ATTACHMENT 23

Fresh Water Supply, Sewage, and Wastewater Management Plan

(443 Pages)

Baffinland Iron Mines Corporation

FRESH WATER SUPPLY, SEWAGE, AND WASTEWATER MANAGEMENT PLAN

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1.0 INTRODUCTION

This document describes Baffinland Iron Mine Corporation's (Baffinland's) plan to manage the fresh water supply and the disposal of sewage, oily water and mine contact water (wastewaters) generated by the Mary River Project.

1.1 PURPOSE AND SCOPE

This plan has been developed under the requirements of Baffinland's Type A Water Licence No. 2AM-MRY1325(Type A Water Licence) and the Type B Water Licence No. 2BE-MRY1421 (Type B Water Licence) issued by the Nunavut Water Board (NWB or the Board). Concordance to the Type A Water Licence and the Type B Water Licence is presented in Appendix A. Furthermore, actions undertaken under this management plan will be compliant with appropriate sections of both Federal and Territorial legislation as indicated in Table 1.1.

TABLE 1.1 APPLICABLE REGULATIONS, STANDARDS, AND CODES

Title	Number/Acronym
American Water Works Association	AWWA
International Building Codes	IBC
National Sanitation Foundation	NSF
Health Canada Guidelines for Canadian Drinking Water Quality	GCDWQ
Northwest Territories Water Supply System Regulations	NWT Regulation 108-2009
Safe Drinking Water Act, 2002	Ontario Regulation 170/03
Nunavut Waters and Nunavut Surface Rights Tribunal Act, SC2 002, c. 10	--
Northwest Territories Water Act	NWTWA
Northwest Territories Water Regulations (SOR/93-303)	--
Ontario Drinking Water Quality Standards	--
Federal Fisheries Act	--
Canadian Environmental Protection Act (1999)	CEPA
CCME Water Quality Guidelines for the Protection of Aquatic Life	--
Ontario Guidelines for Sewage Works, 2008	--
CCME Guidelines for Compost Quality	--
Drinking Water System Components	NSF/ANSI Standard 61
Filtering Material	AWWA Standard B100
Granular Activated Carbon	AWWA Standard B604

Title	Number/Acronym
Canada Occupational Health and Safety Regulations	OSH
Metal and Diamond Mining Effluent Regulations	MDMER
Public Water Supply Regulations (pursuant to Public Health Act)[1]	--

NOTE:

1. The applicability of the Public Water Supply Regulations has not been determined; however, monitoring requirements in the regulations have been adopted as best practice.

1.2 RELATIONSHIP TO OTHER MANAGEMENT PLANS

Other management plans relevant to this Fresh Water Supply, Sewage and Wastewater Management Plan are described in Table 1.2.

TABLE 1.2 RELATIONSHIP TO OTHER MANAGEMENT PLANS

Plan/Guideline	Document No.	Information Provided by Referenced Plan
Environmental Protection Plan (EPP)	BAF-PH1-830-P16-0008	Provides relevant environmental protection measures
Surface Water and Aquatic Ecosystem Management Plan	BAF-PH1-830-P16-0026	Identifies the management strategies and general mitigation measures related to controlling sedimentation and erosion effects on aquatic ecosystems
Aquatic Effects Monitoring Plan	BAF-PH1-830-P16-0039	Monitors changes in the local aquatic environment from multiple Project stressors (effluent discharges, sedimentation, dust deposition)
Waste Management Plan	BAF-PH1-830-P16-0028	Describes the wastes generated, waste minimization strategies and disposal methods. Includes an overview of the management and disposal of hazardous wastes provided in more detail within this plan.
Interim Closure and Reclamation Plan	BAF-PH1-830-P16-0012	Closure measures including the waste disposal during active closure
Spill Contingency Plan	BAF-PH1-830-P16-0036	Response measures associated with spills, including releases of wastes
Emergency Response Plan	BAF-PH1-840-P16-0002	Process for responding to emergencies
Surface Water Sampling Program – Quality Assurance and Quality Control (QA/QC) Plan	BAF-PH1-830-P16-0001	Describes sampling methodologies and related QA/QC measures for sampling and testing water, sediment and effluents

1.3 CORPORATE POLICIES

Baffinland has two corporate policies that apply to environmental management:

- **Sustainable Development (SD) Policy -** identifies Baffinland's commitment internally and to the public to operate in a manner that is environmentally responsible, safe, fiscally responsible and respectful of the cultural values and legal rights of Inuit.
- **Health, Safety and Environment (HSE) Policy -** describes the company's commitment to achieve a safe, healthy and environmentally responsible workplace.

All employees and contractors must comply with the contents of both above mentioned policies, which are included in Appendix B.

2.0 PLANNING

2.1 OBJECTIVES AND TARGETS

The overall objectives of this plan are to ensure:

- Adequate water supply to operate the Project
- Adequate means of disposal of wastewater effluents
- Protection of the aquatic ecosystems

These will be achieved by:

- Compliance with daily water withdrawals as per the Type A Water Licence and Type B Water Licence
- Implementation of a detailed water withdrawal plan
- Compliance with discharge limits specified in the Type A Water Licence
- Compliance with discharge limits from Part 1 of the Metal and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2019)
- Compliance with Fisheries and Oceans Canada (DFO)'s fish screen guideline (DFO, 1995)

2.2 CONSIDERATION OF INUIT QAUJIMAJATUQANGIT

Baffinland recently developed a draft Inuit Qaujimajatuqangit (IQ) Management Framework to support increased collaboration with Inuit and the integration of IQ into the Company's operations, where reasonable to do so (Baffinland, 2019). Specifically, the IQ Management Framework identifies the procedures and provides guidance on the following:

- The processes through which IQ can be shared with Baffinland
- Schedule and timing for gathering and integration of IQ
- Roles and responsibilities of parties involved
- Processes and mechanisms through which IQ informs Project related decision-making

Implementation of the IQ Management Framework is expected to include the establishment of an Inuit Committee to involve Inuit in the full life cycle of Project development, from planning to reporting. The Terms of Reference for the Inuit Committee and mandate to implement the IQ Management Framework is subject to ongoing discussion between the Qikitani Inuit Association (QIA) and Baffinland. At present, Baffinland believes that the Inuit Committee's role on the Project may include providing advice on the integration of IQ into the Project in the following areas:

- Identification or refinement of mitigation measures in management plans
- Design of monitoring programs and the interpretation of monitoring results
- Development of Implementation of adaptive management strategies, as necessary
- Development of future modifications to the project and subsequent application materials

Table 2.1 identifies the opportunities that Baffinland has explored to incorporate IQ into this Plan.

TABLE 2.1 INCORPORATION OF IQ INTO THIS MANAGEMENT PLAN

Element	Description
Environmental sensitivities and receptors	Subsistence Fishing and Fresh Water values identified in Pond Inlet's Tusaqtavut Study can be integrated into a future revision of the Tote Road Monitoring component of this Plan
Indicators and thresholds	To be discussed with Inuit Committee
Mitigation measures	To be discussed with Inuit Committee
Monitoring	To be discussed with Inuit Committee
Adaptive management	To be discussed with Inuit Committee
Validation of IQ Integration	To be driven by IQ Management Framework
Management review	To be driven by IQ Management Framework

An important aspect of integrating IQ is validating such integration with Inuit. For this reason, only potential opportunities for IQ integration have been identified. A more fulsome effort to incorporate IQ into this draft plan will be undertaken in the future, consistent with Baffinland's IQ Management Framework and the terms of reference for the Inuit Committee.

2.3 ADAPTIVE MANAGEMENT

2.3.1 DEFINING THE ADAPTIVE MANAGEMENT PROCESS

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes (Canadian Environmental Assessment Agency, 2016). Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

Baffinland has developed an Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2019). The adaptive management process is iterative and starts with a planning phase; followed by implementation of monitoring; ongoing evaluation of the effectiveness of the plans based on monitoring results; and adjustment of the management strategies and responses as needed. This process is described further in Appendix C.

2.3.2 ADAPTIVE MANAGEMENT CHECKLIST FOR ENVIRONMENTAL MANAGEMENT

Table 2.2 presents an adaptive management checklist developed for the Fresh Water Supply, Sewage and Wastewater Management Plan, identifying how adaptive management has been incorporated into the current revision of the Plan.

TABLE 2.2 INCORPORATION OF ADAPTIVE MANAGEMENT IN THIS PLAN

Adaptive Management Phases	Components	Proposed Adaptive Management Mechanisms	Location or Status
Plan	Objectives	Are objectives clear and key desired outcomes defined?	Section 2.1 - identifies plan objectives and strategies to achieve these objectives.
	Indicators	Are performance indicators adequately identified?	Section 3.1.1 - maximum daily water withdrawal volumes; no early warning triggers deemed appropriate. Section 3.2.2 - treated sewage discharge limits; internal discharge limits are identified. Section 3.3.1 - contact water discharge limits; internal discharge limits are identified. Section 3.4.1 - oily water discharge limits; no early warning triggers deemed appropriate.
	Identification of Thresholds	Are thresholds for specific responses identified (e.g., early warning triggers, action levels, quantitative metrics or qualitative descriptions)?	
	IQ Integration / Influence	Are mechanisms for IQ integration/influence identified?	Section 2.2 - Potential integration of IQ to be discussed with the Inuit Committee.
Implement and Monitor	Management Strategies and Responses	Are management strategies and response options clearly identified?	Management strategies and responses are described in Sections 3.1/3.2 (water supplies), Section 3.3 (sewage), Section 3.4 (contact water) and Section 3.5 (oily water). Adaptive management measures and processes are described at the end of each section.
	Monitoring	Does the monitoring program provide the information needed to determine the effectiveness of management strategies and responses?	Section 5 presents monitoring activities that cover all aspects of water use and wastewater management and disposal. With respect to aquatic effects related to wastewater discharges, monitoring under the MDMER and AEMP are designed to monitor and respond to changes detected in receiving waters.
Evaluate and Learn	Review Data and Feedback	Is the process for reviewing and evaluating management effectiveness (based on monitoring data and feedback) articulated?	Adaptive management flow sheets are presented in the adaptive management subsection at the end of each implementation section. Sections 3.1/3.2 (water supplies), Section 3.3 (sewage) Section 3.4 (contact water) and Section 3.5 (oily water)
	Additional Mitigation	Are mechanisms for determining the need for additional mitigation described?	
	Input of IQ Holders	Are opportunities identified for IQ holders to review results and provide input into adaptive management responses / mitigations?	

Adaptive Management Phases	Components	Proposed Adaptive Management Mechanisms	Location or Status
Adjust	Unanticipated Effects or Issues	Is it apparent how unanticipated effects or issues will be actioned and resolved?	
	Reporting	Are reporting mechanisms for new / revised strategies and response actions established?	
	Scheduled Updates	Is the frequency of scheduled updates to the management plan identified?	Section 6 (Review of Plan Effectiveness) describes the basis for conducting plan reviews.

Implementation of adaptive management will be an iterative process; not all elements have been addressed in the current plan. These will evolve through ongoing engagement (Appendix C).

3.0 IMPLEMENTATION

Project elements relevant to this plan include:

- Domestic and industrial water supplies
- Dust suppression water supplies
- Geotechnical drilling and exploration water use
- Sewage treatment and disposal
- Contact water effluent management
- Oily water treatment and containment

Each of these project components and associated mitigation and adaptive management measures are described in the subsections below.

3.1 DOMESTIC AND INDUSTRIAL WATER USE

3.1.1 WATER SOURCES

Table 3.1 lists the approved sources of water for domestic camp use and industrial purposes during the construction and operations phases of the Project (NWB, 2015). Domestic water use is for camp operations, and industrial uses are primarily for firewater or and smaller industrial uses.

TABLE 3.1 DOMESTIC AND INDUSTRIAL WATER SOURCES AND VOLUMES

Site	SNP Station	Source	Construction Phase	Operations Phase		
			Volume (m^3/day)	Domestic	Industrial	Combined
				Volume (m^3/day)		
Milne Port	MP-MRY-2	Phillips Creek (summer)	367.5	300	67.5	367.5
	MP-MRY-3	Km 32 Lake (Winter)				
Mine Site	MS-MRY-1	Camp Lake	657.5	203.8	151.6	355.4
Steensby Port	SP-08	ST 347 Km Lake	435.8	101	142.6	243.6
	SP-09	3 Km Lake				
Ravn River	TBD	Ravn Camp Lake	145.2	N/A	N/A	N/A
Mid-Rail	TBD	Nivek Lake (Summer)	79.5	N/A	N/A	N/A
	TBD	Ravn Camp Lake (Winter)				
Cockburn North Camp	TBD	Cockburn Lake	101.4	N/A	N/A	N/A
Cockburn South Camp	TBD	Cockburn Lake	111.1	N/A	N/A	N/A
		TOTAL	**1,898**	**604.8**	**361.7**	**966.5**

SNP stations have not been established by the NWB (2015) for the South Railway and Steensby Port.

3.1.2 MITIGATION BY DESIGN

The following mitigation has been incorporated into the design of water supply infrastructure:

- **Engineered intake structures -** Engineered intake structures are designed to minimize erosion, avoid sediment issues, and provide protection from ice and peak water flows. Care is taken to ensure that disturbance to aquatic environments is minimized during installation and maintenance of infrastructure. Riprap used in construction is clean, free of fine sediment, non-acid leaching, and non-metal generating.
- **Screens on intake pipes -** Intakes are screened in accordance with the Fisheries and Oceans Canada (DFO) Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO Guideline, 1995) to ensure no entrainment or impingement of fish. It also requires a water withdrawal rate such that fish do not become impinged on the screen.
- **Water treatment plants -** Water treatment plants have been designed to meet applicable standards and guidelines, as described in Section 3.1.4.

3.1.3 WATER CONSERVATION MEASURES

Water meters are installed at strategic locations to monitor water consumption and enable the development of management strategies to reduce water usage/consumption. These strategies include:

- Installation of low flow water taps
- Reuse of contact water meeting discharge limits for dust suppression
- Water use for drilling operation

Part E, Item 5 of the Type A Water Licence permits the use of reclaimed water from the various treatment facilities and surface water management ponds if such waters meet appropriate discharge criteria for those facilities.

