Appendix D

DFO Notification Form

NOTIFICATION FORM

Fisheries and Oceans Canada
Code of Practice

PROPONENT INFORMATION

NAME:
STREET ADDRESS:
CITY/TOWN: PROVINCE/TERRITORY: POSTAL CODE:
TEL. NO. (RESIDENCE): TEL. NO. (WORK):
FAX NO: EMAIL ADDRESS:

CONTRACTOR INFORMATION (provide this information if a Contractor is working on behalf of the Proponent)

NAME:
STREET ADDRESS:
CITY/TOWN: PROVINCE/TERRITORY: POSTAL CODE:
TEL. NO. (RESIDENCE): TEL. NO. (WORK):
FAX NO: EMAIL ADDRESS:

PROJECT INFORMATION

Select the codes of practice that are being used (check all applicable boxes):

- ☐ Beaver dam removal
- ☐ Routine maintenance dredging
- ☐ Temporary stream crossings
- ☐ Culvert maintenance
- ☐ Temporary cofferdams and diversion channels
- ☐ End of pipe fish screens

Select the type of water body or watercourse at or near your project:

- ☐ River, Stream, Creek
- ☐ Lake (8 hectares or greater)
- ☐ Pond or wetland (pond is less than 8 hectares)
- ☐ Marine (Ocean or Sea)
- ☐ Estuary
- ☐ Riparian

PROJECT LOCATION (S) (Append multiple project locations on an additional sheet if necessary)

Name of water body or watercourse	Coordinates of the Project (UTM co-ordinate or Degrees, Minutes, Seconds), if available Easting: Northing: Latitude: Longitude:
Legal Description (Plan, Block, Lot, Concession, Township, Section, Range)	Directions to Access the Project Site (i.e., Route or highway number, etc.)
Proposed Start Date (YYYY/MM/DD): Click or tap to enter a date.	**Proposed Completion Date** (YYYY/MM/DD): Click or tap to enter a date.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail, email or by fax, this notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to the code of practice.

I, _____ (print name)
certify that the information given on this form is, to the best of my knowledge, correct and complete.

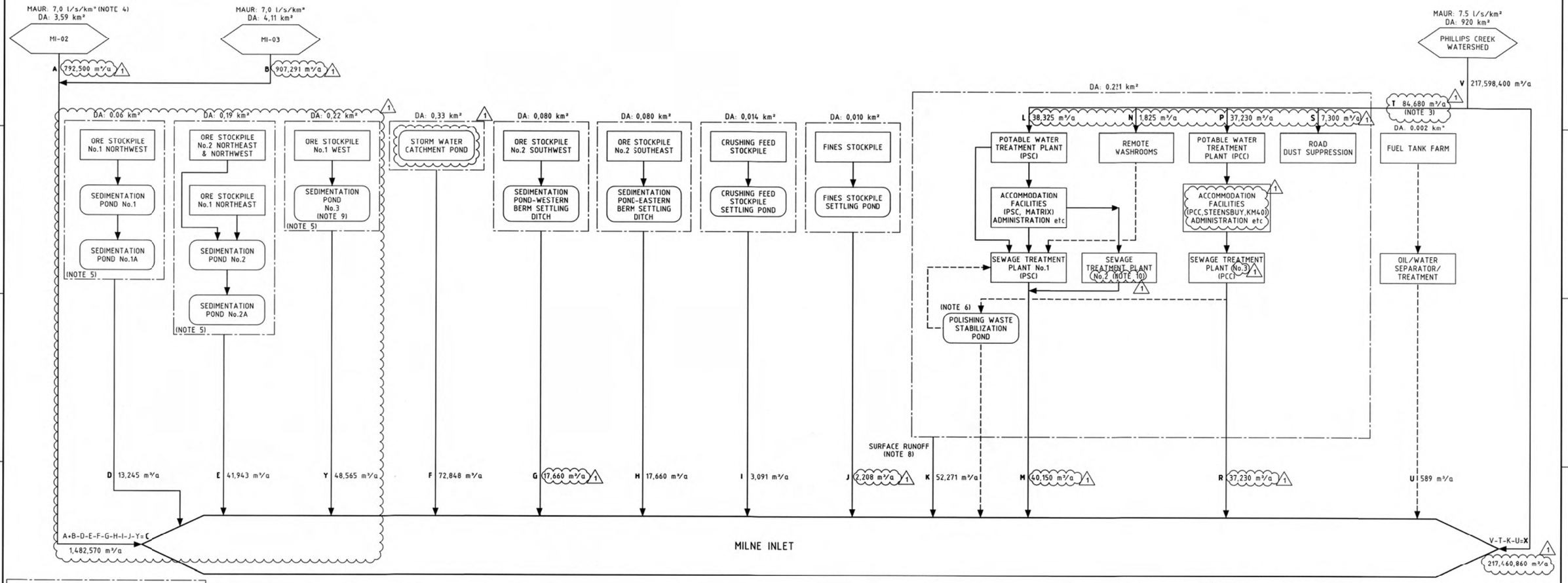
_____ _____
Signature Date

Note: Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the Fish and Fish Habitat Protection Provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-SCI-605. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to, any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provisions of the *Access to Information Act*.

Aussi disponible en français

Appendix E
Site Water Balances

DWG No. H353004-40000-270-252-0002-0001



LEGEND

- IMPACTED WATERSHED
- DEVELOPMENT AREAS
- DEVELOPMENT AREAS SUBJECT TO APPROVAL
- STORMWATER PONDS
- CONTINUOUS OR WATERSHED FLOW
- INTERMITTENT FLOW
- A/AA 100,000 — ANNUAL VOLUME (m³/a)
- MAUR — MEAN ANNUAL UNIT RUNOFF (l/s/km²)
- PSC — PORT SITE COMPLEX
- PCC — PORT CONSTRUCTION CAMP
- MSC — MINE SITE COMPLEX
- DA — DRAINAGE AREA (km²) 1

NOTES:

1. SITE LAYOUT PER DRAWING H353004-00000-220-272-0001-0001, REV 3.
2. REFER TO PROCESS FLOW DIAGRAM H353004-40000-270-282-0001-0001, FOR MORE DETAILED WATER SUPPLY AND WASTE WATER TREATMENT.
3. RAW WATER SUPPLY FLOW RATE FROM PHILIPS CREEK (SUMMER) & KM32 LAKE (WINTER/SUMMER) ARE CURRENTLY EQUAL TO OR LESS THAN TYPE A WATER LICENCE 2AM-MRY1325 FLOW RATE LIMIT OF 68.5m³/day (25,000m³/year) PLUS TYPE B WATER LICENCE 8BC-MRY-1416 FLOW RATE LIMIT OF 299m³/day (109,135m³/year) TOTAL.
4. MAUR IN WATERSHEDS MI-02 AND MI-03 LIKELY RANGE BETWEEN 5 AND 7.5 l/s/km². PART OF THE MI-03 NATURAL CATCHMENT WILL BE USED FOR PROPOSED INFRASTRUCTURE CONSTRUCTION.
5. ORE STOCKPILE AND SEDIMENTATION POND CONSTRUCTION SUBJECT TO APPROVAL. ORE STOCKPILES RECEIVE ONLY PRECIPITATION AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
6. USE OF POLISHING WASTE STABILIZATION POND WILL OCCUR ON A CONTINGENCY BASIS ONLY, SHOULD OFF-SPEC TREATED SEWAGE EFFLUENT BE PRODUCED AND CANNOT BE RECYCLED. 1
7. PLANT SITE RECEIVES ONLY PRECIPITATION-RUNOFF AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
8. REFER ERP SURFACE WATER AND AQUATIC ECOSYSTEM MANAGEMENT FROM H349000-1000-07-126-0005, REV 1 FOR CATCHMENT AREA INFORMATION.
9. STOCKPILE No.1 DEVELOPMENT - POND 3 NORTH AND SOUTH
10. STP MOVED FROM MSC. 1

PERMIT TO PRACTICE
HATCH LTD.
Signature. James Wikston 2019.04.17 12:19:10 -04'00'
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER J.M. WIKSTON LICENSE 249-04-4 NT/NU

FOR USE

No.	DESCRIPTION	BY	CHK'D	DATE
1	STOCKYARD 1 AND PSC UPGRADE	LS	PC	10-04-2019
0	APPROVED FOR USE	HV	PC	12-09-2018

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT		24-08-2018
DESIGNER			
CHECKER	P CHERRY		2019-04-16
DESIGN COORD.	R GOOSEN		2019-04-16
RESP. ENG.	J WIKSTON		2019.04.17 12:18:54 -04'00'
LEAD DISC. ENG.	P CHERRY		2019-04-16
AREA LEAD	V LAVRIC		2019-04-17
ENG. MANAGER	R GOOSEN		2019-04-16
AREA MANAGER	T ATIBA		19-04-19

