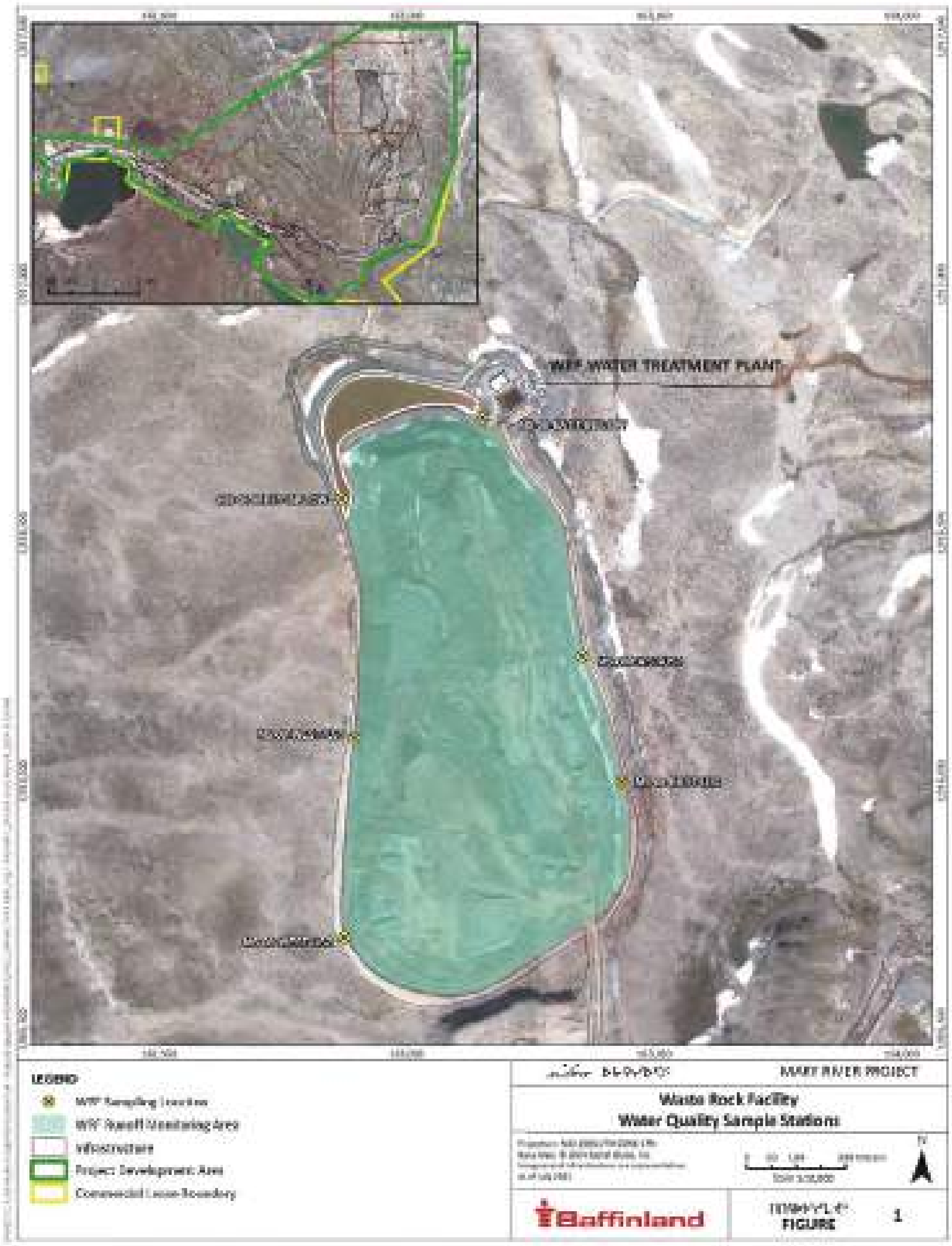


Table 2 provides the targeted frequency and locations for water sampling around the WRF to achieve these objectives. It is the responsibility of the Environmental Coordinator or Technician to collect these samples, submit them for analysis and archive the data for later interpretation. All samples are submitted for detailed water quality analysis will include parameters per the WRMP. A sample may not be collected if insufficient water is observed. However, these dry conditions would be captured in field notes and photos. Water quality data will be reviewed and reported as required.

Refer to Appendix A, Ditch and Inflow WQ Monitoring Project Activities for Performance Indicators, Conditions and Pre-defined Response(s).