3.1.4 OPERATING MITIGATION MEASURES

Water withdrawn from approved water intake locations within the Project are to be recorded and reported to the Site Environment Department. All personnel involved with water use activities are to comply with daily withdrawal limits. Controls that may be implemented to ensure daily limits are not exceeded include:

- Water meters
- Source location and limit signage
- Ongoing training of involved personnel in water taking
- Detailed water truck logs
- Effective communication between day shift and night shift operators

Section 3.1.6 describes the adaptive management measures to be implemented should daily water withdrawals be exceeded.

During winter under ice conditions, water must be drawn from below 2 m of non-frozen water, as the top 2 m of water provides higher oxygenation for resident fish.

3.1.5 WATER TREATMENT PLANT OPERATION

The following sections describe the freshwater systems at the various Project sites. Each site also includes a potable water treatment system which produces drinking water for the personnel at the site during construction and operation phases. These systems treat water to meet the following guidelines:

- Guidelines for Canadian Drinking Water Quality (Health Canada, 2017)
- Ontario Drinking Water Quality Standards (Government of Ontario, 2018a)

Minimum process equipment requirements are based upon:

- Northwest Territories Water Supply System Regulations (Government of the Northwest Territories, Department of Justice, 2012)
- Ontario Design Guidelines for Drinking Water Systems (Government of Ontario, 2019a)
- Ontario Regulation 170/03 - Drinking Water Systems (Government of Ontario, 2018b)
- Procedure for Disinfection of Drinking Water in Ontario (Government of Ontario, 2019b)
- Best management practices

3.1.5.1 MILNE PORT

Currently at Milne Port there are four existing camps that support operations and construction activities. These camps include the following:

- Port Site Complex (PSC) Camp
- Port Site Weatherhaven (PWH) Camp
- 380-person Construction Camp

Steensby Camp (camp relocated from Steensby Inlet).Each camp contains a Potable Water Treatment Plant (PWTP) within or near the camp, as well as freshwater tanks to store raw water being delivered. During construction of the Phase 2 Proposal, the Milne Port water sources will also supply water to a 68-bed construction camp to be located at KM40. The freshwater demand for construction and operation are shown on the Port Site Water and Sewage Process Flow Diagram in Appendix D.

A water truck draws raw water from either KM32 lake or Phillips Creek and delivers the water to raw water storage tanks at the camp. Water from these tanks is used to provide fire water as well as meet the freshwater requirements of the site. The Milne Port camp layout including the locations of potable water related infrastructure is presented in Appendix E.

The potable water treatment scheme consists of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water then undergoes a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use.

3.1.5.2 MINE SITE

Currently onsite at the Mine Site there are three camps that support construction, operations and site wide exploration activities. These camps include:

- Mine Site Weatherhaven (MWH) Camp
- Sailiivik Camp Complex
- Mine Site Complex (MSC) Camp

The MSC Camp will be relocated to expand the PSC at Milne Port in 2019/2020. Each camp contains a Potable Water Treatment Plant (PWTP) within or near the camp as well as freshwater tanks to store raw water being delivered. The Sailiivik Camp will be adequate to support the Phase 2 Proposal through construction and operation. In addition, the PWTP at the Sailiivik Camp will supply potable water to a temporary KM84 camp during construction.

Fresh water supply for the Mine Site is obtained using an electric pump positioned inside a heated and insulated pump house on a raw water jetty on Camp Lake. Water is pumped directly from the lake source to water storage tanks located at both camps. Storage tanks that are not connected to this water line are filled from water trucks that draft water directly from the pump house. Water from these tanks will be used to provide fire water as well as meet the freshwater requirements of the site. A standpipe within each tank ensures that fire water is always available in the tank. The freshwater demand for the Phase 2 Proposal is shown on the Mine Site water and sewage process flow diagram in Appendix D. The Mine Site camp layout including locations of potable water related infrastructure is presented in Appendix E.

The potable water treatment scheme consists of coagulation followed by media filtration and disinfection by ultraviolet radiation. The water will then undergo a secondary disinfection by sodium hypochlorite injection to ensure residual chlorine content at the point of use.

3.1.5.3 TEMPORARY CAMPS

Two 68-bed temporary camps will be positioned at KM40 and KM84 during the construction of the railway. The quantities of water required for these camps is within the allowable water draw from one of the approved water sources for domestic uses (Phillips Creek, KM 32 Lake or Camp Lake) under the current Licence. Potable water for the KM40 Camp will be trucked from the Milne Port PWTP to water storage tanks at the camp. Potable water for the KM84 Camp is expected to be trucked from the Mine Site PWTP but may come from Milne Port if needed to remain under daily water use limits. The daily water supply usage of each temporary camp is 17 m^3.

3.1.6 ADAPTIVE MANAGEMENT RELATED TO DOMESTIC AND INDUSTRIAL WATER WITHDRAWALS

Figure 3.1 presents a response flowsheet regarding the actions that will be taken should daily water withdrawal limits be exceeded.

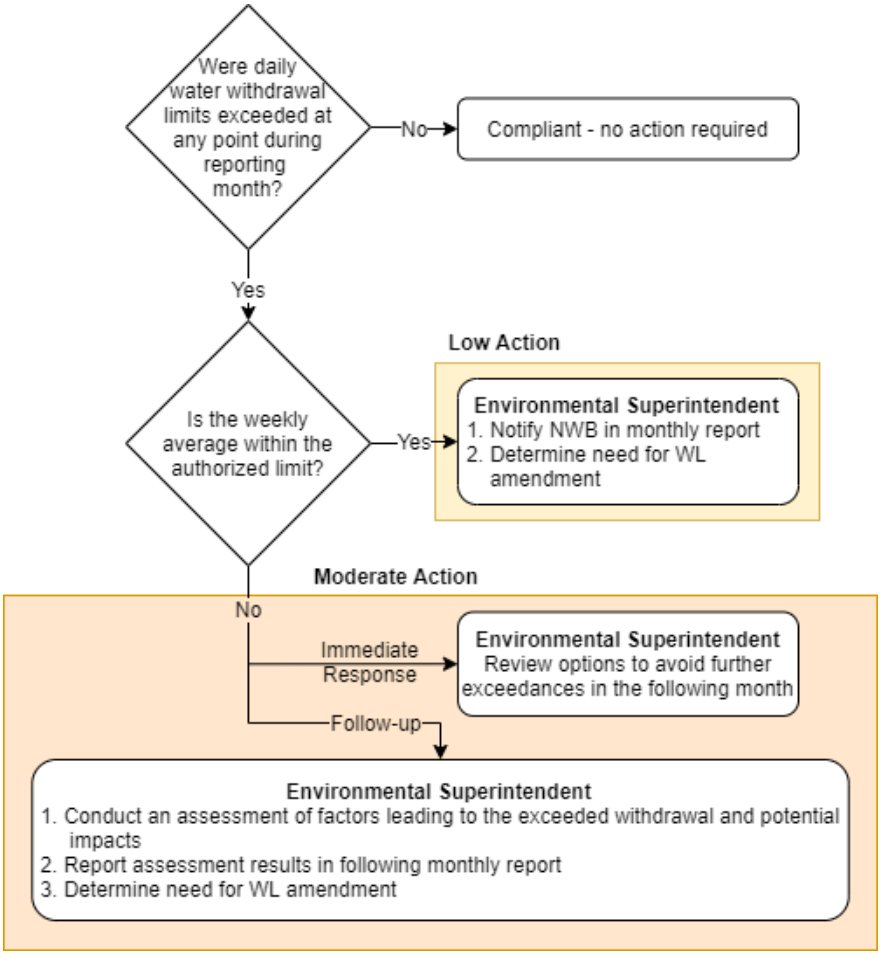

FIGURE 3.1 ADAPTIVE MANAGEMENT MEASURES RELATED TO WATER WITHDRAWALS

In practice, daily withdrawal limits at camp water sources have been exceeded from time to time. In all instances to date, the weekly water withdrawal limit (not regulated) has not been exceeded. This adaptive management approach has been developed such that frequent exceedances of the weekly authorized limit would trigger follow-up responses including potentially seeking a Type A Water Licence amendment.

3.2 DUST SUPPRESSION WATER USE

Water is an important dust suppressant, with or without the addition of calcium chloride (CaCl) or other dust suppressants. Currently, 15 dust suppression water sources are approved under the Type A Water Licence, and changes and additions to these water sources are proposed to support the Phase 2 Proposal. The Project draws water and applies the water to roads during the open water season (roughly late June through early September).

3.2.1 WATER SOURCES

Table 3.2 lists the approved and proposed sources and volumes of water for dust suppression.

TABLE 3.2 DUST SUPPRESSION WATER SOURCES AND VOLUMES

Water Take Station (Source)	Coordinates		Authorized Water Use[1]	Additional Water Use Requested[2]	Revised Maximum Water Use[2]
	Northing (m)	Easting (m)	(m^3/day)	(m^3/day)	(m^3/day)
MP-MRY-2 (Phillips Creek)	7,975,254	502,829	212	-	212
CV128	7,965,895	513,545	579.5	-	579.5
MP-MRY-3 (km32 Lake)	7953,660	521,189	364	-	364
CV099	7,948,820	521,811	110	-	110
CV087	7,941,040	523,704	90	-	90
CV078	7,936,787	525,852	75	15	90
Katiktok Lake	7,934,552	526,600	318	-	318
BG50	7,926,846	529,334	150	65	215
BG32	7,921,622	540,706	120	60	180
CV217	7,922,158	542,219	130	-	130
Muriel Lake	7,921,987	542,508	212	-	212
David Lake	7,919,396	547,885	132	-	132
BG17	7,917,643	550,703	75	-	75
CV223 (Tom River)	7,914,691	555,818	135	-	135
Camp Lake	7,914,684	557,793	86	-	86
CWP1	7,970,914	506,663	-	140	140
CWP2	7,967,146	510,978	-	110	110
CWP3	7,963,947	515,215	-	55	55
CWP4	7,962,497	516,439	-	75	75
CWP5 (km26 Lake)	7,958,592	518,839	-	120	120
CWP6	7,945,826	522,434	-	80	80
CWP7	7,942,153	523,218	-	60	60
CWP8	7,939,580	524,497	-	35	35
CWP9	7,938,445	524,839	-	45	45
CWP10	7,923,139	527,413	-	55	55

Water Take Station (Source)	Coordinates		Authorized Water Use[1]	Additional Water Use Requested[2]	Revised Maximum Water Use[2]
	Northing (m)	Easting (m)	(m^3/day)	(m^3/day)	(m^3/day)
CWP11	7,916,686	529,119	-	100	100
CWP12	7,916,606	551,452	-	80	80
CWP3 (Sheardown Lake)	7,913,489	560,288	-	10	10

NOTES:

1. Source: Type A Water Licence (2AM-MRY1325 - Amendment No. 1).
2. Proposed water withdrawal volumes from TSD 13 for the Phase 2 Proposal (Knight Piésold, 2018).
3. Those water sources shaded are subject to restricted use: no water withdrawals during the months of August and September during low flow (< mean flow) years; see Section 3.2.2.

The dust suppression water withdrawal sites that are approved under the current Type A Water Licence are identified separate from those subject to an application to amend the Type A Water Licence for the Phase 2 Proposal (Knight Piésold, 2019). The water sources proposed for the Phase 2 Proposal can only be used once approved by the NWB under a future second amendment to the Type A Water Licence.

In addition, water that has accumulated in former borrow pits is used opportunistically as a source of water for dust suppression activities.

3.2.2 MITIGATION BY DESIGN

The following mitigation has been incorporated into the design of water supply infrastructure:

- **Identification of as many suitable water sources as possible -** The greater number of water sources spread out along the Northern Transportation Corridor, the less time water trucks spend in transit (between a water source and the section of road requiring application of dust suppressants) and therefore the more effective dust suppression efforts will be.
- **Preference for lakes and ponds -** To the extent feasible, lakes and large ponds have been identified for dust suppression water withdrawals along the Tote Road and North Railway.
- **Selection of streams with adequate flow -** A water take assessment was conducted that identified streams with sufficiently large catchments that flows will not be affected during instantaneous water withdrawals. Restrictions have been placed on smaller streams that have the potential to be adversely affected during low flow conditions.
- **Minimizing access road lengths -** Approved dust suppression water sources are all located immediately adjacent to or on the Tote Road; additional water sources proposed for the Phase 2 Proposal are within 250 m of the Tote Road or North Railway alignment.
- **Screens on intake pipes -** Intake pipes on the water trucks are equipped with screens that are sized in accordance with the DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO, 1995) to ensure no entrainment or impingement of fish.

Several streams identified as water sources have smaller catchments. Adequate water from these streams is available during June and July in any year, but in drier years, water withdrawals in these streams are prohibited

during August and September. Consult the Environmental Coordinator or Superintendent before withdrawing waters from the restricted use streams shaded in Table 3.2 (namely, CV078, CV087, CV099, BG17, BG32 and CWP12), to verify if it is a wet or dry year and if water withdrawals are authorized.

In response to a request by DFO during the NIRB environmental review of the Phase 2 Proposal, Baffinland will develop a water withdrawal plan to ensure that fish and fish habitat at the dust suppression water sources is protected. Any mitigation measures identified in the water withdrawal plan will be incorporated into a future update of this plan.

3.2.3 OPERATING MITIGATION MEASURES

Restricted Use Streams

Sources that are restricted by low flow years (Table 3.2) will have a visual inspection completed by environmental personnel to determine if restrictions need to be put in place on a regular basis. Environmental personnel will then perform instantaneous flow measurement by staff gauge monitoring if deemed necessary. The instantaneous flow estimate will be done by measuring the height of water on a staff gauge and applying it to the rating curves of the representative streams around the Project. This data will be compared to low flow indices from current monitoring locations for a representative stream to determine if it is a low flow year. The Site Environment Department department will inform operators of any restrictions.

Withdrawals from Lakes

Monthly cumulative withdrawals from lakes represent less than 10% of the monthly outflow, unless site-specific conditions indicate that a greater water withdrawal will not be significant in the context of fish bearing habitat (i.e. Camp Lake).