DRAWING APPROVAL STATUS: Approved for Use

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

PORT SITE
AREA WATER BALANCE
BLOCK FLOW DIAGRAM

DRAWING No.	DRAWING TITLE
H349000-2000-10-002-0002	PORT SITE - WATER BALANCE - BLOCK FLOW DIAGRAM

REFERENCE DRAWINGS

REG. PROFESSIONAL

SCALE NTS OR AS NOTED

DWG. No. H353004-40000-270-252-0002-0001

REV 1

SHEET SIZE: D

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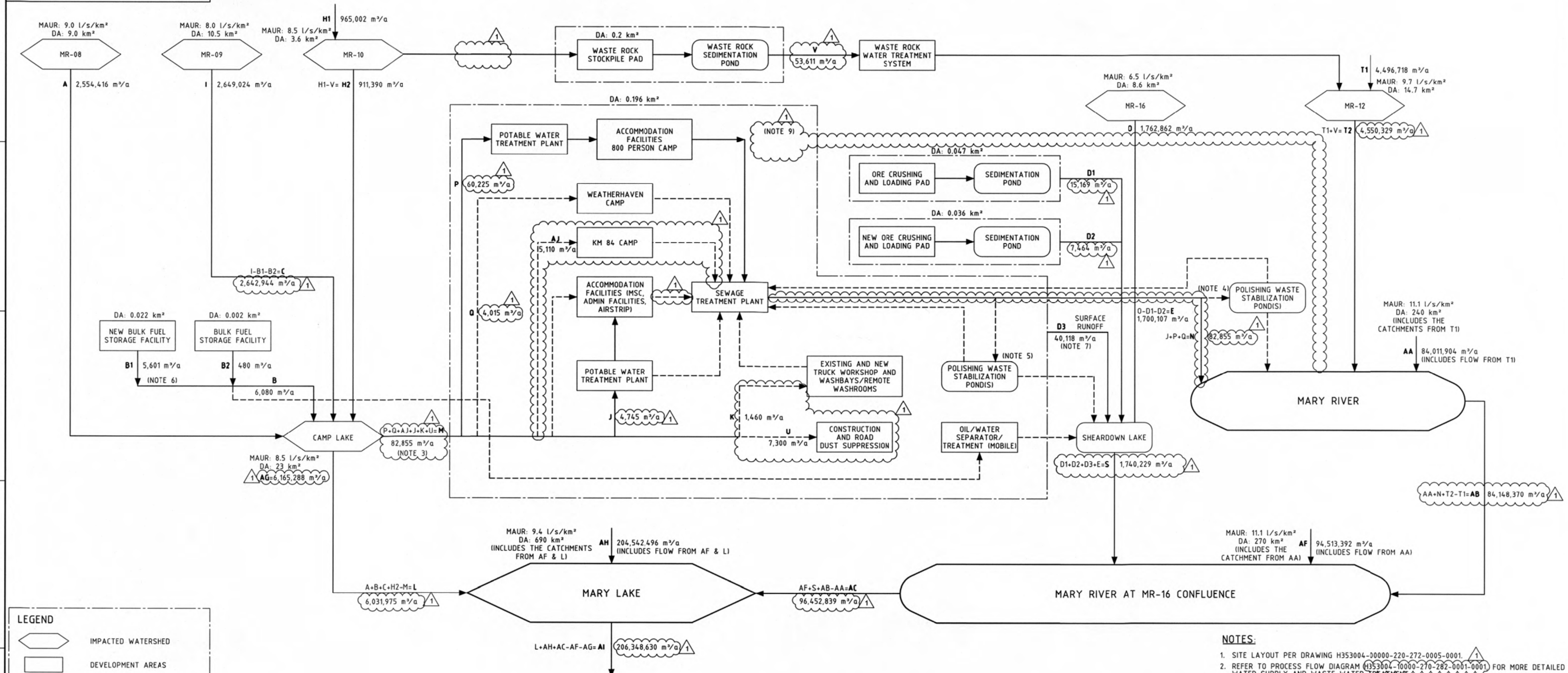
H353004-10000-270-252-0002-0001
DWG. No.



LEGEND

(hexagon)	IMPACTED WATERSHED
(rectangle)	DEVELOPMENT AREAS
(dotted rectangle)	DEVELOPMENT AREAS SUBJECT TO APPROVAL
(rounded rectangle)	STORMWATER PONDS
(solid arrow)	CONTINUOUS OR WATERSHED FLOW
(dashed arrow)	INTERMITTENT FLOW
A/AA 100,000	ANNUAL VOLUME (m^3/a)
MAUR	MEAN ANNUAL UNIT RUNOFF (l/s/km^2)
MSC	MINE SITE COMPLEX
DA	DRAINAGE AREA (km^2)

NOTES:

1. SITE LAYOUT PER DRAWING H353004-00000-220-272-0005-0001.
2. REFER TO PROCESS FLOW DIAGRAM H353004-10000-270-282-0001-0001 FOR MORE DETAILED WATER SUPPLY AND WASTE WATER TREATMENT.
3. RAW WATER SUPPLY FLOW RATE CAMP LAKE IS EQUAL TO OR LESS THAN TYPE A WATER LICENCE 2AM-MRY1325 FLOW RATE LIMIT OF 657.5m^3/day (240,000m^3/year) TOTAL.
4. USE OF POLISHING WASTE STABILIZATION POND PRIOR TO MARY RIVER DISCHARGE WILL OCCUR ON A CONTINGENCY BASIS ONLY, IN THE EVENT OF OFF-SPEC TREATED SEWAGE EFFLUENT.
5. USE OF POLISHING WASTE STABILIZATION POND AND SHEARDOWN LAKE DISCHARGE WILL OCCUR ON A CONTINGENCY BASIS ONLY, SHOULD CAPACITY BE EXCEEDED THROUGH THE SEWAGE TREATMENT SYSTEM DISCHARGING TO MARY RIVER.
6. BULK FUEL STORAGE AREA RUNOFF DRAINED TO ENVIRONMENT IF QUALITY SATISFIES DISCHARGE REQUIREMENTS; OTHERWISE IS CONVEYED TO MOBILE OIL/WATER SEPARATOR FOR TREATMENT PRIOR TO DISCHARGE.
7. PLANT SITE RECEIVES ONLY PRECIPITATION-RUNOFF AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
8. REFER ERP SURFACE WATER AND AQUATIC ECOSYSTEM MANAGEMENT FROM H349000-1000-07-126-0005, REV 1.
9. MSC STP MOVED TO PORT.

PERMIT TO PRACTICE
HATCH LTD.
Signature 2019.04.17 12:22:11 -04'00'
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

DRAWING No.	DRAWING TITLE
H349000-4000-10-002-0002	MINE SITE - WATER BALANCE - BLOCK FLOW DIAGRAM

REFERENCE DRAWINGS

REGISTERED PROFESSIONAL ENGINEER J.M. WIKSTON LICENSEE 2019-04-17 NT/NU
REG. PROFESSIONAL

FOR USE

No.	DESCRIPTION	BY	CHK'D	DATE
1	MSC DORMITORIES AND STP MOVED TO PORT	LS	PC	10-04-2019
0	APPROVED FOR USE	HV	PC	12-09-2018

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT	NR	24-08-2018
DESIGNER		NR	
CHECKER	P CHERRY	(signed)	2019-04-16
DESIGN COORD.	R GOOSEN	(signed)	2019-04-16
RESP. ENG.	J WIKSTON	(signed)	2019.04.17 12:21:48 -04'00'
LEAD DISC. ENG.	P CHERRY	(signed)	2019-04-16
AREA LEAD	M HAAKSMA	(signed)	2019-04-16
ENG. MANAGER	R GOOSEN	(signed)	2019-04-16
AREA MANAGER	T ATIBA	(signed)	19-04-17

DRAWING APPROVAL STATUS: Approved for Use

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

MINE SITE
AREA WATER BALANCE
BLOCK FLOW DIAGRAM

SCALE NTS OR AS NOTED
DWG. No. H353004-10000-270-252-0002-0001
REV 1
SHEET SIZE: D

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16-APR-2019 09:24
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Appendix F
Environmental Guidelines for Project Water Crossing Repairs and/or Installations

Appendix C

Environmental Guidelines for Project Water Crossing Repairs, Modifications and/or Installations

C.1 - Water Quality Monitoring Requirements and Guidelines

Prior to, during and following construction work that involves the repair, modification and/or installation of a water crossing (e.g. culvert, bridge), water quality monitoring will be conducted upstream and downstream of the affected water crossing(s). The following subsections discuss the monitored parameters, monitoring methods, sampling/monitoring locations and frequency for each phase of monitoring (pre, during and post).

1. Monitored Parameters

Monitored parameters and the method at which each parameter will be monitored are listed below.

i. Discrete Water Samples
   a. Total Suspended Solids (TSS; mg/L)
   b. Total Dissolved Solids (TDS; mg/L)
   c. pH (pH units)

ii. Field Monitoring (*in-situ*)
   a. Turbidity (NTU)
   b. pH (pH units)
   c. Specific Conductivity (µS/cm)
   d. Water Temperature (°C)
   e. Dissolved oxygen (mg/L, %)
   f. Presence/Absence of Sheen (visual inspection)

2. Methods and Equipment

Field monitored parameters will measured using a calibrated, multi-parameter water quality probe (e.g. YSI). A visual inspection will be conducted to determine the presence or absence of sheen.

Discrete water samples will be collected in accordance with the protocols outlined in Baffinland's Surface Water Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001; QA/QC Plan).

3. Monitoring Locations

Concurrent water sampling and field monitoring will be conducted at locations 100 metres downstream and 50 metres upstream of each water crossing being repaired, modified and/or installed. Field monitoring will also occur at a location 50 metres downstream of the affected water crossing. Deviations from these distances due to safety and/or accessibility concerns will be documented on the *Water Crossing Monitoring Form.*

Monitoring events will start at the monitoring location furthest downstream of the affected water crossing and progress in an upstream direction to prevent monitoring results from being affected by sediment re-suspended during sampling activities (e.g. stream bed disturbance).

4. Water Sampling and Monitoring Frequency

The following subsections discuss the frequency at which water quality monitoring will be conducted at water crossings that are repaired, modified and/or installed. Water quality is monitored prior to, during and following construction. Post-construction monitoring described below has been designed to assess the performance of the water crossing during an open water season and ensure water quality impacts, if any, are acceptable based on applicable water quality action levels.