FIGURE 8: WRF WATER QUALITY MONITORING LOCATIONS

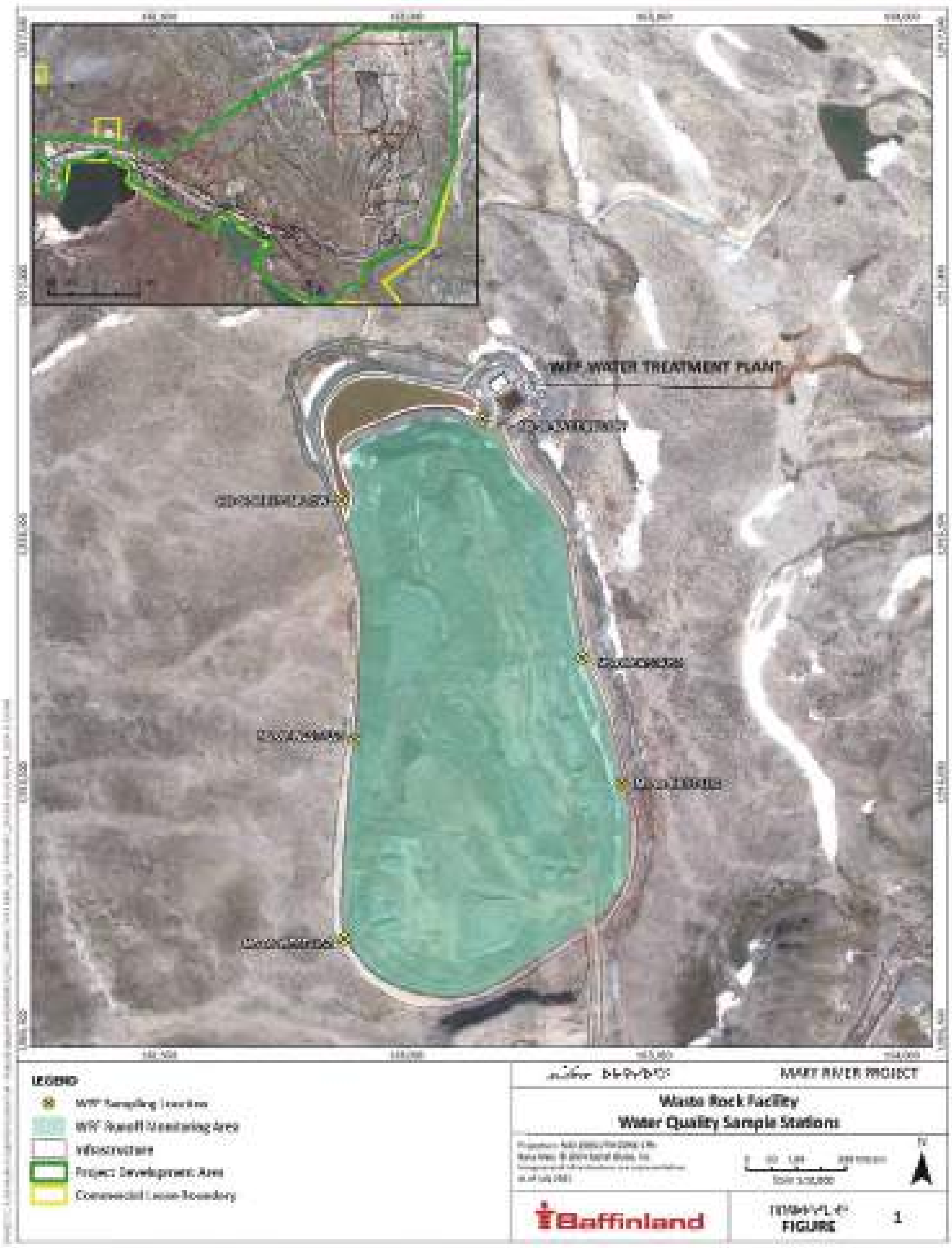


TABLE 2: TARGET FREQUENCY AND LOCATIONS FOR WATER QUALITY SAMPLING AT THE WRF

Monitoring Locations	Frequency	Parameters
East Ditch Inflow (To characterize water quality from waste rock facility into collection pond) • MS-08-EAST-INFLOW	Weekly during periods of Effluent discharge from WRF WTP.	As, Cu, Pb, Ni, Zn, TSS, oil and grease, pH, Conductivity, Temperature
West Ditch Inflow (To characterize water quality from waste rock facility into collection pond) • MS-08-WEST-INFLOW	Weekly during periods of Effluent discharge from WRF WTP.	As, Cu, Pb, Ni, Zn, TSS, oil and grease, pH, Conductivity, Temperature
Up-stream Ditch Sampling (To characterize water quality from waste rock facility at locations upstream of inflow) • MS-08-EAST-US1 • MS-08-EAST-US2 • MS-08-WEST-US1 • MS-08-WEST-US2	Weekly during periods of Effluent discharge from WRF WTP.	As, Cu, Pb, Ni, Zn, TSS, oil and grease, pH, Conductivity, Temperature
WRF Runoff Sampling (Opportunistic sampling locations that vary, assessing water quality of runoff within the facility to characterize more local water quality)	Opportunistic, based on presence of visibly flowing water, with target is to sample and analyze water quality 2x throughout the summer months by walking the WRF pile and sampling observed runoff flowing towards collection ditches.	As, Cu, Pb, Ni, Zn, TSS, oil and grease, pH, Conductivity, Temperature
Targeted Monitoring	If any areas have been identified for targeted water quality monitoring, the target is to opportunistically sample and analyze water quality from these locations 4x throughout the summer months, with sampling dates spaced apart to characterize water quality throughout the summer period.	As, Cu, Pb, Ni, Zn, TSS, oil and grease, pH, Conductivity, Temperature

3.7 Quarterly Reporting Demonstrating Progressive Reclamation

Baffinland is committed to completing progressive reclamation of the WRF through installation of a 4.0 m cover of Non-AG waste over exposed PAG waste, with the objective of achieving and maintaining an exposed PAG waste footprint of 15 %. On a quarterly basis, Baffinland will produce a report summarizing the results of this progressive reclamation, and details on all corrective actions and exceedances of the applicable regulatory requirement or trigger levels. Furthermore, Baffinland will provide the following documentation to regulators:

1. Drawings stamped by a NAPEG registered engineer showing the extents and design details of the Non-AG cover over the WRF, and the area of exposed PAG waste remaining to be covered.
2. Records supporting in-pit material identification and WRF placement.
3. Next 3-months material placement plan, highlighting planned changes in percent PAG exposure.

4 REFERENCES AND RECORDS

Baffinland Iron Mines Corporation (Baffinland), 2023. Waste Rock Management Plan-June 2023 through September 2026. Ref. No. 22572750-006-R-Rev0-5000, Rev. 0. December, 2023.

Appendix A: Trigger Action Response Plan (TARP)

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Material Classification	Ensuring accurate material categorization	Chemical characteristics and categorization of dig blocks	Monthly Audit of Dig Blocks	Dig blocks correctly designed/classified according to site standards.	Dig block <=10 kt incorrectly classified	Dig block >10 kt incorrectly classified	No action required.	Audit of load records and development of remediation plan (if applicable) depending on material placement location.	Moderate Response + 5-why investigation on dig map creation procedure and correction plan.