Withdrawal from Dust Suppression Sources for Other Purposes

Authorization by the NWB, in writing must be obtained prior to withdrawing water at these sources listed above for any purpose other than dust suppression. Streams will not be used as a water source unless authorized and approved by the Board in writing. Additionally, no material shall be removed from below the ordinary High Water Mark (HWM) of any water body unless authorized. For remote fresh water requirements such as dust suppression, tunnelling, and geotechnical and exploration drilling, some water may be drawn by truck from nearby lakes and ponds and used directly for these purpose if the source is pre-approved by Baffinland's Type A Water Licence or by application to the NWB.

Water Withdrawal Rates on Trucks

The water withdrawal rate must be such that fish do not become impinged on the screen (DFO, 1995; Part E, Item 6 of the Type A Water Licence).

One-Time Aquatic Survey at Water Withdrawal Site BG32

A survey of the water withdrawal site BG32 is recommended in the first year following Project approval in late summer/fall when water withdrawals occur and during a low flow event to ensure there is no stranding of Arctic Char (North/South Consultants Inc., 2018). In the event that stranding is observed, a fish salvage would be undertaken to relocate stranded fish to a local waterbody.

3.2.4 ADAPTIVE MANAGEMENT RELATED TO DUST SUPPRESSION WATER WITHDRAWALS

The adaptive management measures identified on Figure 3.1 would also apply to water withdrawals for dust suppression.

3.3 GEOTECHNICAL DRILLING AND EXPLORATION WATER USE

The use of water for geotechnical drilling and regional mineral exploration is authorized under the Type B Water Licence. This includes water used for the purposes of geotechnical and exploration drilling, and domestic camp use at supporting satellite exploration camps.

Water withdrawn for domestic camp use at satellite exploration camps will be withdrawn from sources proximal to each camp. Total water use for all satellite exploration camps will not exceed 49 m^3 per day.

Likewise, drill water will be withdrawn from water source(s) proximal to drilling targets and shall not exceed 250 m^3per day. Streams cannot be used as a water source unless authorized and approved by the Board in writing.

The volume of water withdrawn for all purposes under this licence will not exceed 299 m^3 per day.

Mitigation measures associated with exploration water use include the following:

- Daily water withdrawals associated with exploration are not to exceed the amounts specified above
- At least 15 days' notice must be provided to the Board and an Inspector prior to the use of water from any sources not previously identified
- A screening process will be used to confirm whether water sources are considered adequate as water take locations. Source selection begins by looking for the largest possible water body that is feasible for use. Lakes are considered first, followed by ponds and then large rivers.
- All water intake hoses will be equipped with a screen to ensure that fish are not entrained and the rate which water will be withdrawn will be such that fish do not become impinged on the screen
- Streams cannot be used as a water source unless authorized and approved by the Board in writing
- In cases where water withdrawals may drawdown the source waterbody, a request for approval must be submitted to the board at least 30 days prior to use of the water. The request must include the following information: volume required, hydrological overview of the waterbody, details of impacts, and proposed mitigation measures.
- Material shall not be removed from below the ordinary HWM of any waterbody unless authorized
- The Licensee shall not cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion
- The Licensee shall implement sediment and erosion control measures prior to and maintain such measures during the undertaking to prevent entry of sediment into water
- Land-based exploration drilling and trenching operations shall be conducted at least 31 m from the ordinary HWM unless otherwise approved by the Board in writing

- Geotechnical drilling operations may be conducted within 30 m of the ordinary HWM of any waterbody provided that such activities are consistent with the terms of the Type B Water Licence and if a request has been submitted and received by the NWB at least 10 days in advance of such drilling. The request must include:
  - A thorough description of the proposed activities
  - An appropriately scaled site map, complete with approximate GPS coordinates of planned drilling locations and the associated waterbodies
  - Locations of waste deposition (i.e., sumps to contain drill water, chips, muds and salts in any quantity or concentration)
  - Mitigation measures that are planned to be in place, prior to, during drilling and following if required to protect waters

Other mitigation measures regarding geotechnical and exploration drilling related to waste management are described in the EPP.

3.4 SEWAGE TREATMENT AND DISPOSAL

The treated sewage discharge locations regulated under the Type A Water Licence are listed in Table 3.3.

TABLE 3.3 SEWAGE DISCHARGES

SNP Station	Description
Milne Port	
MP-MRY-04	Milne Exploration Phase Sewage Treatment Facilities (to become inactive after transition period)
MP-MRY-04A	Milne Exploration Phase Sewage Treatment Facilities (to become inactive after transition period)
MP-01	Milne Port Sewage Treatment Facilities (discharge into ditch prior to ocean)
MP-01a	Milne Port Polishing Waste Stabilization Pond (PWSP)
Mine Site	
MS-01	Mine Site Sewage Treatment Facilities
MS-01A	Mine Site Polishing/Waste Stabilization Pond (PWSP)
MS-01B	Effluent from Sailiivik Camp Sewage Treatment Plant
MS-MRY-4A	Exploration Camp Polishing/Waste Stabilization Ponds
MS-MRY-4B	
MS-MRY-4C	

3.4.1 TREATED SEWAGE DISCHARGE LIMITS

Table 3.4 identifies the discharge limits applicable to the discharge of treated sewage effluent at the Project sites. Baffinland has identified an Internal Limit that triggers a low action response (Section 3.3.4). The discharge limits applicable to discharges of treated sewage to the freshwater and marine environments are also presented in Table 3.4.

TABLE 3.4 DISCHARGE LIMITS FOR TREATED SEWAGE

Parameter	Units	Maximum Concentration of Any Grab Sample, as per Baffinland Internal Limits	Maximum Concentration of any Grab Sample discharging into Freshwater[1]	Maximum Concentration of any Grab Sample discharging into Ocean[2]
BOD_5	mg/L		30	**100**
COD	mg/L	90		
TSS	mg/L	28	35	**120**
Faecal Coliform	CFU/100 mL	800 CFU / 80 mL	1,000	**10,000**
Oil and Grease		No visible sheen	No visible sheen	**No visible sheen**
pH		Between 6.5 and 8.5	Between 6.0 and 9.5	**Between 6.0 and 9.5**
Ammonia (NH3-N)	mg/L	3.2	4.0	-
Total Phosphorus (MS-01, MS-01B, MS-MRY-4A)	mg/L		4.0	-
Total Phosphorus (MS-01a)	mg/L	0.8	1.0	-
Toxicity		**Not acutely toxic**	**Not acutely toxic**	**Not acutely toxic**

NOTES:

1. From Table 4 of the Type A Water Licence; applicable to stations MS-01, MS-01b, MS-01a, MS-MRY-4A.
2. From Table 5 of the Type A Water Licence; applicable to station MP-01 and MP-01A.

All sewage generated from relevant Project sites is directed to the Sewage Treatment Facilities or as otherwise approved by the NWB. As per the Type A Water Licence, Baffinland is constructing and operating infrastructure and facilities designed to contain, withhold, divert, or retain Water and/or Waste in accordance with applicable legislation and industry standards. Effluent will be discharged such that surface erosion is minimized and no additional impacts are created. Effluent discharge locations will be regularly monitored for erosion, and control measures will be implemented as required. The quality of the sewage treatment plant effluent discharging to freshwater or directly into the ocean shall be in accordance with the applicable site discharge limits and the approved Type A Water Licence.

Locations MP-01 and MP-01a discharge directly into the ocean, therefore the ocean discharge limit would apply.

Recycled water and use of reclaimed water from the various Treatment Facilities (MBRs, OWSs, etc.), surface water management ponds, and embankment dams and approved discharge locations may be used if waters meet appropriate discharge limits for those facilities.

Sludge generated from Sewage Treatment Facilities or any other facilities shall be incinerated using the Milne Port and Mine Site onsite incinerators, disposed of in the landfill with the appropriate approvals from authorities, or backhauled for disposal off site in Southern Canada.

3.4.2 SEWAGE TREATMENT PROCESS DESCRIPTION

On average sewage generated per person ranges from approximately 100 to 300 L/day. Actual camp occupancy can be optimized based on potable water conservation measures that can be implemented to reduce per capita water consumption and reduce overall sewage generation from current rates.

The process description for the sewage treatment systems at each site are described in the sections that follow. Water and sewage process flow diagrams for each site are presented in Appendix D, and site layouts are presented in Appendix E.

3.4.2.1 MILNE PORT

The existing STP at Milne Port (STP #1) is a membrane bioreactor (MBR) facility that was installed in 2014. Raw sewage generated at the PSC camp is pumped directly via lift stations and sewage lines to the MBR facility at Milne Port. Raw sewage generated at the PSC camp is stored in a raw sewage bladder until it is transported using a vacuum truck to the Milne Port MBR for treatment.

Two additional STPs will be commissioned at Milne Port in 2019 and 2020 as part of current operations. STP #2 is the MBR facility currently servicing the MSC at the Mine Site, which will be relocated to Milne Port along with the MSC buildings in 2019 or 2020. STP#3 will be commissioned in 2019 next to the 380-person construction camp, which was approved as part of Baffinland's Production Increase Project Proposal (Stantec Consulting Ltd., 2018), and by the NWB under Modification Request No. 6 (NWB, 2019).

Treated effluent from the MBR sewage treatment plant is stored in a series of treated effluent tanks which collectively have a hydraulic retention time of eight hours (at minimum) based upon nominal flows. It is designed such that the effluent tank will be at a low-level during operation. This design allows for delay of discharge should sampling indicate that the effluent quality does not meet the applicable limits. Such delay allows the effluent to be mixed, re-treated, and re-tested before discharge. Once sampling indicates that effluent is meeting discharge limits the treated effluent stream is directed to discharge via truck or pipeline to the overland outfall discharge location (See Table 3.5 for coordinates). The discharge location at Milne Inlet is shown on the Milne Port Site Layout (Appendix E).

Should discharge of off-spec effluent be necessary from the treated effluent tanks due to volume, the off-spec effluent will be stored in the Milne Port polishing waste stabilization pond (PWSP). The off-spec effluent will be removed by vacuum truck and fed into the sewage plant feed tank for re-processing or treated by means of a pond treatment system (i.e. DAF system). Should there be high volumes of off-spec effluent greater than the capacity of the existing PWSP, the Type A Water Licence allows for the construction of a second PWSP to be built at Milne Port. This second PWSP (No. 2) would work in parallel with the existing PWSP and be treated in the same manner.

In the event that there is an electrical power outage that causes the sewage treatment plant to be completely inoperable, raw sewage will be diverted temporarily and trucked to the PWSP, until the sewage plant is operational. At that time, partially or untreated sewage from the PWSP(s) will be trucked back to the treatment plant for

treatment or treated using an in-situ pond treatment system and discharged to the ocean outfall (Appendix F - PWSP Effluent Discharge Plan). The PWSP Effluent Discharge Plan is used as a reference guideline by the Site Environment Department. Based on the water quality parameters observed in the PWSP and time of year, the PWSP will be discharged following Option #1 - Spring Discharge Plan or Option #2 - Summer Polishing Treatment Discharge Plan, approved by the NWB. Discharges from Project PWSPs will be monitored and treated as outlined in the PWSP Effluent Discharge Plan to ensure effluent discharged meets the applicable water quality criteria outlined in the Type A Water Licence. In the event that water treatment methods differ significantly from the PWSP Effluent Discharge Plan, Baffinland will seek third party consultation and approvals to determine the appropriate water treatment methods.

The sludge generated by the MBR is de-watered using a mechanical de-watering device, a filter press, and then incinerated or backhauled for disposal off site. Sludge is stored in an animal proof secure area. Odour generation is limited as a result of the sludge being aerobically digested, de-watered, and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents are installed where deemed necessary. The incinerator design considered the solids content of the sludge from the dewatering device. Note that there is a potential option to dispose of de-watered sludge in the Mine Site landfill with the appropriate approvals from authorities. Sewage sludge also accumulates in the bottom of the lift stations that service the accommodations camps at Project sites. Regular maintenance of the lift stations includes the periodic removal of the accumulated sewage sludge.

The sewage treatment system basis as described above will be applicable for current and future construction and operations requirements. The site layout showing the location of camp, sewage treatment and ancillary facilities is presented in Appendix E.

3.4.2.2 MINE SITE

The Mine Site has two MBR Sewage Treatment Plant (STP) facilities, one installed in 2014 and another installed in 2018 specifically for the Sailiivik Camp Complex. The Rotating Biological Contactor (RBC) type STP (Seprotech manufactured), previously used to treat sewage from the Mine Site Weatherhaven camp, will eventually be decommissioned; however, in the interim, it is being used as a temporary holding facility/surge tank for the Mine Site Weatherhaven camp. Raw sewage is transported from the RBC by vacuum truck to the MBR for treatment. In the meantime, the option to re-commission this plant remains, should the need arise, as the required approvals for this facility are still in place.

Treated effluent from the MBR sewage treatment plants is stored in a series of treated effluent tanks which collectively have a hydraulic retention time of 8 hours (at minimum) based upon nominal flows. It is designed such that the effluent tanks will be at a low-level during operation. This design allows for delay of discharge should sampling indicate that the effluent quality does not meet the applicable limits. Such delay allows the effluent to be mixed, retreated, and retested before discharge. Once sampling indicates that effluent is meeting discharge limits the treated effluent stream is directed to discharge via pipelines to the Mary River discharge location; one pipeline from the MSC MBR and one for the Sailiivik Camp Complex MBR (See Table 3.5 for winter and summer discharge co-ordinates). The discharge locations at the Mine Site are shown on the Mine Site Layout presented in Appendix E.

Riprap has been used at the discharge locations to reduce sedimentation and erosion at the discharge location and along the drainages upstream of Mary River. Specific discharge locations into Mary River can be seen on the Mine Site Layout found in Appendix E. The discharge strategy will be reviewed annually and optimized as necessary.