Table C-1 – Summary of Water Quality Monitoring Frequency

Monitoring Method	Monitoring Phase		
	Pre-Construction	During Construction	Post Construction
Water Sampling	One (1) sampling event at locations 100 m downstream and 50 m upstream of the affected water crossing.	Every eight (8) hours at locations 100 m downstream and 50 m upstream of the affected water crossing. Adaptive water sampling events will also be conducted when downstream flows are suspected of encroaching on TSS and turbidity action levels.	One sampling event in June, July and August at locations 100 m downstream and 50 m upstream of the affected water crossing. Sampling events will occur at least 10 days apart.[2]
Field Monitoring	One (1) monitoring event (alongside water sampling event) at locations 100 m and 50 m downstream and 50 m upstream of the affected water crossing.	Every four (4) hours at locations 100 m and 50 m downstream and 50 m upstream of the affected water crossing.[1] Field monitoring will also be conducted alongside adaptive water sampling events outlined above.	Field monitoring will be conducted concurrently with the water sampling events listed above.[2]

Notes:

[1]Field monitoring should be conducted concurrently with water samples collected every eight (8) hours to allow for TSS/turbidity curve development.

[2]Additional monitoring may be required if applicable water quality action levels are exceeded. Refer to action response framework for post-construction performance monitoring presented in Section 7, ii.

i. Pre-Construction Monitoring

Concurrent water sampling and field monitoring will be conducted at least once at locations 100 metres downstream and 50 metres upstream of the water crossing to be repaired, modified and/or installed. During the same monitoring event, field monitoring will also be conducted at a location 50 metres downstream of the affected water crossing.

ii. During Construction Monitoring

Water samples will be collected at locations 100 metres downstream and 50 metres upstream of the affected water crossing every eight (8) hours. Field monitoring will occur at locations 100 metres and 50 metres downstream and 50 metres upstream of the affected water crossing every four (4) hours. Additional adaptive monitoring events will be conducted if downstream flows are suspected of encroaching on TSS and turbidity action levels, outlined in Section 5 below.

The during construction action response framework, provided below in Section 7, i, will be used for assessing during construction monitoring results and the performance of construction mitigation measures (i.e. silt fences) implemented.

iii. Post-Construction Monitoring

Post-construction water quality monitoring, at a minimum, will consist of three (3) concurrent water sampling and field monitoring events conducted during the open water season following the completion of construction at a water crossing. Water quality will be monitored during high flows (June), medium flows (July) and low flows (August) at locations 100 metres downstream and 50 metres upstream of the water crossing. Water sampling and field monitoring events will occur at least 10 days apart.

For example, a water crossing repaired, modified and/or installed during frozen conditions would be monitored at least once during June, July and August of the following open water season. In contrast, a water crossing repaired, modified and/or installed during July, would be monitored at least once during the following month (August) and once again during June and July of the following year. This approach will ensure that a modified water crossing's performance is assessed and determined to be adequate for varying flow conditions, representative of flow conditions during a typical open water season.

As shown in the post construction action response framework in Section 7, ii, below, additional monitoring events may be required if elevated TSS and/or turbidity are observed during sampling/monitoring events.

5. Water Quality Action Levels

Environmental concerns associated with construction work and the performance of water crossings focus on the potential effects of elevated suspended solids (sedimentation) on aquatic receiving environments. As such, turbidity and TSS monitoring conducted prior to, during and following construction on water crossings will be used to inform mitigation and management actions. Table C-1 outlines the water quality action levels that will be used to assess monitoring results during the first year of implementation. Action levels outlined below will be reassessed following the first year of implementation.

Table C-1 –Water Quality Action Levels

Parameter	Monitoring Phase		
	Pre-Construction	During Construction	Post Construction
Turbidity (NTU)	None. TSS will be the parameter used to assess the pre-construction water quality conditions near water crossings.	An increase of 25 NTU from background levels (DFO, 1999)[1], or an appropriate action level derived from site-specific TSS/turbidity datasets. The turbidity monitoring action level will be used to inform mitigation and management actions in the field, as outlined in the action response framework detailed in Section 7, i, below.	None. TSS will be the parameter used to assess the post-construction water quality conditions near water crossings.
TSS (mg/L)	A maximum increase of 50 mg/L from background levels (upstream) when background levels are between 25 and 250 mg/L. A maximum increase of 10% of background levels when background levels are greater than 250 mg/L.[2]	A maximum increase of 100 mg/L from background levels (upstream).[3]	A maximum increase of 50 mg/L from background levels (upstream) when background levels are between 25 and 250 mg/L. A maximum increase of 10% of background levels when background levels are greater than 250 mg/L.[2]

Notes:

[1] An increase of 25 NTUs approximates to an increase of 100 mg/L TSS (adapted from DFO, 1999)[1]

[2] Based on low risk to aquatic organisms, expressed as an increase over background levels (adapted from DFO, 1999)

[1] Department of Fisheries and Oceans Canada (DFO), 1999. The Effects of Sediment on Fish and their Habitat. ISSN 1480-4883.

[3] During construction TSS action level used in Aquatic Effects Monitoring Plan & Surveillance Network Program: Construction of the Inuvik to Tuktoyaktuk Highway (Government of NWT, 2014)

Water quality sampling, in comparison to the Type 'A' Water Licence criteria, will continue to be reported in the NWB/QIA Annual Report for Operations.

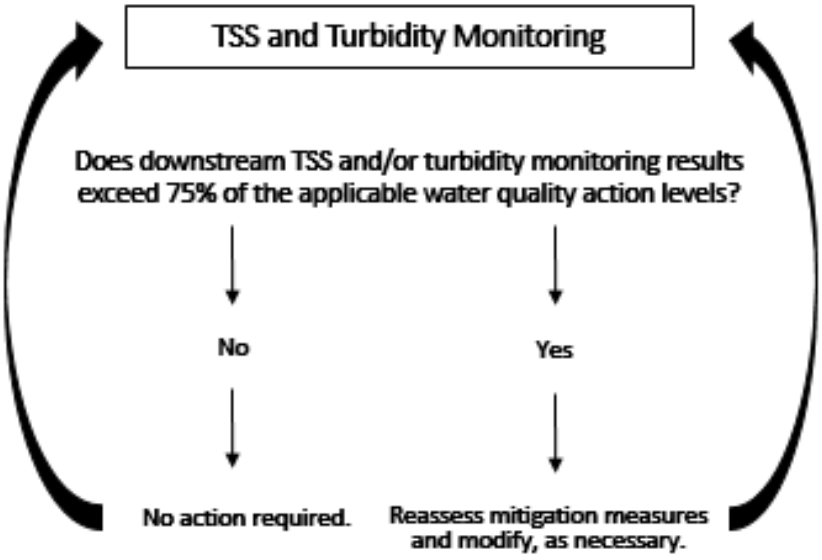
6. Data Management

All data collected during monitoring activities will be documented using the *Water Crossing Monitoring Form.* A *Water Crossing Monitoring Form* will be completed for each water crossing that is repaired, modified and/or installed. All documentation, including photos, will be saved on the onsite Environmental server.

7. Action Response Framework

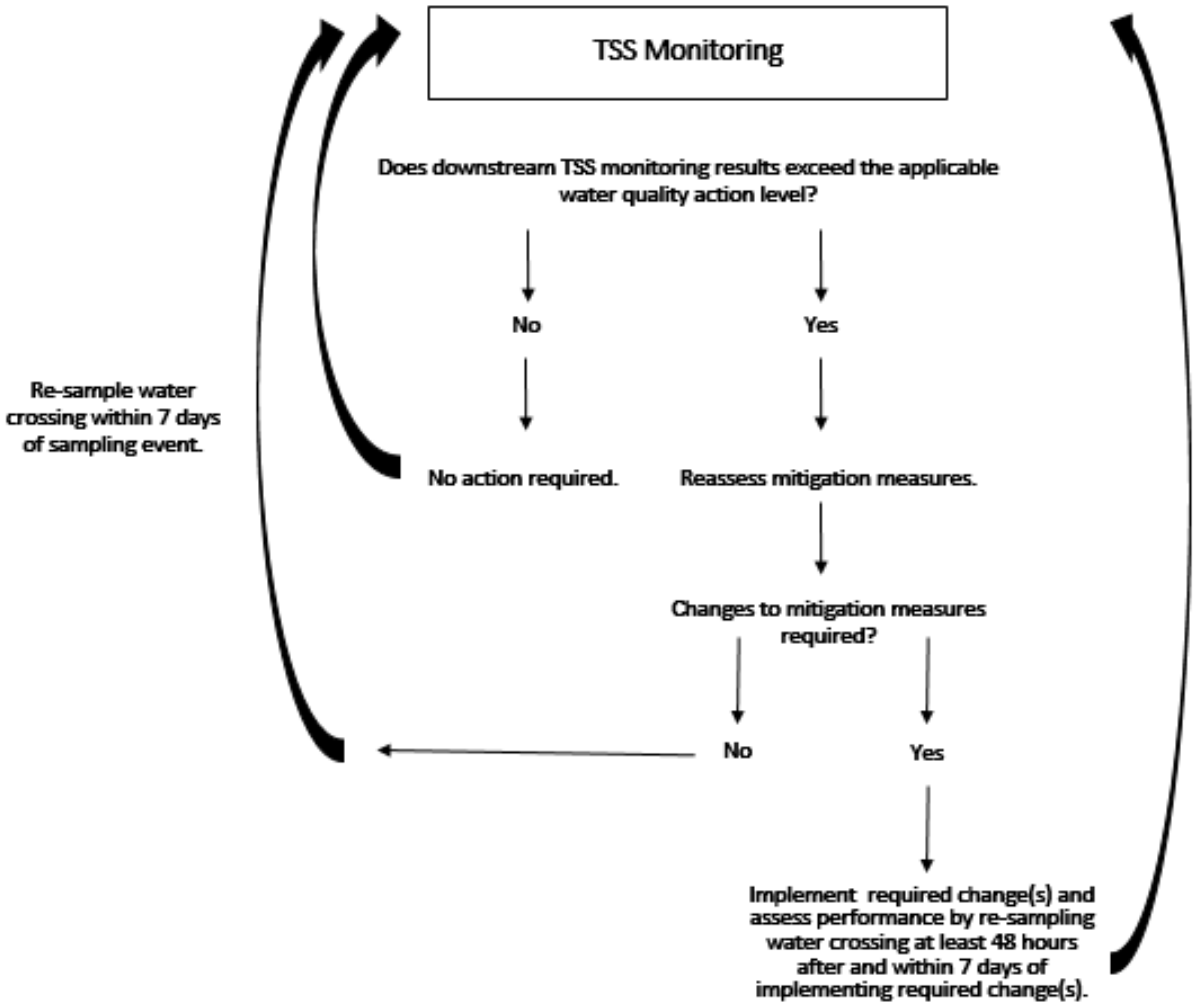
i. During Construction

The following action response framework will be used to assess the performance of the mitigation measures used during construction activities on water crossings, during periods of flow.



ii. Post- Construction

The following action response framework will be used to assess the performance of the water crossings in regards to water quality impacts following construction activities.