Material Classification	Ensuring accurate material categorization	Chemical characteristics and categorization of dig blocks	Quarterly Audit of Dig Blocks	Dig blocks correctly classified according to site standards	<=50 kt incorrectly classified	>50 kt incorrectly classified	No action required.	Audit of load records and development of remediation plan (if applicable) depending on material placement location.	Moderate Response + 3rd party review of dig map creation procedure and correction plan.
Material Classification	Ensuring accurate material categorization	Chemical characteristics and categorization of dig blocks	Quarterly Total Sulfur vs ABA confirmation test work, and SFE analysis	<2% of material types improperly allocated.	<5% of results inconsistent with original blasthole results	>5% of results inconsistent with original blasthole results	No action required.	Review location of inconsistent result and complete audit of dig map results and load records associated to the dig block(s). Internal review of QAQC sampling procedures. Perform batch analysis of additional samples for ABA testing. Development of remediation plan (if applicable) depending on material placement location.	Moderate Response + 3rd party review of material classification criteria for potential development and implementation of revised criteria.
Material Classification	Ensuring accurate material categorization	Chemical characteristics and categorization of dig blocks	Annual Total Sulfur vs ABA confirmation test work, and SFE analysis	<2% of material types improperly allocated.	<3% of results inconsistent with original blasthole results within the last year	>3% of results inconsistent with original blasthole results within the last year	No action required.	Internal review of QAQC sampling procedures. Perform a batch analysis on additional blasthole samples for ABA analysis. If still warranted, initiate a 3rd party review of material classification criteria for potential revision.	Moderate Response + Executive level review meeting, immediate adjustment to mine and dump plan to ensure encapsulation of PAG material.
Material Classification	Ensuring accurate material categorization	Loading unit dig block and dump location selection accuracy	Weekly Audit of FMS Load/Dump Records	<=1% PAG loads incorrectly Assigned	<=10% PAG loads incorrectly Assigned	>10% PAG loads incorrectly Assigned	No action required.	Geology to report finding(s) to Mine Ops Superintendent for review with dispatchers and/or operators. Audit of load records and development of remediation plan (if applicable) depending on material placement location.	Moderate response + Internal meeting with Mine Ops teams to review FMS system results and development of corrective action plan.
Material Classification	Ensuring accurate material categorization	Loading unit dig block and dump location selection accuracy	Monthly Audit of FMS Load/Dump Records	<=1% PAG loads incorrectly Assigned	<=5% PAG loads incorrectly Assigned	>5% PAG loads incorrectly Assigned	No action required.	Internal meeting with Mine Ops teams to review FMS system results and development of corrective action plan. Audit of load records and development of remediation plan (if applicable) depending on material placement location.	Moderate response + 5-why investigation on incorrect load assignment issues and development of corrective actions.