In the event that there is an electrical power outage that causes the sewage treatment plant to become inoperable, raw sewage will be temporarily trucked to local existing polishing waste stabilization ponds until the sewage plant comes online again. Partially or untreated sewage from the PWSPs from this event will either be trucked back to the treatment plant for treatment/reprocessing or treated in situ at the pond location (Refer to Appendix F - PWSP Effluent Discharge Plan). The PWSP Effluent Discharge Plan is used as a reference guideline by the Site Environment Department. Water quality parameters will be monitored in the spring and a discharge plan will be developed based on the determined water quality conditions. Discharges from Project PWSPs will be monitored and treated as outlined in the PWSP Effluent Discharge Plan to ensure effluent discharged meets the applicable water quality criteria outlined in the Type A Water Licence. In the event that water treatment methods differ significantly from the PWSP Effluent Discharge Plan, Baffinland will seek third party consultation to determine the appropriate water treatment methods.

The sludge generated at the MBR is dewatered using a mechanical dewatering device, a filter press, and then incinerated or backhauled for disposal off site. Sludge cake is stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents are installed where deemed necessary. The incinerator design considered the solids content of the sludge from the dewatering device. Sewage sludge also accumulates in the bottom of the lift stations that service the accommodations camps at Project sites. Regular maintenance of the lift stations includes the periodic removal of the accumulated sewage sludge.

The MBR sewage treatment plant is designed to also process raw or partially treated sewage from Raven and Mid-Rail camps in the event these facilities have been constructed. The sewage could be transported to the Mary River permanent sewage treatment facility via vacuum truck.

The sewage treatment system basis as described above is adequate for current construction and operations requirements. The modular nature of the plants makes it very simple to add containerized plants for increased sewage treatment capacity. The site layout showing the location of camp, sewage treatment and ancillary facilities is presented in Appendix E.

3.4.2.3 TEMPORARY CAMPS

As noted in Section 3.1.5.3, two 68-bed temporary camps will be positioned at KM40 and KM84 during the construction of the railway. The daily sewage generation from each temporary camp will be 17 m^3. Sewage will be held in holding tanks and then transported by truck to one of the sewage treatment plants at Milne Port (Section 3.3.2.1) or at the Mine Site (Section 3.3.2.2).

3.4.2.4 FUTURE SOUTH RAILWAY AND STEENSBY PORT CAMPS

Plans for sewage treatment associated with the South Railway operation will be articulated in a future update to this Plan, once that information becomes available.

3.4.3 TREATED EFFLUENT GENERAL DISCHARGE AND OUTFALL LOCATIONS

Treated sewage and wastewater for the Project are discharged to the locations listed in Table 3.5.

TABLE 3.5 APPROXIMATE TREATED EFFLUENT GENERATION AND DISCHARGE/OUTFALL LOCATIONS

Camp/Site	Discharge/Outfall Location		Coordinates
	Summer	Winter	
Milne Port[1]	Ocean at Milne Inlet		N: 7976338 E: 503636
Mine Site[1]	Sheardown Lake for Exploration Camp	Storage Pond	N: 7913630 E: 559733
	Discharge 1 to Mary River		N: 7911946 E: 562321
	Discharge 2 to Mary river		N: 7911938 E: 562342
	Discharge 3 to Mary River		N: 7912010 E: 562249
Tote Road Work Sites	Conveyed to Mine Site or Milne Port Sewage Treatment		N/A
Steensby (Port)[2]	Ocean at Steensby Port		N: 7801412 E: 593378
Ravn River Area[2]	Conveyed to Mine Site Sewage Treatment		N/A
Mid-Rail Area[2]	Conveyed to Mine Site Sewage Treatment		N/A
Cockburn Tunnels Area[2]	Conveyed to Steensby Sewage Treatment		N/A
Cockburn South Camp[2]	Conveyed to Steensby Sewage Treatment		N/A

NOTES:

1. Refer to Site Block Flow Diagrams in Appendix D for Milne Port and Mine Site anticipated annual effluent discharge.
2. These sites are not expected to be active in the foreseeable future.

Each of the three STPs at Milne Port will share a common final discharge points, either the outfall represented by MP-01, or the PWSP represented by MP-01a.

Treated wastewater effluent will be discharged at a distance of at least thirty-one metres (31 m) above the Ordinary HWM of any water body or watercourse, or where direct flow into the adjacent water body or watercourse is possible, so that surface erosion is minimized and additional impacts are avoided.

3.4.4 ADAPTIVE MANAGEMENT RELATED TO SEWAGE DISPOSAL

Environmental management strategies related to sewage disposal are described in Sections 3.2.1 through 3.2.5. If monitoring (Section 5) finds that these strategies are inadequate (discharge limits for treated sewage effluent could be exceeded), additional actions will be implemented as shown on Figure 3.2.

As shown on Figure 3.2, under normal operations, sewage meets discharge limits and is discharged as it is generated. If sewage does not meet discharge limits, three levels of response have been identified:

- **Low action response -** If it is possible to delay discharge (there is available capacity in the PWSP), off-spec sewage is discharged into the PWSP for additional management in accordance with a site specific discharge plan developed from the generic PWSP in Appendix F. Additional management in most instances will involve in-pond effluent treatment. Subsequent testing verifies the effluent is below Internal Discharge Limits (Table 3.4) and the effluent is discharged.
- **Moderate action response -** If subsequent testing does not meet Internal Discharge Limits but meets regulatory discharge limits (Table 3.4), the moderate action response is triggered. This involves conducting a risk evaluation as to proceed with discharge. The risk evaluation considers the likelihood that subsequent testing during discharge may identify effluent within the pond that exceeds the Regulatory Discharge Limits and considers factors such as PWSP volume and the resources and time to conduct subsequent treatment or testing. Depending upon the outcome of the risk evaluation, treated sewage exceeding Internal Discharge Limits but within Regulatory Discharge Limits will either be discharged under the moderate action response, or another discharge plan will be developed under the low action response.
- **High action response -** The high action response involves discharging effluent that does not meet regulatory discharge limits. This would only occur under a spill scenario or if delaying discharge was not possible. This is considered a highly unlikely scenario. Should this occur, the Spill Contingency Plan will be implemented and the NWB and the QIA would be notified. The Emergency Response Plan (ERP) would be implemented if the spill was Level 2 or 3, as described in Section 3.7. Once the immediate actions have been implemented and the spill has been contained and managed, follow-up actions will be implemented as identified on Figure 3.2 (an investigation of cause would be implemented, additional contingencies would be identified, and/or the need for an amendment to the Type A Water Licence would be contemplated).

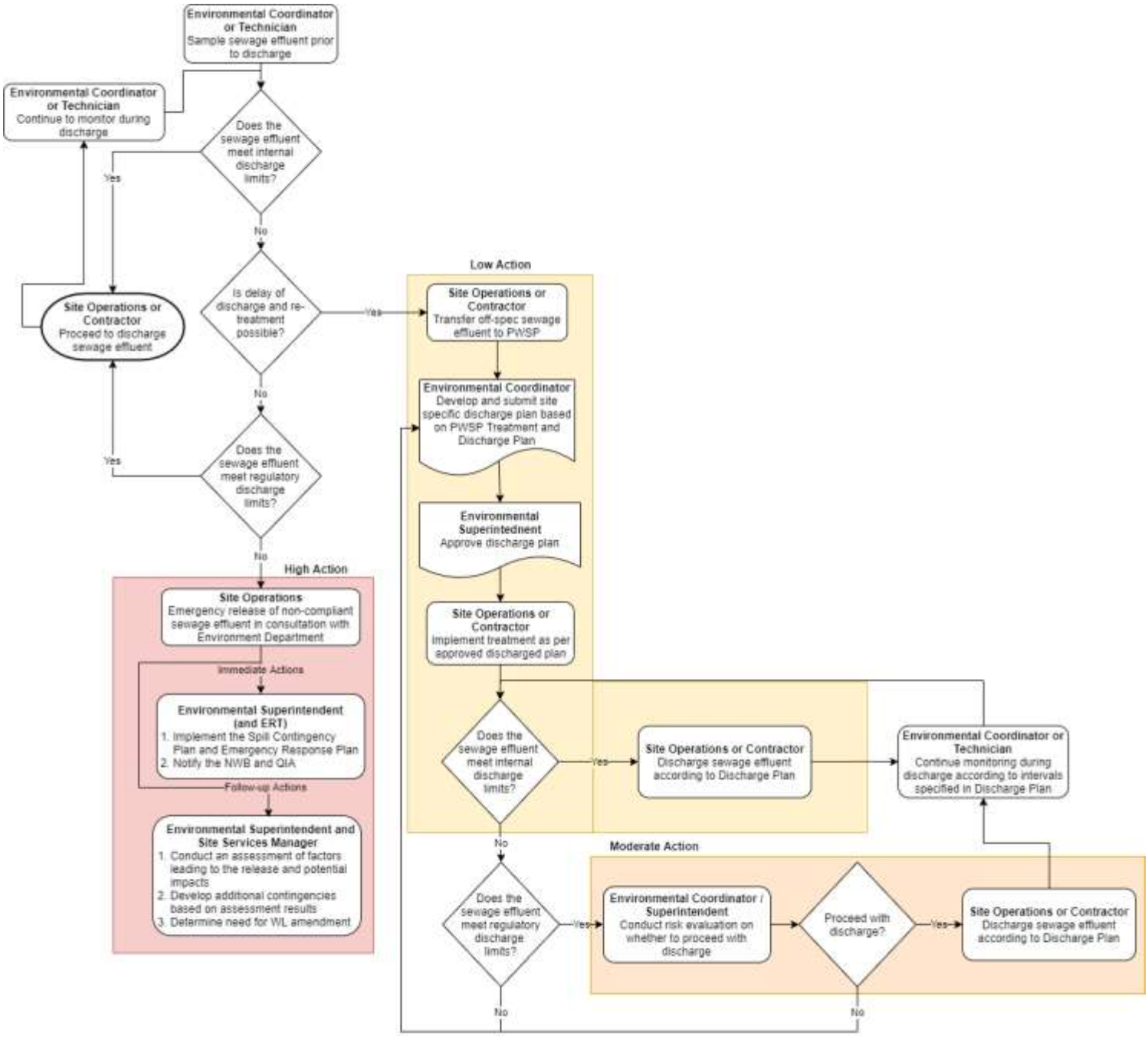

FIGURE 3.2 ADAPTIVE MANAGEMENT MEASURES RELATED TO TREATED SEWAGE EFFLUENT DISCHARGES

3.5 CONTACT WATER MANAGEMENT

The Type A Water Licence defines contact water as: surface water or runoff that is physically or chemically affected by the Mary River Project mine development areas and activities (NWB, 2015). Contact water is water that has contacted ore or waste rock, also referred to as mine effluent.

Table 3.6 identifies the contact waters requiring management.

TABLE 3.6 CONTACT WATERS REQUIRING MANAGEMENT

SNP Station	Description
Milne Port	
MP-05	Milne Port Ore Stockpile Sedimentation Pond (East)
MP-06	Milne Port Ore Stockpile Settling Pond (West)
MP-07 (new)	Milne Port Ore Stockpile Stormwater Pond No. 3
MP-08 (new)	Milne Port Ore Stockpile Stormwater Pond No.4
MP-09 (new)	Milne Port Ore Stockpile Stormwater Pond No.5
MP-10A (new)	Lump Ore Stockpile Perimeter Ditching East
MP-10B (new)	Lump ore stockpile perimeter ditching West
Mine Site	
MS-06	Ore stockpile (crusher pad) pond stormwater
MS-06B (new)	Stormwater Pond No. 2 at North Rail Loadout Facility
MS-07	Run of Mine (ROM) Ore Stockpile Pond Stormwater
MS-08	Waste Rock Stockpile West Pond
MS-09 (future)	Waste Rock Stockpile East Pond
MS-MRY-09	2008 Bulk Sample Program - Open Pit - Downstream Surface Water Drainage
MS-MRY-10	2008 Bulk Sample Program - Ore Stockpile Area – Downstream Surface Water Drainage
MS-MRY-11	2008 Bulk Sample Program - Ore Processing Area - Downstream Surface Water Drainage

With the introduction of crushing at Milne Port with the Phase 2 Proposal, the facility will be considered a mill, and the ore stormwater discharges at the port will be subject to the MDMER.

3.5.1 CONTACT WATER DISCHARGE LIMITS

The discharges listed in Table 3.6 will be subject to the discharge limits identified in Table 3.7. Baffinland has established an Internal Limit which is lower than the applicable discharge limits identified in the Type A Water Licence and/or the MDMER.

TABLE 3.7 CONTACT WATER DISCHARGE LIMITS

Parameter[3]	Units	Baffinland Internal Limit	Water Licence Discharge Limit[1]	MDMER Discharge Limit[2]	
Sample Type		Grab	Grab	Mean Monthly	Grab
Total Arsenic	mg/L	0.40	0.50	0.50	1.00
Total Copper	mg/L	0.24	0.30	0.30	0.60
Total Lead	mg/L	0.16	0.20	0.20	0.40
Total Nickel	mg/L	0.40	0.50	0.50	1.00
Total Zinc	mg/L	0.40	0.50	0.50	1.00
Total Suspended Solids	mg/L	12	15	15	30
Oil and Grease	Visual	No visible sheen	No visible sheen		
Toxicity		No acutely toxic	Not acutely toxic	Not acutely toxic	
pH		6.5 - 8.5	6.0 - 9.5	6 - 9.5	
Radium-226[4]	Bq/L			0.37	1.11
Un-ionized Ammonia[5]	mg/L			0.50	1.00

NOTES:

1. Source: Type A Water Licence Table 10.
2. Source: Schedule 4, Metal and Diamond Mining Effluent Regulations (Minister of Justice, 2019).
3. Parameters listed above are sampled weekly during discharge.
4. If Radium-226 concentration is less than 0.037 Bq/L for 10 consecutive weeks, the frequency of testing can be reduced to once quarterly (each test being at least one month apart).
5. Un-ionized ammonia (expressed in mg/L as nitrogen) will be added to the MDMER deleterious substance list on June 1, 2021. Field measures of effluent pH and temperature must be collected so that un-ionized ammonia concentrations can be calculated.

When the maximum limit for a parameter differs between the MDMER and Type A Water Licence discharge limits, the more conservative (lower) limit for the parameter is adopted.