8. Data Reporting Requirements and Interpretation

Data collected during the monitoring program will, at a minimum, be presented in the Annual Report prescribed by the Project's Commercial Lease with the QIA and the Type 'A' Water Licence, issued by the NWB. In the Annual Report, Baffinland will present the data, compare the data against the interim water quality actions levels presented in Table C-1 and the Type 'A' Water Licence criteria and outline Baffinland's interpretation of the data and plans for any additional monitoring.

C.2 - Construction and Monitoring Guidelines during Frozen Conditions

2. General

All materials and equipment used for site preparation and construction shall be operated and stored in such a manner that prevents deleterious substances from entering nearby water bodies. Specifically:

a. Any excavated and stockpiled materials shall be stored and stabilized in a designated area that is at least 31 metres from the ordinary High Water Mark of nearby water bodies.
b. Any part of a vehicle and/or equipment entering the water shall be free of fluid leaks and externally cleaned/degreased;
c. Vehicle and equipment washing, re-fuelling, and/or maintenance shall be conducted in a location that is at least 31 metres from the ordinary High Water Mark of nearby water bodies.
d. Vehicles and equipment involved with construction activities shall be operated in a way that minimizes the disturbance to the banks of the watercourse/waterbody. If disturbance occurs, the banks shall be restored.
e. Fuel and any other materials associated with the servicing of machinery shall be stored at least 31 metres from the ordinary High Water Mark of nearby water bodies.

3. Typical Scope of Work for Culvert Repair/Installation

The basic construction scope of work expected at a culvert includes the following activities:

a. Excavate to desired elevation to install new or extend existing culvert(s).
b. Install new culverts, or new culvert lengths/extensions.
c. Back fill with compaction to finished grade.
d. Place rip-rap at culvert inlet and outlet ends, as required.
e. Clean up loose material around the culvert(s) prior to freshet to mitigate water quality impacts from construction.

4. Monitoring Activities

a. Take pre, during and post photographs of the affected water crossing, as outlined in the *Water Crossing Monitoring Form.*
b. Complete post-construction water quality monitoring during next open water season and record results and observations on the *Water Crossing Monitoring Form*, as outlined in Section C.1.
c. Include affected water crossing in the next biannual geotechnical inspection, prescribed by the Type 'A' Water Licence.
d. If fish bearing, include affected water crossing in the annual inspection of the Project's fish bearing water crossings, conducted by a Professional Fisheries Biologist.
e. Record all relevant information on *Water Crossing Monitoring Form*.

C.3 - Construction and Monitoring Guidelines during Periods of Flow

1. General

All materials and equipment used for site preparation and construction shall be operated and stored in such a manner that prevents deleterious substances from entering nearby water bodies. Specifically:

a. Any excavated and stockpiled materials shall be stored and stabilized in a designated area that is at least 31 metres from the ordinary High Water Mark of nearby water bodies.
b. Any part of a vehicle and/or equipment entering the water shall be free of fluid leaks and externally cleaned/degreased;
c. Vehicle and equipment washing, re-fuelling, and/or maintenance shall be conducted in a location that is at least 31 metres from the ordinary High Water Mark of nearby water bodies.
d. Vehicles and equipment involved with construction activities shall be operated in a way that minimizes the disturbance to the banks of the watercourse/waterbody. If disturbance occurs, the banks shall be restored.
e. Fuel and any other materials associated with the servicing of machinery shall be stored at least 31 metres from the ordinary High Water Mark of nearby water bodies.

2. Typical Scope of Work for Culvert Repair/Installation

The basic construction scope of work expected at a culvert includes the following activities:

a. Excavate to desired elevation to install new or extend existing culvert(s).
b. Install new culverts, or new culvert lengths/extensions.
c. Back fill with compaction to finished grade.
d. Place rip-rap at culvert inlet and outlet ends, as required.
e. Clean up loose material around the culvert(s) to mitigate water quality impacts from construction.

3. Pre-Construction Activities

Where there are construction activities occurring during periods of flow, the following steps will be taken prior to construction.

a. Complete a fish assessment prior to construction. Record information on the *Water Crossing Monitoring Form*.
b. If the stream survey yields the presence of fish, a salvage fishery will be conducted if any in-stream work is anticipated. If fish are present for any in-stream work, a barrier net will be placed downstream of the construction site to prevent additional fish potentially from accessing the construction site. Any fish present upstream of the barrier will be captured (using a backpack electrofisher) and transferred to fish-bearing habitat downstream of the barrier.

c. Take pre-construction photographs of the affected water crossing as outlined in the Water Crossing Monitoring Form.
d. Complete pre-construction water quality monitoring and record results and observations on the *Water Crossing Monitoring Form,* as outlined in Section C.1.
e. Install sediment control measures. Ensure sediment control measures are functioning properly prior to the start of construction. Record information on the *Water Crossing Monitoring Form*.
f. Record all relevant information on *Water Crossing Monitoring Form*.

4. During-Construction Activities

a. Complete construction activities.
b. Take during construction photographs of the affected water crossing as outlined in the *Water Crossing Monitoring Form*.
c. Complete during construction water quality monitoring and record results and observations on the *Water Crossing Monitoring Form*, as outlined in Section C.1.
d. Record all relevant information on *Water Crossing Monitoring Form*.

5. Post-Construction Activities and Performance Monitoring

a. Take post-construction photographs of the affected water crossing as outlined in the *Water Crossing Monitoring Form*.
b. Complete post-construction water quality monitoring and record results and observations on *Water Crossing Monitoring Form*, as outlined in Section C.1.
c. Include affected water crossing in the next biannual geotechnical inspection, prescribed by the Type 'A' Water Licence.
d. If fishing bearing, include affected water crossing in the annual inspection of the Project's fish bearing water crossings, conducted by a Professional Fisheries Biologist.
e. Record all relevant information on the *Water Crossing Monitoring Form*.

WATER CROSSING MONITORING FORM

Baffinland

WATER CROSSING MONITORING FORM
PART 1 - GENERAL INFORMATION

WATER CROSSING ID:									
Construction Duration:			**Start (YY/MM/DD XX:XX HRS):**		**Finish (YY/MM/DD XX:XX HRS):**				
During Frozen Conditions?	Yes / No								
During Periods of Flow?	Yes / No								
IF CONSTRUCTION OCCURS DURING PERIODS OF FLOW, COMPLETE ENTIRE FORM (PART 1 & PART 2A, B & C) (PRE, DURING AND POST CONSTRUCTION WATER QUALITY MONITORING)									
IF CONSTRUCTION OCCURS DURING FROZEN CONDITIONS, COMPLETE PART 1 & PART 2C OF THIS FORM (POST CONSTRUCTION WATER QUALITY MONITORING)									
CROSSING MODIFICATION / REPAIR DETAILS									
Change in existing design?	**Yes / No**		**If Yes, details of change:**						
Final Design (e.g. number of culverts, length, etc.):									
Applicable Approvals									
TRAN									
DFO Approvals									
Notes:									
LOCATION									
Datum:	**Zone:**								
Easting (m):	**Northing (m):**		**Elevation (from mapping):**						
Notes:									
FISH ASSESSMENT PRIOR TO CONSTRUCTION									
Date (YY/MM/DD):									
Fish Present?	Yes / No		**If Yes, distance from crossing:**					US / DS	
Spawning Arctic charr present at crossing?			Yes / No		If Yes, contact a biologist				
Spawning site present 20 m upstream or downstream of crossing?			Yes / No						
Notes:									
SEDIMENT AND EROSION CONTROL MEASURES									
Measures Installed:					Date installed:				
					Date removed:				
Measures taken to stabilize disturbed areas:									
Notes:									
PHOTOS									
View across water crossing, view from upstream, view from downstream and view of sediment controls employed.									
	Photo #	**Date (YY/MM/DD)**	**Direction**	**Vantage Point**		**Photo #**	**Date (YY/MM/DD)**	**Direction**	**Vantage Point**
Before					**After**				
Across					Across				
From US					From US				
From DS					From DS				
During					**Sed. Cont.**				
Across					Across				
From US					From US				
From DS					From DS				
Notes:									

Baffinland

WATER CROSSING MONITORING FORM
PART 2A - PRE-CONSTRUCTION WATER QUALITY MONITORING

WATER CROSSING ID:											Pg. (X/X):
Location (e.g. 100 m downstream)	Date (YY/MM/DD)	Time (XX:XX HRS)	Field Monitoring						Water Sample Collected (Yes / No)	Lab Water Sample ID	Notes
			Turbidity (NTU)	pH (pH Units)	Sp. Cond. (µS/cm)	Water Temp. (°C)	DO (mg/L)	DO (% Sat.)			

Monitoring Frequency:

Water Sampling - At least one (1) sampling event at locations 100 m downstream and 50 m upstream of the affected water crossing, prior to construction.

Field Monitoring - At least one (1) monitoring event (alongside water sampling event listed above) at locations 100 m and 50 m downstream and 50 m upstream of the affected water crossing, prior to construction.