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Execution Control	Adherence to WRMP	Dump Compliance	Weekly Review	>=90% of PAG loads are within the primary weekly dumping location. 100% of loads within allowed PAG dumping locations	>=75% of PAG loads are within the primary weekly dumping location. >=95% of loads within allowed PAG dumping locations	<75% of PAG loads are within the primary weekly dumping location or <95% of loads within allowed PAG dumping locations	No action required.	Audit of load records and development of remediation plan (if applicable) depending on material placement location. Non-compliant loads to be tracked in BIM tracking database with clear tracking of any remediation actions taken. Informal review of weekly plan with Mine Ops to understand reason secondary dumping location is being used.	Moderate response + Internal Review of non-compliant dumps by Mine Operations and Technical Services and development of corrective action plan
Execution Control	Adherence to WRMP	Dump Compliance	Monthly Review	>=75% of PAG loads are within the primary monthly dumping location. 100% of loads within allowed PAG dumping locations	>=50% of PAG loads are within the primary monthly dumping location and >=95% of loads within allowed PAG dumping locations	<50% of PAG loads are within the primary monthly dumping location or <95% of loads within allowed PAG dumping locations	No action required.	Audit of load records and development of remediation plan (if applicable) depending on material placement location. Internal review of monthly performance by Tech. Svcs. And Mine Ops and development of corrective action plan.	Moderate response + 5-why on dumping deviation and corrective action plan.
Execution Control	Adherence to WRMP	Dump Compliance	Quarterly Reporting and Planning	100% of loads within allowed PAG dumping locations	>=99% of loads within allowed PAG dumping locations	<99% of loads within allowed PAG dumping locations	No action required.	Audit of load records and development of remediation plan (if applicable) depending on material placement location. 5-why on dumping deviations and corrective action plan.	Moderate Response + Formal report to Regulators detailing the reasons for non-compliance and formal action plan to improve dump compliance by the following quarter.
Execution Control	Adherence to WRMP	Dump Checklist Tracking	Weekly Review	Dumping limits and areas are clearly marked in the field	<5 Reports by Supervisors of insufficient field controls	>5 Reports by Supervisors of insufficient field controls	No action required.	Internal Tech. Svcs. Manager review of WRMP QA/QC procedure with Survey team and development of corrective action plan.	Moderate Response + 5-why investigation on recurrent lack of field controls and corrective action plan.
Execution Control	Adherence to WRMP	Lift Thickness Cover Thickness	Monthly Internal Review	Lift thickness, Cover thickness 100% compliant	Lift thickness, Cover thickness and >=95% compliant	Lift thickness, Cover thickness <95% compliant	No action required	Internal Tech. Svcs./Mine Ops review of monthly non-compliances and development of corrective action plan (i.e. increasing thickness to minimum 4.0 m).	Moderate Response + 5-why investigation on non-compliance and development of corrective action (i.e. increasing thickness to 4.0m).
Execution Control	Adherence to WRMP	Lift Thickness Cover Thickness	Quarterly Reporting and Planning	Lift thickness, Cover thickness 100% compliant	Lift thickness, Cover thickness >=98% compliant	Lift thickness, Cover thickness <98% compliant	No action required	Internal Tech. Svcs./Mine Ops review of monthly non-compliances and development of corrective action plan (i.e. increasing thickness to minimum 4.0 m).	Moderate Response + 5-why investigation on non-compliance and development of corrective action (i.e. increasing thickness to 4.0m).