Additional parameters including sub-lethal toxicity, aluminum, cadmium, iron, mercury, molybdenum, selenium, nitrate, ammonia, chloride, chromium, cobalt, sulphate, thallium, uranium, phosphorus, manganese, hardness, alkalinity and specific conductance are also required under MDMER, however these parameters do not have a maximum water quality discharge limit but instead are used to provide additional information to assist in interpreting toxicity results and identifying potential effects on the receiving environment..

3.5.2 GENERAL MITIGATION MEASURES FOR MANAGING CONTACT WATER

The following summarizes the general mitigation measures for managing contact water:

- Contact water will be collected in surface water management ponds for primary settling, and water treatment, if required
- Effluent shall not be combined with water or any other effluent for the purpose of diluting effluent before it is deposited (MDMER Part 2, Section 6)

- Contact water must meet the discharge limits identified in Table 3.7 prior to discharge
- Discharge will be from established Final Discharge Points registered with Environment and Climate Change Canada (ECCC) under the MDMER

Additional details regarding the surface water management ponds at each project site are provided below.

3.5.3 MILNE PORT STOCKPILE SURFACE WATER MANAGEMENT PONDS

Table 3.8 provides a summary of the sources of contact water at Milne Port and the current methods of contact water management.

TABLE 3.8 MILNE PORT CONTACT WATER MANAGEMENT

Source		Treatment Method	Contingency Treatment	Final Discharge
MP-05	Milne Port Ore Stockpile Sedimentation Pond (East)	Stormwater ponds	Flocculants, GAC, clay, filters, etc.	To environment via final discharge points
MP-06	Milne Port Ore Stockpile Settling Pond (West)			
MP-07 (new)	Milne Port Ore Stockpile Stormwater Pond No. 3			
MP-08 (new)	Milne Port Ore Stockpile Stormwater Pond No.4			
MP-09 (new)	Milne Port Ore Stockpile Stormwater Pond No.5			
MP-10A (new)	Lump Ore Stockpile Perimeter Ditching East			
MP-10B (new)	Lump ore stockpile perimeter ditching West			

The two (2) Milne Port stockpile surface water management ponds (east and west) were constructed to temporarily retain the runoff water from the Milne Port ore stockpile and crushing/screening area and to contain the sediment load. During normal operation, runoff from the stockpile area drains to the stockpile surface water management ponds. The ponds were designed with sufficient retention time to ensure the sediment would gravity-settle to the bottom of the pond and allow the runoff to be tested before the water reaches the overflow weirs. The ponds are equipped with overflow weirs designed to allow the unloaded surface water to drain through a controlled discharge to Milne Inlet. Alternatively, the pond can be pumped out using a portable pump arrangement.

An expansion of the current ore stockpiles will be undertaken in 2019 that will result in construction of twinned ponds #1 and #2 (ponds #1A and 2A, respectively), and construction of stage 1 of stormwater pond #3 along the west side of the ore stockpile area. The Phase 2 Proposal will involve construction of stage 2 of stormwater pond #3, and stormwater ponds at the crushing feed stockpile (pond #4) and the fines stockpile (pond #5). The Milne Port Phase 2 Proposal layout is presented in Appendix E. A site water balance process flow diagram showing stormwater management at Milne Port, as well as a piping and instrumentation diagram showing how each pond is emptied and discharged, are presented in Appendix D.

Each of the stormwater ponds will ultimately discharge from one of the two existing final discharge points (i.e., the beach area in front of Ponds #1 and #2).

In the case that the surface water management pond effluent quality does not meet the discharge limits outlined in the Type A Water Licence by means of sediment gravity settling alone, additional treatment methods (i.e. flocculants, GAC, clay, filters, etc.) will be employed to ensure effluent compliance.

The ponds were designed to fit within the foreshore areas north of the stockpile area and therefore do not encroach near the shoreline.

3.5.4 MINE SITE FACILITIES SURFACE WATER MANAGEMENT PONDS

Table 3.9 provides a summary of the sources of contact water at Mine Site and the current methods of contact water management. To date, only contact water from the Waste Rock Facility (WRF) has required water treatment, however, various contingency treatment options are available if discharge limits were exceeded in any of the surface water management ponds. A discharge plan would be developed prior to the discharge of treated effluent.

TABLE 3.9 MINE SITE CONTACT WATER MANAGEMENT

Source		Treatment Method	Contingency Treatment	Final Discharge
MS-06	Ore stockpile (crusher pad) pond stormwater	Primary settling	Flocculants, GAC, clay, filters, etc.	Land discharge running into Mary River via a common effluent discharge pipeline
MS-06B (new)	Stormwater Pond No. 2 at North Rail Loadout Facility	Primary settling	Flocculants, GAC, clay, filters, etc.	
MS-07	Run of Mine (ROM) Ore Stockpile Pond Stormwater	Primary settling	Flocculants, GAC, clay, filters, etc.	
MS-08	Waste Rock Stockpile West Pond	Primary settling and Water Treatment Plant	Various, see Phase 1 Waste Rock Management Plan	Land discharge running into the F0 tributary of Mary River via final discharge points

3.5.4.1 MINE SITE ORE CRUSHER PAD SURFACE WATER MANAGEMENT POND

The existing ore crusher pad surface water management pond at the Mine Site was completed in 2015. This pond is designed to temporarily retain the runoff water from the Mine Site Crusher Facility (CF) and contain the sediment load, particularly during seasonal freshet activities. During normal operation, runoff from the crusher area drains to the surface water management pond (west of the crusher pad). The pond is equipped with an overflow weir designed for extreme weather periods (e.g. greater than a 1 in 10-year, 24-hour design storm), allowing the effluent to discharge to Sheardown Lake via an emergency spillway. However, this is not the normal operating watershed. The ponds were designed with sufficient retention time to ensure the sediment would gravity-settle to the bottom of the pond before the water reaches the overflow weir.

The pond is also equipped with a pump pad on the northwest side. The normal operation of the pond will be to test the water quality for compliance with the discharge limits identified in Table 3.7, and when on-spec, control discharge using a portable pump arrangement. The pump arrangement connects into the treated effluent discharge pipeline for discharge to Mary River.

In the case that the surface water management pond effluent quality does not meet the applicable discharge limits by means of sediment gravity settling alone, additional treatment methods (i.e. flocculants, GAC, clay, filters, etc.) will be employed to ensure effluent compliance.

3.5.4.2 MINE SITE RAIL LOADOUT FACILITY SURFACE WATER MANAGEMENT POND

A new crusher facility and stormwater pond will be constructed to serve the rail load-out facility, at the location shown on the Mine Site Phase 2 Proposal layout in Appendix E. A site water balance process flow diagram showing stormwater management at the Mine Site is presented in Appendix D.

The normal operation of the pond will be to test the water quality for compliance with the discharge limits identified in Table 3.7, and when on-spec, control discharge using a portable pump arrangement. The pump arrangement connects into the treated effluent discharge pipeline for discharge to Mary River.

In the case that the surface water management pond effluent quality does not meet the applicable discharge limits by means of sediment gravity settling alone, additional treatment methods (i.e. flocculants, GAC, clay, filters, etc.) will be employed to ensure effluent compliance.

3.5.4.3 MINE SITE RUN OF MINE STOCKPILE SURFACE WATER MANAGEMENT POND

The Mine Site Run of Mine (ROM) stockpile infrastructure, when constructed, will support Deposit No. 1 mining operations and is to be located off the Mine Haul Road. Stormwater runoff originating in the ROM stockpile is intercepted by the Facility's perimeter collection ditches and directed to the ROM pond. The ROM pond is designed to temporarily retain the runoff and contain the sediment load, particularly during freshet activities. During normal operation, runoff from the ROM stockpile drains to the surface water management pond. The pond is equipped with an overflow spillway designed for extreme weather periods (e.g. greater than a 1 in 10-year, 24-hour design storm), allowing the unloaded surface water to drain through a controlled discharge to Mary River.

In the case that the surface water management pond effluent quality does not meet the applicable discharge criteria by means of sediment gravity settling alone, additional treatment methods (i.e. flocculants, GAC, clay, filters, etc.) will be employed to ensure effluent compliance.

3.5.4.4 MINE SITE WASTE ROCK FACILITY POND

The WRF Surface Water Management Pond (WRF pond) was constructed to support Deposit No. 1 mining operations and is located northeast of the Deposit No. 1 open pit. Seepage and stormwater runoff originating from the WRF is intercepted by perimeter collection ditches and directed to the WRF pond. The WRF pond for the Mine Site was constructed in 2016 and is designed to temporarily retain surface water runoff. Water from the WRF Pond is pumped into the Water Treatment Plant (WTP). Operating procedures for the WTP are provided in Appendix G - Waste Pond Water Treatment Plant Operations. Additional contingency water treatment measures are described in Section 9.2 of the Phase 1 Waste Rock Management Plan.

The effluent from the Geotube is tested to ensure it meets MDMER and applicable Type A Water Licence Limits and then controlled discharged intermittently using a portable pump arrangement. Sludge generated from the operation of the WRF WTP will be assessed for suitability of disposal within the WRF or disposed of off-site at an appropriate waste receiving facility. Following the final discharge point (FDP), effluent passes through approximately 475 metres (m) of layflat hose and is discharged to the tundra of the approved receiving environment, the Mary River watershed. If required, effluent will be transported via layflat hose to the Mary River watershed.

In high rainfall periods (e.g. greater than a 1 in 10-year, 24-hour design storm), the pond is also equipped with an overflow weir on the north side designed to allow the unloaded surface water to drain through a controlled discharge diversion channel. The pond was designed with sufficient retention time to ensure the sediment would gravity-settle to the bottom of the pond before the water reaches the overflow weir. However, Baffinland endeavors to control discharge water from the pond to meet MDMER monitoring requirements using pumping systems.

3.5.5 ADAPTIVE MANAGEMENT RELATED TO CONTACT WATER DISPOSAL

Environmental management strategies related to contact water disposal are described in Sections 3.5.2 to 3.5.4. If monitoring (Section 5) finds that these strategies are inadequate (discharge limits for effluent could be exceeded), additional actions will be implemented as shown on Figure 3.3.

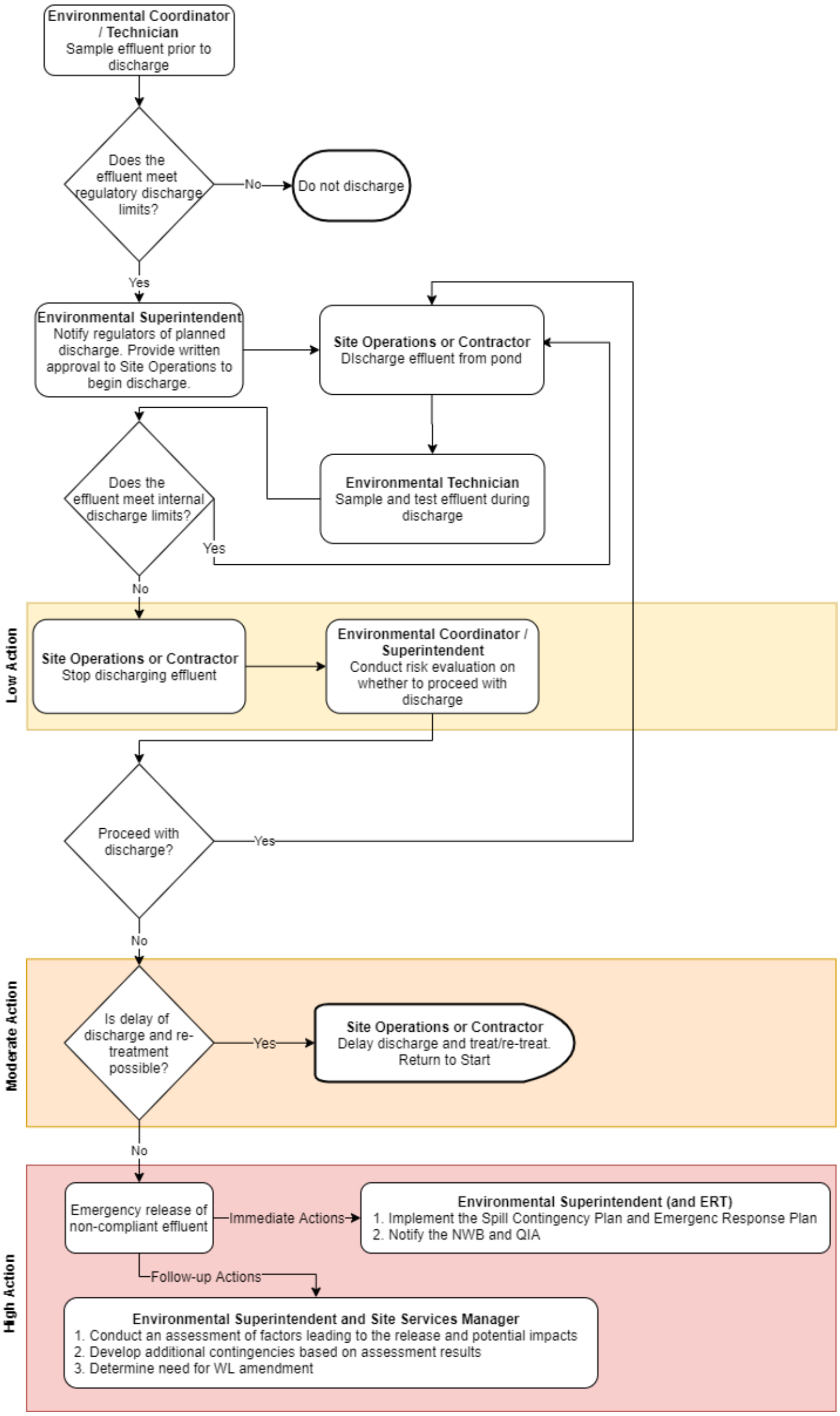

FIGURE 3.3 ADAPTIVE MANAGEMENT MEASURES RELATED TO CONTACT WATER DISCHARGES

As shown on Figure 3.3, contact water is pumped out of the surface water management ponds after pre-discharge testing of the effluent has verified that the effluent is below Regulatory Discharge Limits (Type A Water Licence and MDMER Discharge Limits). Baffinland's adaptive management process for contact water is to conduct periodical sampling during discharge. If testing during discharge finds that contact water exceeds Baffinland's Internal Discharge Limits, three levels of response have been identified:

- **Low action response -** Discharge of effluent ceases until Baffinland's Environmental department has conducted a risk evaluation to determine whether to continue to proceed with discharge. If the decision is made to continue discharging, ongoing testing is resumed. If the risk evaluation determines that resumption of discharge should not occur, the moderate action response is triggered.
- **Moderate action response -**The moderate action response considers whether or not delaying discharge and water treatment (or in the case of contact water from the WRF, additional water treatment) is possible. If possible, this is done and then pre-discharge sampling is conducted again before resuming discharge. If delay of discharge is not possible (for example, if a pond has reached capacity and cannot accept additional inputs that are forthcoming), then the high action response is triggered.
- **High action response -** The high action response involves discharging effluent that does not meet Internal Discharge Limits. This would only occur under a spill scenario or if delaying discharge was not possible. This is considered a highly unlikely scenario. Ongoing sampling during discharge will determine if Regulatory Discharge Limits are exceeded, and if they are and a non-compliant discharge has occurred, the Spill Contingency Plan will be implemented and the NWB and the QIA would be notified. The ERP would be implemented if the spill was Level 2 or 3, as described in Section 3.7. Once the immediate actions have been implemented and the spill has been contained and managed, follow-up actions will be implemented as identified on Figure 3.3 (an investigation of cause would be implemented, additional contingencies would be identified, and/or the need for an amendment to the Type A Water Licence would be contemplated).