Baffinland

WATER CROSSING MONITORING FORM
PART 2B - DURING CONSTRUCTION WATER QUALITY MONITORING

WATER CROSSING ID: **Pg. (X/X):**

Location (e.g. 100 m downstream)	Date (YY/MM/DD)	Time (XX:XX HRS)	Field Monitoring						Water Sample Collected (Yes / No)	Lab Water Sample ID	Notes
			Turbidity (NTU)	pH (pH Units)	Sp. Cond. (µS/cm)	Water Temp. (°C)	DO (mg/L)	DO (% Sat.)			

Monitoring Frequency:

Water Sampling - Every eight (8) hours at locations 100 m downstream and 50 m upstream of the affected water crossing, during construction.

Field Monitoring - Every four (4) hours at locations 100 m and 50 m downstream and 50 m upstream of the affected water crossing, during construction.

Note: Field monitoring and water sampling shall be conducted concurrently where frequency and locations overlap.

Adaptive water sampling events will also be conducted when downstream flows are suspected of encroaching on TSS and turbidity criteria limits.

Baffinland

WATER CROSSING MONITORING FORM
PART 2C - POST CONSTRUCTION WATER QUALITY MONITORING

WATER CROSSING ID: **Pg. (X/X):**

Location (e.g. 100 m downstream)	Date (YY/MM/DD)	Time (XX:XX HRS)	Field Monitoring						Water Sample Collected (Yes / No)	Lab Water Sample ID	Notes
			Turbidity (NTU)	pH (pH Units)	Sp. Cond. (µS/cm)	Water Temp. (°C)	DO (mg/L)	DO (% Sat.)			

Monitoring Frequency:

Water Sampling - Three sampling events: once in June, July and August at locations 100 m downstream and 50 m upstream of the affected water crossing. Sampling events will occur at least 10 days apart.

Field Monitoring - Field monitoring will be conducted concurrently with water sampling events listed above.

Appendix G
Surveillance Network Program Schedule

Schedule G.1 - Construction Phase SNP Stations - Milne Port

Sampling Location	Coordinates		Monitoring Parameters	Frequency
	Easting	Northing		
MP-C-A	503214	7976483	Water Discharge volume (m^3) Ammonia (total NH_3-N) Nitrate (total NO_3-N) pH Conductivity Total suspended solids Oil and grease	Monthly sampling during periods of flow and following significant precipitation events
MP-C-B	502836	7975732		
MP-C-C	503436	7975427		
MP-C-D	503651	7976363		
MP-C-E	503736	7976346		
MP-C-F	503922	7976304		
MP-C-H	504114	7976417		
MP-C-J	502940	7974760		
MP-C-K	502979	7975333		

Schedule G.2 - Construction Phase SNP Stations - Mine Site

Sampling Location	Coordinates		Monitoring Parameters	Frequency
	Easting	Northing		
MS-C-A	561263	7913571	Water Discharge volume (m^3) Ammonia (total NH_3-N) Nitrate (total NO_3-N) pH Conductivity Total suspended solids Oil and grease	Monthly sampling during periods of flow and following significant precipitation events
MS-C-B	561454	7913537		
MS-C-C	561110	7913199		
MS-C-D	561008	7913280		
MS-C-E	560980	7913388		
MS-C-F	561797	7913278		
MS-C-G	561813	7911830		
MS-C-H	561162	7912067		
MQ-C-A	559489	7914408	Acute lethality to rainbow trout (Biol Test Method EPS/1/RM/13) Acute lethality to Daphnia magna (Biological Test Method EPS/1/RM/14) Ammonia (total NH_3-N), Nitrate (total NO_3-N) pH, Conductivity, Total suspended solids, Oil and grease	Monthly sampling during periods of flow
MQ-C-B	560076	7913888		
MQ-C-D	559422	7914223		
MQ-C-E	563351	7912902		

Schedule G.3 - Operation Phase SNP Stations - Milne Port

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-MRY-2	Freshwater Intake at Phillips Creek (Summer)	514503	7964579	Water withdrawal volume (m^3)	Recorded Daily
MP-MRY-3	Freshwater Intake from KM32 Lake	521547	7953735	Water withdrawal volume (m^3)	Recorded Daily
WS27.1A **WS27.1B** **WS27.1C**	Freshwater Intake from KM27 Lake	518956 518513 518616	7958644 7959186 7958667	Water withdrawal volume (m^3)	Recorded Daily
MP-01 **MP-01B**	Milne Port Sewage Treatment Facilities (discharge into ditch prior to ocean)	503804	7975991	Water discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-01a	Milne Port Polishing Waste Stabilization Pond (PWSP)	503625	7976015	Water discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Once Prior to discharge and monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-02	Milne Port Maintenance Shop Oily water/WWTF	503785	7976209	Water discharge volume (m^3) pH, TSS, Ammonia, Total Phosphorous Benzene, Ethylbenzene, Toluene, Oil and Grease, Total Metals: Arsenic, Copper, Lead, Nickel, Zinc	Monthly

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-03	Milne Port Bulk Fuel Storage Facility Stormwater	503638	7976272	Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow, Monthly
MP-04	Milne Port Landfarm Facility Stormwater	503710	7975574	Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow Reported Monthly
MP-04A	Milne Port Contaminated Snow Dump	503862	7975482	Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Monthly
MP-05	Milne Port Ore Stockpile Sedimentation Pond (East)	503469	7976383	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-06	Milne Port Ore Stockpile Settling Pond (West)	503125	7976364	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-07	Milne Port Ore Stockpile Stormwater Pond No. 3	502857	7975896	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-08	Milne Port Ore Stockpile Stormwater Pond No.4	503357	7974942	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-09	Milne Port Ore Stockpile Stormwater Pond No.5	503147	7974756	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-10A	Lump Ore Stockpile Perimeter Ditching East	503344	7975395	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-10B	Lump ore stockpile perimeter ditching West	503126	7975410	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MP-11	Milne Port Rail Maintenance Shop Oily water/WWTF	503916	7974980	Water discharge volume (m^3) pH, TSS, Ammonia, Total Phosphorous Benzene, Ethylbenzene, Toluene, Oil and Grease, Total Metals: Arsenic, Copper, Lead, Nickel, Zinc	Monthly

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MP-12	Milne Port Landfill	504076	7974722	Water discharge volume (m^3) pH, Alkalinity, Conductivity, TSS, TDS, Oil and Grease, Phenols, TPH, TOC, DOC, Total Trace Metals as Determined by a standard ICP Scan (to include Pb, Li, Mn, Mo, Ni, Se, Si, Tl, Ti, U, V, Zn); and trace Arsenic and Mercury	Daily Monthly
MP-Q1-01	Surface runoff from Quarry Q1	503838	7974472	Water discharge volume (m^3) Ammonia (total NH3-N), Nitrate (total NO3-N), pH, Conductivity, Total suspended solids, Oil and grease	Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	
MP-Q1-02	Surface runoff from Quarry Q1	503827	7975417	Water discharge volume (m^3) Ammonia (total NH3-N), Nitrate (total NO_3-N), pH, Conductivity, TSS, Oil and grease	Monthly

Schedule G.4 - Operation Phase SNP Stations - Mine Site

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-MRY-1	Freshwater Intake from Camp Lake	557793	7914684	Water withdrawal volume (m^3)	Recorded Daily
MS-01 **MS-01B**	Mine Site Sewage Treatment Facilities	503804 560794	7975991 7913235	Water discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-01A	Mine Site Polishing/Waste Stabilization Pond (PWSP)	Coordinates to be finalized.		Water discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Once prior to discharge and Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-02	Mine Site Maintenance Shop Oily Water WWTF	561638	7913222	Water discharge volume (m^3) pH, TSS, Ammonia, Total Phosphorous Benzene, Ethylbenzene, Toluene, Oil and Grease, Total Metals: Arsenic, Copper, Lead, Nickel, Zinc	Monthly
MS-MRY-4A, MS-MRY-4B & MS-MRY-4C	Exploration Camp Polishing/Waste Stabilization Ponds	558470	7914237	Water discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Once prior to discharge and Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-MRY-04	Exploration Camp Sewage Treatment Facility	558141	7914427	Water Discharge volume (m^3) BOD_5, pH, TSS, Faecal Coliform, Oil and Grease, NH_3-N, TKN, Total Phosphorus	Monthly
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-03 **MS-03B**	Mine Site Bulk Fuel Storage Facility Stormwater	561258	7913304	Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow Reported Monthly
MS-04	Mine Site Fuel Unloading Station Stormwater	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow Reported Monthly
MS-05	Mine Site Landfarm Facility	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow Reported Monthly
MS-05B	Mine Site Contaminated Snow Dump	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, Ammonia, Total Phosphorous Benzene, Ethylbenzene, Toluene, Oil and Grease, Total Metals: Arsenic, Copper, Lead, Nickel, Zinc	Monthly
MS-MRY-6	Exploration Camp Bulk Fuel Storage Facility	558186	7914780	Water discharge volume (m^3) pH, TSS, Benzene, Ethylbenzene, Toluene, Total Lead, Oil and Grease, TPH	Daily Flow Reported Monthly

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-06	Ore stockpile (crusher pad) pond stormwater	561475	7913000	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-07	Run of Mine (ROM) Ore Stockpile Pond Stormwater	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-08	Waste Rock Stockpile West Pond	563492	7916273	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-09	Waste Rock Stockpile East Pond	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS10	SDLT-1 Pond Ore Stockpile Stormwater	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-11	KM105 Pond Stormwater	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-12	Weatherhaven Camp Stormwater	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-13	Explosives Magazine Pond	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-14	Quarry QMR2 Pond/Sump	Coordinates to be finalized.		Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride. Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc. Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-MRY-09	2008 Bulk Sample Program - Open Pit - Downstream Surface Water Drainage	561237	7914954	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually

Station	Description	Coordinates		Monitoring Parameters	Frequency
		Easting	Northing		
MS-MRY-10	2008 Bulk Sample Program - Ore Stockpile Area - Downstream Surface Water Drainage	563488	7915197	Water discharge volume (m^3) pH, TSS, TDS, Alkalinity, hardness, turbidity, TKN, NH_3-N, NO_3-N, DOC, TOC, Total Phosphorus, Sulphate, Fluoride, Chloride Total and Dissolved Metals: aluminium, arsenic, cadmium, calcium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, uranium, zinc Field Parameters: pH, Temperature, turbidity, specific conductance	Monthly during the summer
				Acute lethality to rainbow trout Acute lethality to Daphnia magna	Annually
MS-MRY-13a	Mine Site Non-Hazardous Waste Landfill Facility - Downstream Surface Water Drainage	560754	7912484	Water discharge volume (m^3)	Daily Flow
MS-MRY-13b		560642	7912527	pH, Alkalinity, Conductivity, TSS, TDS, Oil and Grease, Phenols, TPH, TOC, DOC, Total Trace Metals as Determined by a standard ICP Scan (to include Pb, Li, Mn, Mo, Ni, Se, Si, Tl, Ti, U, V, Zn); and trace Arsenic and Mercury	Monthly

Appendix H
Northern Corridor Monitoring Program

Appendix H

Northern Corridor Monitoring Program

Purpose and Scope

This Northern Corridor Monitoring Program (NCMP) was developed to monitor the water quality of surface water flows at select water crossing (culverts, bridges) along the Milne Inlet Tote Road (Tote Road) and future North Railway, with a primary focus on monitoring total suspended solids (TSS) concentrations upstream and downstream of water crossings. Prior to the addition of the North Rail, the NCMP was formerly the Tote Road Monitoring Program (TRMP).

Monitoring data collected under the NCMP will be used to:

a) Inform Project operations of potential water quality impacts from Project activities at water crossings along the Transportation Corridor.
b) Guide and prioritize Transportation Corridor maintenance work, corrective actions and improvement projects for surface water management infrastructure.
c) Adjust mitigation measures and management strategies for Project activities along the Transportation Corridor.
d) Expand the Project's understanding of natural water quality conditions along the Transportation Corridor (upstream) and the natural factors that contribute to changes in surface water quality.

1. Monitored Parameters

Water quality monitoring conducted to date along the Tote Road has identified TSS as a parameter of concern. Observations indicate that sources of TSS can be both Project-related, such as construction activities, and natural, such as bank erosion and streambed scouring during high flow periods.

In addition to TSS, the NCMP will monitor for additional parameters, including metals, nutrients, oil & grease, and routine chemistry, such as dissolved anions, turbidity and total dissolved solids (TDS).

Tables H.1 and H.2 outline the field and analytical parameters that will be monitored under the NCMP.

TABLE H.1 NORTHERN CORRIDOR MONITORING PROGRAM - FIELD PARAMETERS

Parameter Type	Method	Units	Parameter Group
Turbidity	1	NTU	Group 1
pH	1	pH units	
Specific Conductivity	1	µS/cm	
Water Temperature	1	°C	
Dissolved Oxygen	1	mg/L, %	
Oil & Grease Sheen	2	Presence/Absence	

NOTES:

1. Method 1 - *In situ* testing using a multi-parameter water quality probe (i.e. YSI).
2. Method 2 - Visual inspection during water sampling event.

TABLE H.2 NORTHERN CORRIDOR MONITORING PROGRAM - ANALYTICAL PARAMETERS

Parameter Type	Method[1]	Units	Parameter Group
pH	3	pH units	Group 2
Total Suspended Solids (TSS)	3	mg/L	
Total Dissolved Solids (TDS)	3	mg/L	
Conductivity	3	µS/cm	
Oil & Grease	3	mg/L	Group 3
Hardness	3	mg/L as $CaCO_3$	Group 4
Alkalinity	3	mg/L as $CaCO_3$	
Chloride (Cl^-)	3	mg/L	
Ammonia	3	mg/L N	
Total Phosphorus	3	mg/L N	
Nitrate (NO_3^-)	3	mg/L N	
Nitrite (NO_2)	3	mg/L N	
Dissolved Organic Carbon (DOC)	3	mg/L N	
Total Organic Carbon (TOC)	3	mg/L N	
Total and Dissolved Metals	3	mg/L	

NOTE:

1. Method 3 - analytical testing of water samples by an accredited third party laboratory.

2. Monitoring Methods and Equipment

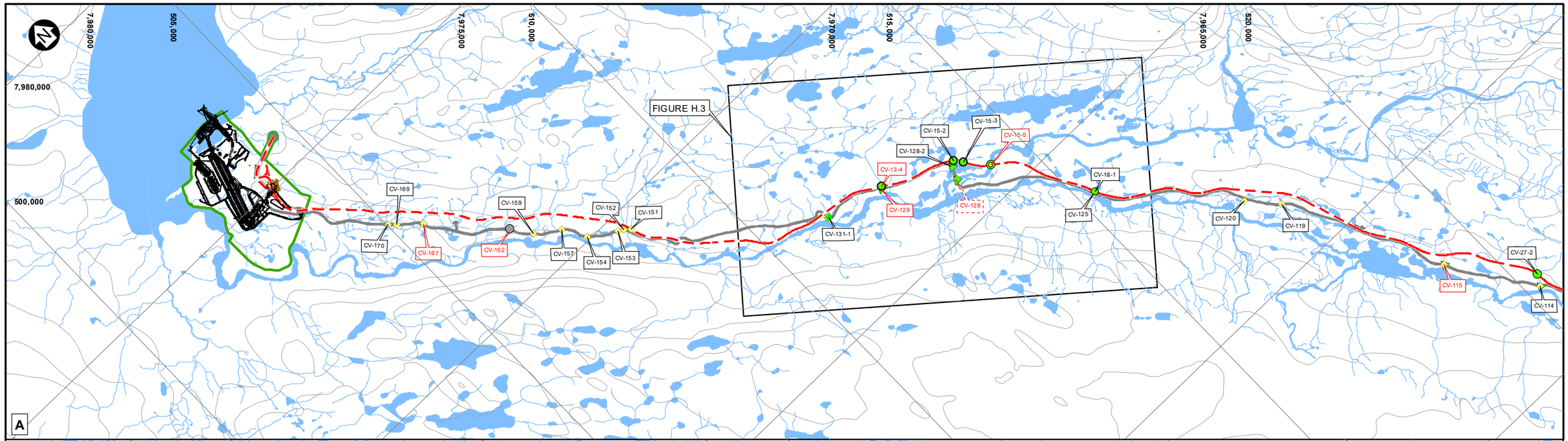
Field monitored parameters will be measured using a calibrated, multi-parameter water quality probe (e.g. YSI). A visual inspection will be conducted to determine the presence or absence of an oil and grease (hydrocarbon) sheen.

Discrete water samples will be collected, transported and analyzed in accordance with the protocols outlined in Baffinland's Surface Water Sampling Program - Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001; QA/QC Plan).

3. Monitoring Locations

Water crossings monitored under the NCMP were selected to give a geographically representative sample set of water crossings for each given watershed intersected by the Northern Corridor (Phillips Creek, Ravn River, Mary River), presented in Figure H.1 and H.2. In selecting the Northern Corridor water crossings to monitor within each watershed, the following factors were considered:

a) Key depositional habitats downstream of the Northern Corridor (e.g. fish habitat)
b) Areas historically prone to sedimentation events
c) Historical borrow source locations
d) Proximity to the Tote Road and the Proposed North Railway
e) Existing monitoring locations and programs



LEGEND:

- MILNE INLET TOTE ROAD
- POTENTIAL DEVELOPMENT AREA
- PROPOSED NORTH RAIL ALIGNMENT
- RIVER/STREAM/DRAINAGE
- WATER
- WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM
- HADD FISH BEARING WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM

FISH HABITAT ASSESSMENT (RAIL)

- POTENTIAL
- IMPORTANT

FISH HABITAT ASSESSMENT (ROAD)

- POTENTIAL
- IMPORTANT
- NO

NSCON 2021 CONFIRMED FISH HABITAT

- FISH HABITAT

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30JUN'21	ISSUED WITH TRANSMITTAL	RWT	AS	RAC

NOTES:

1. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
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3. DETAILED TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
4. CONTOUR INTERVAL IS 20 METRES.
5. PLAN BASED ON INFORMATION PROVIDED BY BAFFINLAND IRON MINES CORPORATION (MAY 2021).