Project Activity	Objectives	Performance Indicators	Monitoring Program / Plan	Condition Status / Threshold			Pre-defined Response(s)		
				Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Execution Control	Verify material characterization of Non-AG cover material	Material classification of Non-AG cover in line with plan	WRF Surface Sampling Program	All samples collected are verified as Non-AG	A PAG sample is identified in a Non-AG location. Follow-up sample returns Non-AG	Initial and follow-up sampling at location identified cover material as PAG	No action required	Resample the location to confirm results. Notify Mine Operations of non-conformance. Quarterly report to note locations that required follow-up testwork.	5-why investigation on non-compliance and development of corrective action (e.g. additional Non-AG cover layer, etc). The non-conformance and associated corrective actions will be reported at the next Quarterly report.
Ditch and Inflow WQ Monitoring	Characterize water quality within the Waste Rock Facility water containment structures for closure planning purposes	As, Cu, Pb, Ni, Zn, TSS, pH.	WRF QA/QC	Ditch and Inflow WQ Monitoring is at or above Lower Level Action Limits for one of the performance indicators for two samples in a row (Table A1).	Ditch and Inflow WQ Monitoring is at or above Lower Level Action Limits for two or more performance indicators or a single performance indicator for 1year (Table A1).	Ditch and Inflow WQ Monitoring is at or above Lower Level Action Limits for two or more performance indicators or a single performance indicator for 2 or more years (Table A1).	Env't Dept: Conduct investigation into potential sources of input (Internal WRF WQ Monitoring Trend Analysis). Tech. Svcs. Dept.: Review waste rock placement strategy and ARD testing results, if Env't investigation identifies specific area. Review thermistor results for trends or anomalies.	Tech. Svcs. Dept.: Engage third party to review monitoring results and identify if any modifications are required to QA/QC Plan, waste disposition strategy or monitoring locations, or frequencies.	Tech. Svcs. Dept.: Engage third party to review monitoring results and identify if any additional contingencies are required, or if changes are required to be made to the Operational WRMP.
Internal WRF WQ Monitoring	Characterize water quality within the Waste Rock Facility water containment structures for closure planning purposes	As, Cu, Pb, Ni, Zn, TSS, pH	WRF QA/QC	Internal WRF WQ Monitoring is at or above Lower Level Action Limits for one of the performance indicators for two samples in a row (Table A1).	Internal WRF WQ Monitoring is at or above Lower Level Action Limits for two or more performance indicators or a single performance indicator for 1 year (Table A1).	Internal WRF WQ Monitoring is at or above Lower Level Action Limits for two or more performance indicators or a single performance indicator for 2 or more years (Table A1).	Env't Dept: Conduct investigation into potential sources of input (Internal WRF WQ Monitoring Trend Analysis). Tech. Svcs. Dept.: Review waste rock placement strategy and ARD testing results, if Env't investigation identifies specific area. Review thermistor results for trends or anomalies.	Tech. Svcs. Dept.: Engage third party to review monitoring results and identify if any modifications are required to QA/QC Plan, waste placement, deposition or monitoring locations, or frequencies.	Tech. Svcs. Dept.: Engage third party to review monitoring results and identify if any additional contingencies are required, or if changes are required to be made to the Operational WRMP.

Table A1: WRF Water Quality Lower Action Levels and Water Licence/MDMER Limits

Performance Indicators	Lower Action Levels (mg/L)		WL/MDMER Limits (mg/L)	
	Monthly Mean	Grab Sample	Monthly Mean	Grab Sample
Arsenic	0.24	0.48	0.30	0.60
Copper	0.24	0.48	0.30	0.60
Lead	0.08	0.16	0.10	0.20
Nickel	0.4	0.8	0.50	1.00
Zinc	0.4	0.8	0.50	1.00
pH	6.2 - 9.0	6.2 - 9.0	6.0 - 9.5	6.0 – 9.5
TSS	12	24	15.00	30.00