3.6 OILY WATER MANAGEMENT

Three types of oily water are generated at Project sites:

- Wash water generated at the vehicle maintenance facilities, waste management building, emergency response garage and truck wash
- Surface water that collects within the bulk fuel storage berms and hazardous waste storage berms
- Surface water that collects within landfarm facilities including the contaminated snow/ice cell

Based on the different nature of these wastewater sources, the Type A Water Licence specifies distinct discharge limits for each (Section 3.5.1). Distinct treatment plans have been developed for each type of oily water (Sections 3.5.2 and 3.5.3).

Table 3.10 lists the sources of oily water that may be generated at the Project, excluding minor oily water generated from accidental spills which is handled by the Spill Contingency Plan.

TABLE 3.10 OILY WATER DISCHARGES

SNP Station	Description
Milne Port	
MP-02	Milne Port Maintenance Shop Oily water/WWTF
MP-03	Milne Port Bulk Fuel Storage Facility Stormwater
MP-04	Milne Port Landfarm Facility Stormwater
MP-04B (new)	Milne Port Contaminated Snow Dump
MP-11 (new)	Milne Port Rail Maintenance Shop Oily water/WWTF
Mine Site	
MS-02	Mine Site Maintenance Shop Oily Water WWTF
MS-03	Mine Site Bulk Fuel Storage Facility Stormwater
MS-03B	Mine Site Bulk Fuel Storage Facility No.2 Stormwater
MS-04	Mine Site Fuel Unloading Station Stormwater
MS-05	Mine Site Landfarm Facility
MS-05B	Mine Site Contaminated Snow Dump
MS-MRY-6	Exploration Camp Bulk Fuel Storage Facility

3.6.1 OILY WATER DISCHARGE LIMITS

All discharge from the Oily Water/Wastewater Treatment Facilities for monitoring stations MP-02 and MS-02 will not exceed the following Effluent quality limits provided in Table 3.11.

TABLE 3.11 OILY WATER TREATMENT FACILITIES EFFLUENT DISCHARGE LIMITS

Parameter	Maximum Concentration of Any Grab Sample (mg/L)
pH	6 – 9.5
TSS	35
Ammonia	4
Phosphorous	4
Benzene	0.370
Ethylbenzene	0.090
Toluene	0.002
Oil and Grease	15 and no visible sheen
Arsenic	0.50
Copper	0.30
Lead	0.20
Nickel	0.50
Zinc	0.50

NOTE:

1. Source: Type A Water Licence (2AM-MRY1325 - Amendment No. 1) Table 6.

All discharge from Bulk Fuel Storage Facilities will not exceed the following effluent quality limits outlined in Table 3.12. Applicable Monitoring Stations include MP-03, MS-03, MS-04, and MS-MRY-6.

TABLE 3.12 BULK FUEL STORAGE FACILITIES EFFLUENT DISCHARGE LIMITS

Parameter	Maximum Concentration of any Grab Sample (mg/L)
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090
Lead	0.001
Oil and Grease	15 and no visible sheen

NOTE:

1. Source: Type A Water Licence (2AM-MRY1325 Amendment No. 1) Table 8

All discharge from Landfarm Facilities, including the Contaminated Snow Containment Berms, will not exceed the following effluent quality limits outlined in Table 3.13. Applicable Monitoring Stations include MP-04, MS-05 and MS-05B.

TABLE 3.13 LANDFARM FACILITIES EFFLUENT DISCHARGE LIMITS

Parameter	Maximum Concentration of any Grab Sample (mg/L)
pH range	Between 6.0 and 9.0
Total Suspended Solids	15
Oil and Grease	15 and no sheen
Total Lead	0.001
Benzene	0.370
Toluene	0.002
Ethylbenzene	0.090

NOTE:

1. Source: Type A Water Licence (2AM-MRY1325 - Amendment No. 1) Table 9.

3.6.2 MANAGEMENT OF OILY WATER AT MILNE PORT

Table 3.14 lists the sources of oily water that may be generated at the Milne Port (excluding minor oily water generated from accidental spills which is handled by the Spill Contingency Plan).

All possible sources listed above are shown in the Milne Port layout presented in Appendix E.

Any oily water generated from the Milne Port Bulk Fuel Storage Facility or other lined containment facilities is collected in sump(s) within each facility. The water is then treated directly by the prefabricated mobile oily water separator (OWS) contained within a 40’ seacan or an on-site constructed oily water separator. The prefabricated mobile OWS uses a series of skimmers, filters, clay, and activated carbon to capture and remove hydrocarbons from oily water.

TABLE 3.14 MILNE PORT OILY WATER TREATMENT PROCESS SUMMARY

Source		Treatment Method	Contingency Storage	Final Discharge
MP-MRY-7	Milne Exploration Phase Bladder Fuel Storage Facility Storm water (to become inactive after transition period)	Mobile oily water separator (OWS)	Collected in totes and stored at engineered lined containment facilities	Discharged directly based on sampling
MP-02	Milne Port Maintenance Shop Oily water/WWTF	Mobile OWS pH adjustment, if required		
MP-03	Milne Port Bulk Fuel Storage Facility Stormwater	Mobile OWS		
MP-04	Milne Port Landfarm Facility Stormwater			
MP-04B (new)	Milne Port Contaminated Snow Dump			
MP-11 (new)	Milne Port Rail Maintenance Shop Oily water/WWTF	Mobile OWS pH adjustment, if required		

Wash and melt water generated at the vehicle and rail maintenance facilities, waste management building, and emergency response garage collects in each building's designated sump(s) by gravity flow. Suspended material in the wastewater settles out in the sump. All sump water collected in these buildings is collected and stored at engineered lined containment facilities until the water can be treated during the open water season using the mobile OWS system. Following treatment by the OWS, the treated effluent will be pH adjusted, if required, and resampled to ensure effluent water quality meets the applicable discharge limits before the effluent is finally discharged to the receiving environment.

All effluent discharges of treated oily water/wastewater to the receiving environment will be discharged under intentions to meet effluent discharge limits outlined in Section 3.4.1. Depending on the situation, treated oily water effluent may be blended with treated sewage and discharged, or discharged directly based on sampling.

3.6.3 MANAGEMENT OF OILY WATER AT THE MINE SITE

Table 3.15 lists the sources of oily water that may be generated at the Mine Site (excluding minor oily water generated from accidental spills which will be handled by the Spill Contingency Plan).

TABLE 3.15 MINE SITE OILY WATER TREATMENT PROCESS

Source		Treatment Method	Contingency Storage	Final Discharge
MS-02	Mine Site Maintenance Shop Oily Water WWTF	Mobile OWS	Collected in totes and stored at engineered lined containment facilities	To environment via final discharge point
MS-03	Mine Site Bulk Fuel Storage Facility Stormwater		Not applicable	
MS-03B	Mine Site Bulk Fuel Storage Facility No.2 Stormwater			
MS-04	Mine Site Fuel Unloading Station Stormwater			
MS-05	Mine Site Landfarm Facility		Collected in totes and stored at engineered lined containment facilities	
MS-05B	Mine Site Contaminated Snow Dump			
MS-MRY-6	Exploration Camp Bulk Fuel Storage Facility		Not applicable	

All possible sources listed above are shown in the Mine Site layout presented in Appendix E.

Wash and melt water generated at the vehicle maintenance facilities, truck wash, waste management building, and emergency response garage collects in each building's designated sump(s) by gravity flow. Suspended material in the wastewater settles out in the sump. All sump water collected in these buildings will be transferred to Totes that will be stored in hazardous containment lined facilities. The water in these Totes will be discharged and treated in lined berms utilizing the mobile OWS system or shipped off site for disposal at an accredited treatment facility. The contaminated snow/ice cell at each landfarm could be used for temporary containment of oily water, as a contingency measure.

The Truck Wash Facility is equipped with an oily water recycle system that is fed through trays and a sump to capture all wash water generated at the facility, allowing it to recycle up to 90% of the water used. Wash water produced in the truck wash facility (truck washing, equipment and floor wash down) will flow by gravity and be collected in the trays and a local sump. Suspended material in the wastewater is removed using a series of sumps, settling tanks (de-muck tank) and filters. Free and emulsified oil in the wastewater is removed by the facility's oily water separator which utilizes skimmer, activated carbon and filters in order to substantially reduce oil levels in the recycled wastewater. The water is then reused by the facility to wash down equipment and vehicles. The wastewater is collected in totes that will be stored in hazardous containment lined facilities. The water in these totes will be discharged and treated in lined berms utilizing the mobile OWS system or shipped off site for disposal at an accredited treatment facility.

Collected stormwater run-off from the Mine Site Bulk Fuel Storage Facility and/or other lined containment facilities (i.e. hazardous waste berms, etc.) will be treated using the mobile OWS system and discharged directly to the adjacent land surface. As previously mentioned,, the mobile OWS system is a prefabricated mobile oily water separator contained within a 40' seacan. The mobile OWS system uses a series of skimmers, filters, clay and activated carbon to capture and remove oils and hydrocarbons from wastewater. Effluent from the mobile OWS will be

sampled regularly to ensure effluent quality meets the applicable discharge limits outlined in the Type A Water Licence.

Depending on the situation, effluent from the mobile OWS system may be blended with treated sewage prior to being discharged or will be discharged directly based on sampling.

3.6.4 ADAPTIVE MANAGEMENT RELATED TO THE MANAGEMENT OF OILY WATER

Environmental management strategies related to the management and disposal of oily water are described in Sections 3.4.1 through 3.4.3. If monitoring (Section 5) finds that these strategies are inadequate (i.e. discharge limits for oily water could be exceeded), additional actions will be implemented such as additional treatment or offsite disposal. The contaminated snow/water cell in the landfarms is available for contingency storage.

3.7 CONTINGENCY MEASURES

Design criteria for the potable, sewage and oily water treatment systems and discharge limits for surface water management ponds have been reviewed and revised to provide additional safety factors.

To effectively manage emergency responses, Baffinland has adopted a tiered emergency classification scheme (Figure 3.4). Each level of emergency, based on its severity, require varying degrees of response, effort, and support. Each level has distinct effects on normal business operations, as well as requirements for investigation and reporting. Levels of classification specific to spill response are as follows:

Level 1 (Low) - Minor accidental release of a deleterious substance with:

- No threat to public safety
- Negligible environmental impact to receiving environment

Level 2 (Medium) - Major accidental release of a deleterious substance with:

- Some threat to public safety
- Potential Moderate environmental impact to receiving environment

Level 3 (High) - Uncontrolled hazard which:

- Jeopardizes project personnel safety
- Potential significant environmental impacts to receiving environment

The sewage treatment systems are set back sufficiently from surface water bodies and are fully enclosed units. In the event of a spill of untreated or partially treated sewage from these facilities, Baffinland will follow the procedures in its Spill Contingency Plan and Emergency Response Plans. For Spill Response Level 1 the Spill Contingency Plan will be triggered, while for Spill Response Levels 2 and 3 the Spill Contingency Plan and Emergency Response Plan will be triggered. Sewage spills are treated the same as more immediately hazardous hydrocarbon-based spills.

Surface water management ponds are to be discharged in adherence to the MDMER and Type A Water Licence discharge limits. Workers involved in the pumping operations will need to exercise caution setting up and operating the pump on the pond's liner. While installing the pump's intake hose on an inner tube in the pond, workers will be in particularly close proximity to the water. The workers should ensure they have dry, secure footing while performing this task. When compliant results are received from pre-discharge water samples, surface water management ponds can be discharged.