BAFFINLAND IRON MINES CORPORATION

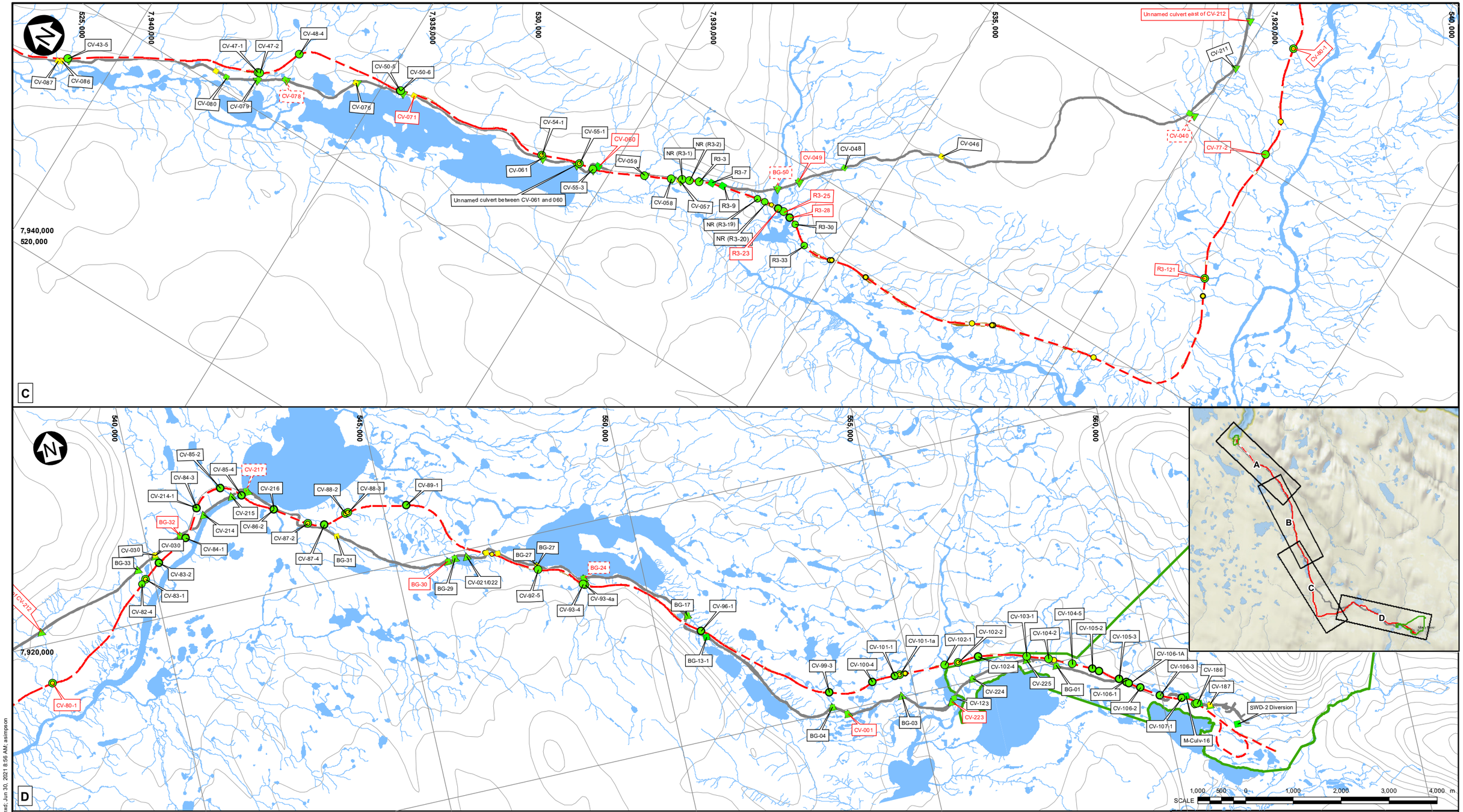
MARY RIVER PROJECT

MONITORING PROGRAM (SHEET 1 OF 2)

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/65	NB21-00151

FIGURE H.1 REV 0



LEGEND:

- MILNE INLET TOTE ROAD
- POTENTIAL DEVELOPMENT AREA
- PROPOSED NORTH RAIL ALIGNMENT
- RIVER/STREAM/DRAINAGE
- WATER
- WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM
- HADD FISH BEARING WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM

FISH HABITAT ASSESSMENT (RAIL)

- POTENTIAL
- IMPORTANT

FISH HABITAT ASSESSMENT (ROAD)

- POTENTIAL
- IMPORTANT

NSCON 2021 CONFIRMED FISH HABITAT

- FISH HABITAT

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30JUN'21	ISSUED WITH TRANSMITTAL	RWT	AS	RAC

NOTES:

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MONITORING PROGRAM (SHEET 2 OF 2)

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/65	NB21-00151

FIGURE H.2 REV 0

Using the factors and criteria listed above, the following 22 Tote Road water crossings and 19 Rail water crossings, presented in Table H.3, were identified as monitoring locations.

TABLE H.3 WATER CROSSING MONITORED UNDER NCMP

Road Water Crossing	Approximate Tote Road Chainage	Rail Water Crossing	Watershed	Number of Samples
CV167	6	-	Phillips Creek	3
CV162	8	-	Phillips Creek	3
CV129	17	CV13-4	Phillips Creek	2
CV128*	17	CV15-5	Phillips Creek	3
CV115	27	-	Phillips Creek	3
CV112	31	CV28-6	Phillips Creek	2
CV106	33	CV30-5	Phillips Creek	2
CV099*	37	CV35-2	Phillips Creek	2
CV094*	41	-	Phillips Creek	2
CV078*	51	CV48-4	Phillips Creek	3
CV071	54	-	Phillips Creek	2
CV060	58	CV-55-3	Phillips Creek	3
BG50*	62	R3-23	Ravn River	3
CV-049	-	R3-25	Ravn River	3
-	-	R3-28	Ravn River	2
-	-	R3-121	Ravn River	2
CV-040*	72	CV-77-2	Ravn River	3
Unnamed culvert east of CV-212	-	CV-80-1	Ravn River	3
BG32	78	CV-84-1	Ravn River	2
CV217*	80	CV-85-4	Ravn River	2
BG30	84	CV-89-1	Ravn River	4
BG24*	87	CV-93-4	Mary River	3
CV001	94	CV-100-4	Mary River	3
CV223	97	CV-102-1	Mary River	3

NOTES:

1. Water crossing with an asterisk (*) are HADD fish bearing water crossings.

When a water course intersects both the Tote Road and the Railway, the number of samples collected will be determined based on the distance between the crossings and observed water quality results. The following rationale is provided for the expected sampling scenarios along the NCMP.

Sampling Scenario 1 - The Tote Road and Railway are within approximately 100 m of each other. These features will be monitored as one feature and it is proposed that one sample is collected 50 m upstream, and one sample is collected 100 m downstream. A third sample may be required between the Tote Road and the Railway if downstream water quality results do not meet guideline concentrations/values.

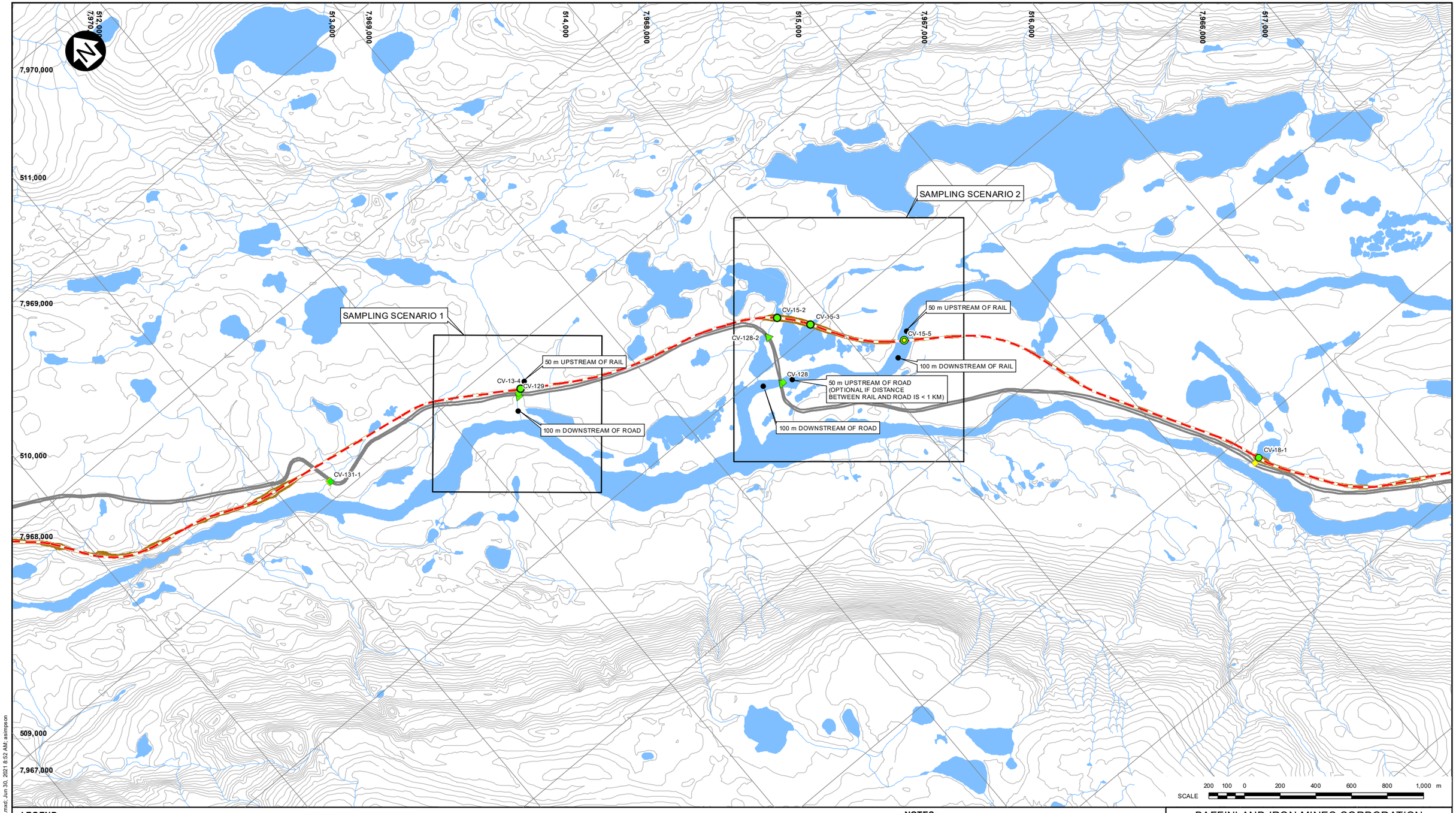
Sampling Scenario 2 - The Tote Road and Railway are within approximately 1 km of each other. These features will be monitored as two separate features and up to four samples may be required. Initially, three samples are proposed, one sample will be collected 50 m upstream of the most upstream feature and one sample will be collected 100 m downstream of this feature. The third sample will be collected approximately 100 m downstream of the most downstream feature. A fourth sample may be required 50 m upstream of the most downstream feature if conditions between the Tote Road and the Railway are expected to impact water quality (e.g. erosion).