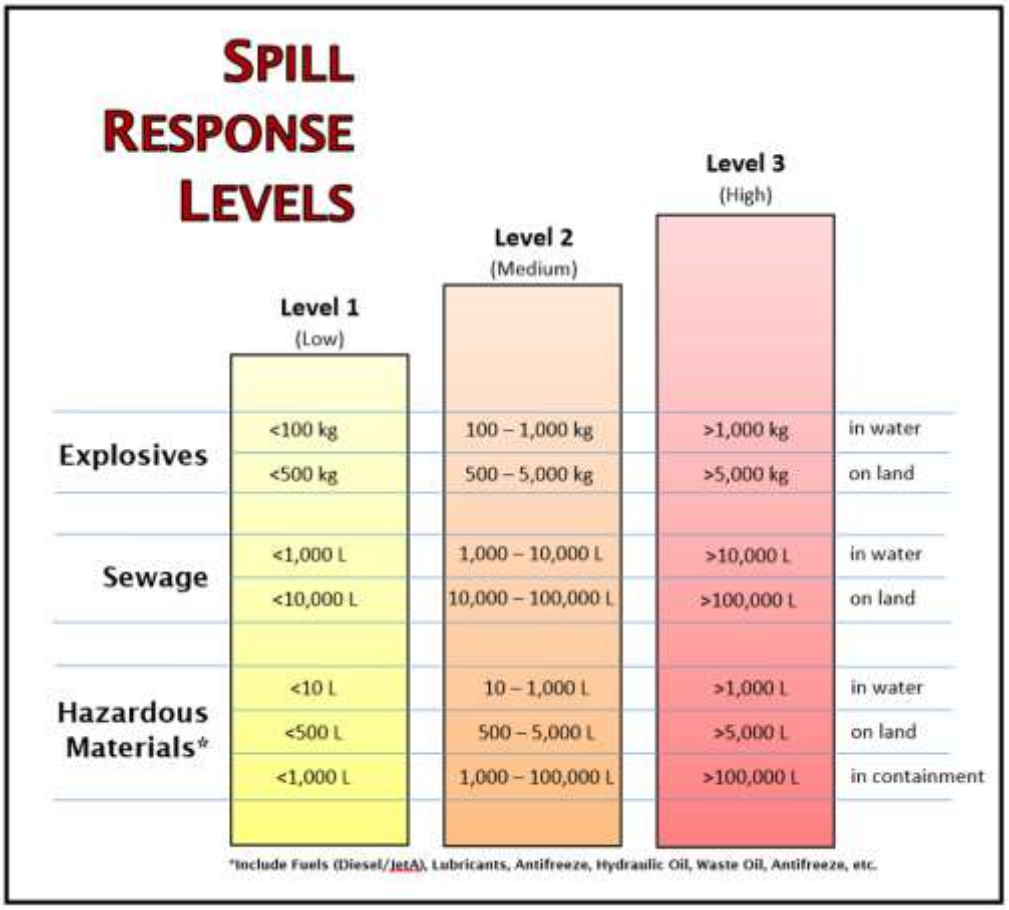

FIGURE 3.4 EMERGENCY SPILL RESPONSE LEVELS

Discharge must be discontinued if internal or external results are approaching or exceed applicable water quality criteria. In the event of a spill of non-compliant water, Baffinland will follow the procedures in its Spill Contingency Plan and Emergency Response Plans (for contact water, this is the MDMER Emergency Response Plan in Appendix H). In cases where water contained in the WRF Pond or crusher facility Pond is determined to be non-compliant with applicable discharge limits, water contained in the pond(s) must be treated as per Baffinland's Waste Rock Management Plan and Waste Pond Water Treatment Plant Operations to ensure compliance with the applicable discharge limits.

3.8 TREATMENT FACILITIES

Baffinland has treatment facilities in place to treat water prior to discharge. This includes the following treatment facilities:

- Sewage Treatment Facility
  - Operations and Maintenance Manual is available in Appendix I
- Potable Water Treatment System
  - Fully automatic system requiring regular maintenance only (see Appendix J)
- Mobile Oily Water Separator
  - Operations and Maintenance Manual is available in Appendix K
- Oily Water Treatment Plant
  - Currently not in use, however it may be used in the future. The Oily Water Treatment Plant will require maintenance only once in operation (see Appendix L).

3.9 SEEKING APPROVAL FOR NEW WATER WITHDRAWALS

Part E, Item 8 of the Type A Water Licence notes that streams or waterbodies cannot be used as a water source unless authorized and approved by the Board in writing, and Item 9 of the same part requires Baffinland notify the Inspector and the Board at least 10 days in advance of using Water from any sources not identified in the Application or requiring approval as per Part E, Item 8.

Related to any request to the NWB for additional water withdrawals, Part E, Item 14 of the Type A Water Licence states the following:

> *"The Licensee shall, where the use of Water of a sufficient volume would likely result in the drawdown of the source Water body involved or dewatering of the specific Water body is anticipated, submit the following for the approval of the Board in writing:*
>
> *a. the volume of Water required;*
>
> *b. a hydrological overview of the Water body;*
>
> *c. details of impact; and*
>
> *d. Proposed mitigation measures."*

For water withdrawals from waterbodies that are potential or confirmed fish habitat, the DFO may require an assessment of potential effects to potential impacts to fish and fish habitat.

4.0 ROLES AND RESPONSIBILITIES

The personnel responsible for implementing this plan and their respective roles are described in Table 4.1.

TABLE 4.1 ROLES AND RESPONSIBILITIES FOR WATER MANAGEMENT

Position	Responsibilities
Chief Operations Officer (COO) / General Manager	• Reports to the Chief Executive Officer • Responsible for providing oversight for all Project operations and allocating the necessary resources for the operation, maintenance and management of Project infrastructure.
Mine Operations Manager / Superintendent	• Reports to the COO / General Manager • Provides oversight for all Deposit No. 1 mining operations, including the operation, construction and maintenance of water and waste management infrastructure at Deposit No. 1 mining areas, ROM stockpile, Waste Rock Facility and along the Mine Haul Road, including culverts, ditches, surface water management ponds and associated water treatment systems.
Crushing Manager / Superintendent	• Reports to the COO / General Manager • Provides oversight for all ore crushing operations, including the operation, construction and maintenance of surface water management infrastructure at Mine Site Crusher Facility, including culverts, ditches, surface water management ponds and any associated water treatment systems.
Site Services Manager / Superintendent	• Reports to the COO / General Manager • Provides oversight for all Site Services operations, including the operation, construction and maintenance of water and waste management infrastructure and treatment systems at the Mine Site and Milne Port. • Responsible for managing water retained in containment areas associated with Project bulk fuel facilities and hazardous materials/waste storage areas, including landfarm facilities.
Environmental Superintendent	• Support the management of the Project water management infrastructure by advising on-site environment staff and obtaining the appropriate regulatory approvals for necessary changes and modifications. • Advise the Environmental Coordinator and/or Technician on the implementation of the appropriate controls to manage effluents at the Project. • Provide review and approval of discharge plans Report incidents to senior management and the appropriate regulatory agencies and stakeholders. • Conduct inspections and monitoring to ensure compliance with applicable regulations and commitments. • Provide training sessions to operational departments on the appropriate mitigation measures and strategies for managing surface water flows and effluents at the Project.

Position	Responsibilities
Surface Works Superintendent	• "Baffinland to advise"
All Departmental Supervisors	• Reports to the Departmental Manager / Superintendent • Responsible for reading and understanding applicable sections of this Plan and directing departmental personnel on the appropriate mitigation measures and strategies for managing surface water flows and effluents in their Project area.
All Project Personnel	• All Project personnel will be responsible to comply with the requirements of this Plan in the management of surface water flows and effluents at the Project.

5.0 MONITORING

Monitoring of freshwater use and wastewater effluent quality is conducted to meet internal environmental protection goals as well as the following regulatory requirements:

- *Public Health Act* and regulations - requires testing of domestic water supplies for potability
- Type A Water Licence and Type B Water Licence - consists of inspection requirements and two monitoring programs:
  - Inspections of water and waste structures - This includes weekly inspections by Project personnel and biannual inspections by a Geotechnical Engineer of all structures designed to contain, withhold, divert or retain waters or wastes during periods of flow
  - SNP - requires recording of water volumes and testing of effluent quality[1]
  - AEMP - monitors effects in the local receiving waters (separate management plan)[2]
- MDMER - consists of the following components:
  - Effluent characterization including water chemistry and acute lethality testing (requirements partially overlap with SNP program in terms of parameters tested and discharge limits)
  - Biological monitoring of reference areas and near and far field exposure areas of the aquatic environments receiving mine effluent discharges (partial overlap with the AEMP)[2]

Monitoring associated with freshwater use and wastewater effluent quality is further summarized in Table 5.1.

TABLE 5.1 FRESHWATER USE AND WASTEWATER MANAGEMENT MONITORING PROGRAM

Project Element	Specific Project Component(s)	Description of Monitoring Program	Requirement
Potable water	Permanent camp water supplies (Camp Lake, KM32 Lake, Phillips Creek)	Record daily volumes; potable water testing	SNP; monitoring requirements of Public Water Supply Regulations
Dust suppression water	Short-term seasonal water withdrawals	Record daily volumes	SNP
Geotechnical drilling and exploration	Short-term water withdrawal for drilling and for exploration camp use	Record daily volumes	SNP (Type B Water Licence)
Treated Sewage Effluent	Sewage Treatment Plants and PWSPs	Discharge volumes, bacteriological, general chemistry, nutrients, aquatic toxicity	SNP
Contact Water	Mine Site: Waste Rock Facility, Ore Crusher Pad, and Run of Mine Stockpile Port Site: Ore Stockpiles	Discharge volumes, general chemistry, total metals, aquatic toxicity	SNP and MDMER

[1] The SNP also includes monitoring of local watercourses downstream of construction; addressed in the SWAEMP.

[2] The AEMP monitors the combined effects of effluent discharges, dust deposition, erosion and sedimentation. MDMER monitoring is solely focused on monitoring effects of mine effluent discharges.

Project Element	Specific Project Component(s)	Description of Monitoring Program	Requirement
Oily Waters	Vehicle maintenance/wash facility sumps, lined containment areas, landfarm	Discharge volumes, pH, TSS, Ammonia, Total Phosphorous, petroleum hydrocarbons, total metals	SNP

Baffinland also undertakes more frequent internal process sampling and monitoring to identify potential upset conditions early and to take corrective action before instances of non-compliance occur.

5.1 DAILY WATER CONSUMPTION

The daily volumes of water withdrawn from approved water intake locations (Tables 3.1 and 3.2) will be recorded and reported to the Site Environment Department. The Camp Lake pumphouse is equipped with a water meter, and all other water withdrawals will be recorded in logs by the water truck drivers. The Site Environment Department will report daily water consumption to the NWB in monthly water licence reports.

5.2 POTABLE WATER TESTING

Untreated freshwater will be sampled at active take locations and/or from the raw water tank at the potable water treatment plants. Treated potable water will be sampled from the potable water treatment plant effluent as well as several locations throughout the distribution system.

Samples shall be collected at active potable water sources for select analyses twice annually, consistent with the monitoring requirements of Nunavut's Public Water Supply Regulations. A typical list of parameters, which may be tested, includes the following:

Calcium, Magnesium, Sodium, Potassium, Aluminum, Arsenic, Boron, Barium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Vanadium, Zinc, Tin, pH, Conductivity, Alkalinity as $CaCO_3$, TDS (COND-CALC), TSS (total suspended solids), Turbidity, Phenols, N-NH_3, SO_4, Cl, Br, N-NO_2, N-NO_3, NO_2 + NO_3 as N, Mercury, Hardness as $CaCO_3$, COD (chemical oxygen demand), Oil and Grease.

A comparison of the sampling results to the Guidelines for Canadian Drinking Water Quality (GCDWQ) will be completed. Exceedances of the GCDWQ will be investigated through repeat sampling, and possibly a further investigation of cause.

5.3 INSPECTIONS

Two types of inspections are conducted as required under the Type A Water Licence:

- **Weekly inspections -** Site Environment staff conduct weekly inspections of all structures designed to contain, withhold, divert or retain Waters or Wastes during periods of flow (Part E, Item 11 of the Type A Water Licence). Inspection records are maintained and are made available for review upon the request by the Board or an Inspector. Any seepage observed from these facilities are reported to an Inspector, and the results and an interpretation of the seepage monitoring carried out, are presented in the annual report, in accordance with Part I, Item 14 of the Type A Water Licence.

- **Summer Biannual Geotechnical Inspections -** A Geotechnical Engineer inspects earthworks and geological and hydrological regimes of the project biannually between July and September in accordance with Part D, Item 18 and Part I, Item 12 of the Type A Water Licence. The following project features are included in these inspections:
  - Pit walls
  - Quarries
  - Landfills
  - Landfarms
  - Bulk fuel storage facilities
  - Sediment ponds
  - Collection ponds
  - PWSPs

5.4 EFFLUENT MONITORING

As noted in Table 5.1, two regulated monitoring programs apply to effluent discharges:

- Type A Water Licence's Surveillance Network Program (SNP; NWB, 2015)
- Metal and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2019)

Additionally, an internal effluent sampling program has been incorporated into how Baffinland discharges treated sewage and contact water effluents. A description of each of these programs is provided in the sections that follow.

5.4.1 SURVEILLANCE NETWORK PROGRAM

The SNP prescribed in the Type A Water Licence requires monitoring the quality of the following effluents prior to discharge to the environment:

- Treated sewage effluent
- Contact water
- Oily water

Detailed SNP schedules are provided in Appendix M. Monitoring results are reported monthly and annually to the NWB.

5.4.2 METAL AND DIAMOND MINING EFFLUENT REGULATIONS

An overview of the effluent monitoring components of the MDMER is provided in this section, and the receiving environment monitoring components of the MDMER are provided in Section 5.4. This information is provided for Baffinland staff, regulatory agencies and other stakeholders to understand how the MDMER monitoring program provides a mechanism for verifying environmental effects and responding to unexpected effects of contact water discharges on the aquatic environment. There are subtleties in the regulations that are not captured in this overview, and for this reason, in implementing monitoring under the MDMER, Site Environment staff are directed to more detailed guidance developed for Baffinland by Minnow Environmental Inc. (2018), as well as the MDMER legislation itself.

Effluent monitoring components of the MDMER are identified along with testing frequencies in Table 5.2. Four effluent final discharge points (FDPs) are currently monitored: MS-06, MS-06B, MS-07 and MS-08 (each location is described further in Table 3.6).

Adaptive management is built into the effluent characterization components of the MDMER monitoring program. If a monthly effluent sample is determined to be acutely lethal by an acute lethality test, the following additional actions are required:

- Effluent characterization testing on each failing sample
- Acute lethality testing of grab samples from the same final discharge point twice monthly (but not less than seven days apart)

The regular frequency of acute lethality sampling can be resumed if the effluent is determined not to be acutely lethal in three consecutive tests.