An example of these sampling scenarios is provided in Figure H.3

4. Monitoring Frequency

Each year water quality monitoring under the NCMP will commence with the start of flows and end with the freeze-up of flows. Water quality monitoring will be divided into two seasons: Freshet and Summer. Freshet will be begin with the start of flows and typically end mid-July. Summer will begin mid-July and end with the freeze-up of flows generally in September. If flows persist in October, another sample may be collected if water quality results did not meet guideline concentrations/values during the previous sampling event. Selected water crossings will be sampled weekly (4 events per month) during Freshet and monthly during the Summer.

Tables H.4 and H.5 outline the frequency of sampling events for the primary parameters (Groups 1 & 2) and additional parameters (Group 4), respectively. As shown in Tables H.4 and H.5, primary parameters will be monitored weekly during Freshet and monthly during Summer while the additional parameters will only be sampled once per season at HADD fish-bearing water crossings. Water samples will be collected for oil & grease (Group 3) during sampling events in which visible hydrocarbon sheen is observed.



LEGEND:

- MILNE INLET TOTE ROAD
- POTENTIAL DEVELOPMENT AREA
- PROPOSED NORTH RAIL ALIGNMENT
- RIVER/STREAM/DRAINAGE
- WATER
- WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM
- HADD FISH BEARING WATER CROSSING MONITORED BY THE NORTHERN CORRIDOR MONITORING PROGRAM

FISH HABITAT ASSESSMENT (RAIL)

- POTENTIAL
- IMPORTANT

FISH HABITAT ASSESSMENT (ROAD)

- POTENTIAL
- IMPORTANT

NSCON 2021 CONFIRMED FISH HABITAT

- FISH HABITAT

- SAMPLE LOCATION

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30JUN'21	ISSUED WITH TRANSMITTAL	RWT	AS	RAC

NOTES:

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4. CONTOUR INTERVAL IS 20 METRES.
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

SAMPLING LOCATION SCENARIOS

Knight Piésold CONSULTING

P/A NO. NB102-181/65

REF NO. NB21-00151

FIGURE H.3

REV 0

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TABLE H.4 MONITORING FREQUENCY FOR PRIMARY PARAMETERS (GROUPS 1 & 2)[1]

Month	May				June				July			August				September			
All Water Crossings	F	F	F	F	F	F	F	F	F	F		S			S			S	

NOTES:

1. F - Indicates Freshet water sampling event.
2. S - Indicates Summer water sampling event.
3. [1]Water samples for Group 3 (oil & grease) will be collected where visible sheen is observed.

TABLE H.5 MONITORING FREQUENCY FOR ADDITIONAL PARAMETERS (GROUP 4)[1]

Month	May	June	July	August	September
HADD Fish-Bearing Water Crossings[2]		F		S	

NOTES:

1. F - Indicates Freshet water sampling event.
2. S - Indicates Summer water sampling event.
3. [1]Water samples for Group 3 (oil & grease) will be collected where visible sheen is observed.
4. [2]HADD fish-bearing water crossings are identified in Table E-3.

During each water sampling event, water samples will be collected at a location approximately 100 metres downstream and 50 metres upstream of each monitored water crossing, as access allows. Field monitoring (*in situ*) parameters will be measured at the same locations. Deviations from these established distances due to safety and/or accessibility concerns will be documented on the *NCMP - Sampling Event Monitoring Form.*

Water sampling events will start at the monitoring location furthest downstream of the monitored water crossing and progress in an upstream direction to prevent monitoring results from being affected by sediment re-suspended during sampling activities (e.g. stream bed disturbance).

It should be noted that additional monitoring may be required if the TSS water quality action levels, presented in Section 6 below, are exceeded. Additional sampling requirements and responses to documented TSS exceedances under the NCMP are outlined in the action-response framework presented in Section 6.

5. TSS Water Quality Criteria and Response-Action Framework

The Northern Corridor Monitoring Program will utilize a response-action framework to identify, mitigate and monitor for Project related changes in TSS concentrations, if present. The response framework is outlined in the Figure H.4.

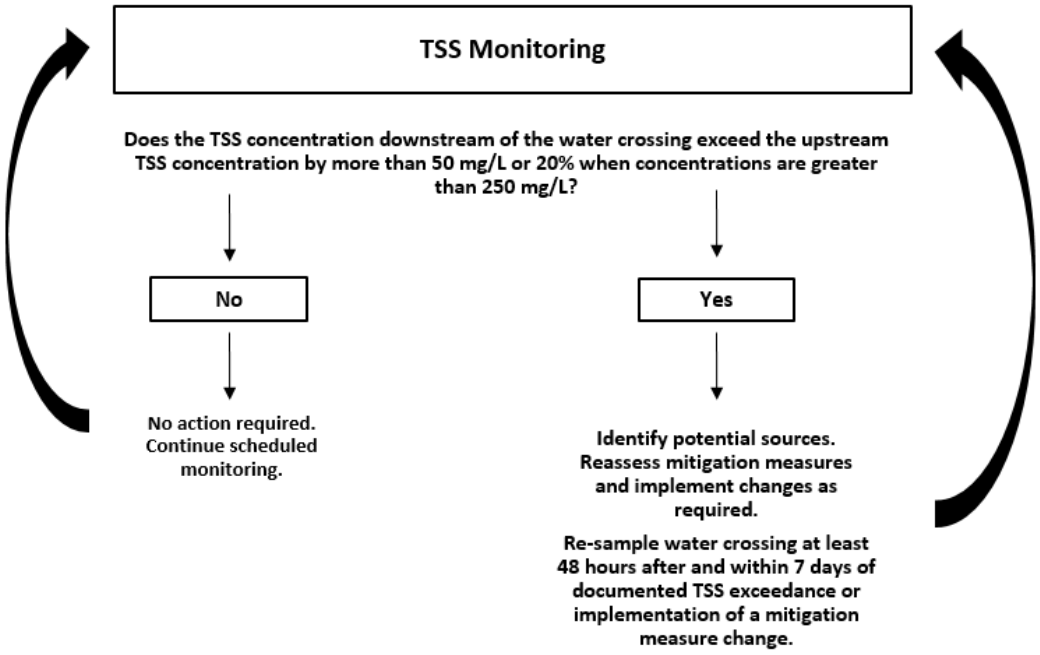

FIGURE H.4 TSS RESPONSE-ACTION FRAMEWORK

To evaluate the potential for a Project related change to concentrations of TSS within the NCMP LSA, water samples will be collected at designated locations approximately 100 m downstream and 50 m upstream of the crossing, as access allows, at the frequency outlined in Section 5.3. Following receipt of analytical results, TSS concentrations at the upstream and downstream location will be compared. When upstream concentrations are less than 250 mg/L, a potential Project related change is defined as a greater than 50 mg/L increase in the downstream concentration. Where concentrations are greater than 250 mg/L in the upstream sample, a potential Project related change is defined as a greater than 20% increase in the downstream sample.

If the results of a sampling event identify a potential Project related change, Baffinland will assess the effectiveness of existing mitigation measures and/or implement new mitigation measures . During the assessment, the water crossing will be evaluated to determine the potential sources of the observed sedimentation event(s) and TSS concentration increases, including natural phenomenon. The water crossing will then be re-sampled at least two (2) days later, but not later than seven (7) days, following receipt of sampling results. The results from the re-sampling will be evaluated to determine if the revised mitigation and/or corrective actions have reduced TSS concentrations below the appropriate action level.

6. Data Management

During each sampling event, a *NCMP - Sampling Event Monitoring Form* will be completed. All documentation, including photos, will be saved on the onsite Environmental server.

7. Data Reporting Requirements and Interpretation

Data collected during the NCMP will be presented in the Annual Report prescribed by the Project's Commercial Lease with the QIA and the Type 'A' Water Licence, issued by the NWB. In the Annual Report, Baffinland will present the data, compare the data against the applicable water quality criteria and outline Baffinland's interpretation of the data and plans for any additional monitoring in the upcoming field season.

NORTHERN CORRIDOR MONITORING PROGRAM - SAMPLING EVENT MONITORING FORM

Water Crossing ID	Monitoring Location Description (e.g. 100 m downstream)	Coordinates of Monitoring Location (UTM; NAD83)[1]			Date (YY/MM/DD)	Time (XX:XX HRS)	Field Monitoring							Water Samples Collected (Yes / No)	Reason for Sampling (e.g. Scheduled Sampling Event, Follow-up, etc.)	Mitigation Measures Implemented (Yes / No)	Photos IDs	Notes (General Observations, Weather, Deviations from Protocol, etc.)
		Zone	Easting	Northing			Turbidity (NTU)	pH (pH Units)	Sp. Cond. (µS/cm)	Water Temp. (°C)	DO (mg/L)	DO (% Sat.)	Sheen Observed (Yes / No)					

Notes:

[1]Coordinates will be recorded for sampling events that deviate from the prescribed distances upstream (50 m) and downstream (100 m) of water crossings.

Northern Corridor - Sampling Event Monitoring Form

Water Crossing ID:	Date:	Time:	Photos: Upstream:
Samplers:	Camera ID:	Weather:	Cross Section:
YSI Model:	Calibration:		Downstream:
Coordinate of Monitoring Location (UTM; NAD83)	Zone:	Easting:	
		Northing:	

Sampling Information

Reason for Sampling (e.g. scheduled sampling, follow-up, etc.):

Water Sample Collected (Y/N):

Mitigation Measures Implemented (Y/N):

Field Parameters

Time (24-hr)	Temp. (°C)	pH	Cond. (µs/cm)	Turbidity (NTU)	DO (%)

QA/QC Samples (Y o N):				**Monitoring Location Description**
Field Dup. (01)	Field Blank (02)	Travel Blank (03)	Equip. Blank (04)	(e.g. 100m downstream)

Notes: (General observations, Deviations from protocol, etc.)