TABLE 5.2 COMPONENTS OF EFFLUENT MONITORING UNDER THE MDMER

Component	Frequency
Deleterious substances monitoring	Weekly during discharge
Effluent characterization	Once per calendar quarter, at least one month after the previous quarterly sample; on effluent samples that were tested to be acutely lethal
Acute lethality testing (Rainbow Trout and Daphnia magna)	Monthly; additional testing if effluent found to be acutely lethal. Daphnia magna is a “monitor-only” parameter with no compliance-related repercussions for failed tests.
Sublethal toxicity testing (fish, invertebrate species, plant species, algal species in freshwater and marine water	Quarterly during discharges (generally twice annually at Mary River) concurrent with effluent characterization samples. Testing is completed only at the FDP that contributes the highest loadings of deleterious substances taking receiving environment dilution factors into account, which at the Project is FDP MS-08 at the waste rock facility. Sublethal toxicity testing data are used to potentially inform biological effects monitoring and are not used for evaluating regulatory compliance.
Effluent volume monitoring	Total monthly volume of effluent deposited from each FDP for each month during which there was a deposit (discharge)

Additionally, the frequency of acute lethality testing at a given FDP may be reduced to once each calendar quarter if the effluent from that FDP is determined not to be acutely lethal for 12 consecutive months.

If any of the following is reported to have occurred, the owner/operator of the mine shall notify an ECCC inspector without delay and report the results in writing to the inspector within 30 days:

- MDMER Discharge Limits in Schedule 4 are being or have been exceeded
- Effluent pH is less and 6.0 or greater than 9.5
- An effluent is acutely lethal

If any of the above have occurred over the year, the causes of that non-compliance must be described in the annual report to ECCC along with remedial measures that are planned or that have been implemented.

5.4.3 INTERNAL MONITORING DURING EFFLUENT DISCHARGES

Baffinland has established Internal Discharge Limits for treated sewage (Table 3.4) and contact water (Table 3.7), and sampling and testing of this effluent is conducted during discharge, to account for variabilities in effluent quality (pre-discharge effluent testing is not always representative). The Internal Discharge Limits and sampling during discharge are additional monitoring elements that have been incorporated into Baffinland's adaptive management processes for managing these effluents (Section 3.4.4 for treated sewage and Section 3.5.5 for contact water).

5.5 WATER QUALITY MONITORING

Water quality monitoring is conducted by collecting samples of water from the exposure area surrounding the points of entry of effluent into water from each FDP and from the related reference areas, and from the sampling areas that are selected for biological monitoring (Section 5.5).

At the Mine Site, the Mary River is the ultimate receiver of treated mine effluent from the MS-08 and MS-06 final discharge points. Receiving environment water sampling at the Mine Site is conducted at three locations:

- Station MS-08-DS - an effluent-exposed station located downstream of the Mary River Tributary-F confluence on Mary River
- Station MS-08-US - a reference station situated upstream of the Mary River Tributary-F confluence on Mary River
- Station MS-06-DS - A second effluent-exposed station on Mary River downstream of the confluence with the undefined channel to which the MS-06 FDP effluent reports

MDMER water quality monitoring stations at the Mine Site (MS-08-US, MR-08-DS and MR-06-DS) are identified on Figure 1 in Appendix E.

Water quality monitoring will be required at any effluent-exposed locations in Milne Inlet receiving contact water discharges from the surface water management ponds at Milne Port. The location of these stations will be confirmed when Milne Port becomes subject to the MDMER (when secondary crushing is relocated to Milne Port) and FDPs are registered with ECCC.

Parameters include:

- Field measurements of water temperature and dissolved oxygen
- The same parameters listed in Section 3.5.1 (as per Section 4(1) of the MDMER)
- At the Mine Site, where effluent is deposited into fresh water, recording the pH, hardness, alkalinity and electrical conductivity of the water samples
- At Mine Port, where effluent that is deposited into marine waters, recording the salinity of the water samples

Water quality monitoring is conducted four times per calendar year and at least one month apart on the samples of water collected, while the mine is depositing effluent, and at the same time as biological monitoring studies are conducted. Water quality monitoring results are used to interpret biological monitoring results (Section 5.5).

5.6 ENVIRONMENTAL EFFECTS MONITORING IN THE RECEIVING ENVIRONMENT

The local aquatic environment receiving effluent discharges are monitored by two separate but complimentary programs:

- Aquatic Effects Monitoring Program (AEMP) under the Type A Water Licence
- Environmental effects monitoring (EEM) under the MDMER

The EEM program under the MDMER is focused solely on monitoring the aquatic effects of effluent discharges, whereas the scope of the AEMP is more broad and focuses on monitoring changes in the local aquatic environment from multiple stressors (effluent discharges, sedimentation, dust deposition). The AEMP involves monitoring water and sediment quality, invertebrates and fish populations, and is equipped with a data assessment and response framework with low, moderate and high action responses defined (Baffinland, 2015). An annual report for the AEMP is included in the annual report to the NWB and QIA for mine operations.

Biological monitoring studies, implemented at mine effluent receiving environments, are a requirement of the Environmental Effects Monitoring (EEM) program under Schedule 5 of the MDMER. Generally speaking, the purpose of biological studies under EEM is to determine whether mine effluent is causing an effect on the fish population, the use of fisheries resources by humans (e.g., influences on fish tissues) and/or fish habitat (benthic invertebrate communities; Environment Canada 2012).

Each EEM biological study collectively includes the preparation of a study design document, field survey(s) implementation, preparation of an interpretive report document, and electronic data submission. All these tasks are required to be conducted within a 36-month period, the timeframe of which is referred to as a “Phase” and begins on the date that a mine becomes subject to the regulations. The initial (Phase 1) EEM cycle was from July 2015 to January 2018, and subsequent biological study interpretive reports will thus be required for January 14, 2021 (Phase 2), January 14, 2024 (Phase 3), and so on, on a three year frequency (Minnow Environmental Inc., 2018). Within each phase, mines must submit a biological monitoring Study Design to the federal Minister of Environment and Climate Change (i.e., ECCC) for regulatory approval at least six months prior to field study implementation.

In accordance with the three-year biological monitoring frequency stipulated in the MDMER, the second phase of EEM biological monitoring studies must be conducted at the Project in 2020 and will include:

- Benthic invertebrate community survey
- Fish population survey
- Fish tissue selenium survey
- Supporting water quality assessment

5.7 REPORTING

Reporting of monitoring results is undertaken as follows:

- SNP monitoring results are reported to the NWB monthly and annually
- Reports on geotechnical Inspections conducted biannually during the summer must be submitted to the Board within sixty (60) days of the inspection, and include a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations
- AEMP monitoring results are reported annually to the NWB
- Effluent characterization, aquatic toxicity, and water monitoring results under MDMER are reported to ECCC quarterly and annually
- Biological monitoring studies EEM under the MDMER are reported to ECCC on a 36-month cycle

Any instances of non-compliance reported under MDMER annually must identify remedial measures, and sustained effects triggers an investigation of cause.

6.0 REVIEW OF PLAN EFFECTIVENESS

An important element of Baffinland's management system is reviewing the continued suitability, adequacy and effectiveness of each management plan. This will occur through an annual review process as well as scheduled updates.

6.1 ANNUAL REVIEW OF COMPLIANCE AND UNANTICIPATED EFFECTS

Baffinland conducts internal inspections and audits throughout the year, as described in Section 5. In addition, the Project is subject to external audits as noted in Section 5.1. Throughout the year, immediate corrective actions are taken as appropriate to address instances of non-compliance, as well as unanticipated effects observed. Follow-up corrective actions may also be required. These immediate and follow-up corrective actions are documented in the annual report.

One follow-up corrective action may be to revise mitigation measures or monitoring programs described in the applicable management plans. During the annual reporting cycle, Baffinland staff will review instances of non-compliance as well as unanticipated effects and determine if a review of plan effectiveness is appropriate. This process is articulated on Figure 6.1. The results of this annual review will be reported in the annual report. Management plan updates that result from this process will also be filed with the annual report.

6.2 SCHEDULED UPDATES

In addition to the annual review cycle described above, scheduled Plan reviews will occur according to the schedule presented in Table 6.1.

TABLE 6.1 PLAN REVIEW SCHEDULE

Review Event	Description
Post-construction	Mandatory management review
Every 3 years during operation	Mandatory management review

Plan updates will be recorded in the Document Revision Record located at the front of the Plan.

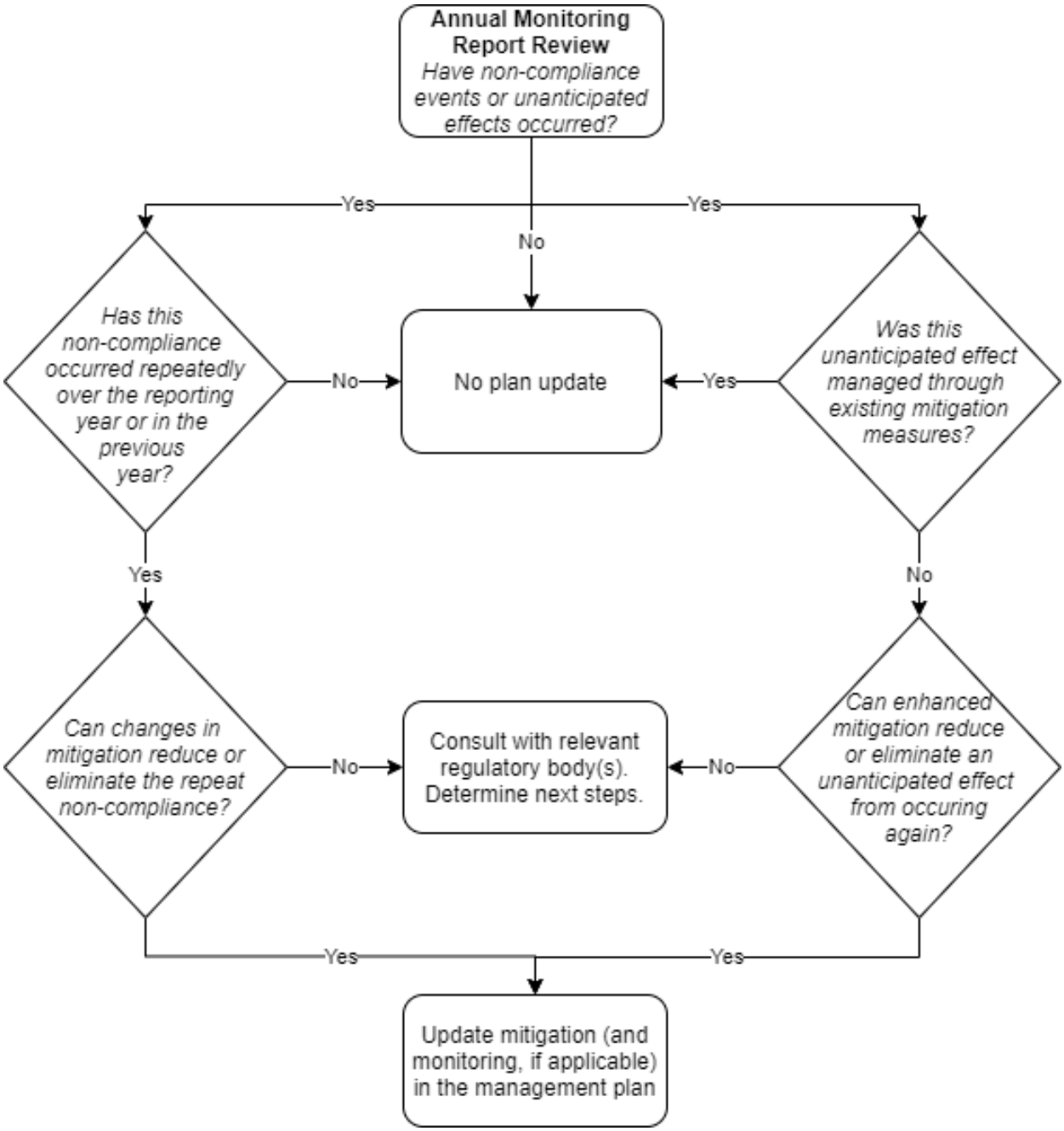

FIGURE 6.1 ANNUAL REVIEW OF PLAN EFFECTIVENESS

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Appendix A
Concordance to Type A Water Licence 2AM-MRY1325

Table A.1 shows the Part, number and Condition of the Type A Water Licence (2AM-MRY1325 - Amendment No 1 and the location where the condition is located within this Plan.

TABLE A.1 CONCORDANCE TABLE - TYPE A WATER LICENCE 2AM-MRY1325 AMENDMENT NO 1

Part	Number	Condition	Section/Commitment
B	11	The Licensee shall post signs in the appropriate areas to inform the public of the location of infrastructure and/or facilities designed to contain, withhold, divert or retain Water and/or Waste. All signs must be in English, Inuktitut, and French.	Signage, written in English, Inuktitut, and French, will be posted inform the public of the location of infrastructure and/or facilities designed to contain, withhold, divert or retain Water and/or Waste.
D	2	The Licensee shall submit to the Board for review and acceptance, at least sixty (60) days prior to construction or in a timeframe otherwise approved by the Board in writing, final design and for-construction drawings, stamped and signed by a Professional Engineer, for all infrastructure and/or facilities designed to contain, withhold, divert or retain Water and/or Waste, as authorized under the Licence.	60 days prior to construction. If more immediate timeline required, Baffinland will issue letter to NWB with early drawings.
	17	The Licensee shall submit a Construction Summary Report to the Board, within ninety (90) days following the completion of any structure designed to contain, withhold, divert or retain Waters or Wastes, as authorized by the Board. The construction summary report shall be prepared by an Engineer(s) in accordance with Schedule D, Item 1.	90 days following the completion of any structure designed to contain, withhold, divert or retain Waters or Wastes, as authorized by the Board.
D	23	The Licensee shall construct and operate all infrastructure and Facilities authorized by the Board that are designed to contain, withhold, divert or retain Water and/or Waste, in accordance with all applicable legislation and industry standards.	Demonstrated and outlined by this plan.

Part	Number	Condition	Section/Commitment
E	3	The Licensee shall obtain all fresh Water for domestic camp use and industrial purposes, during the Construction Phase of the Project, in amounts and from the sources described in Table 2, or from sources otherwise approved by the Board in writing. In addition to the source-specific limits prescribed in Table 2, the Licensee is authorized to use up to one thousand eight hundred and eighty-eight (1,888) cubic metres of Water per day, to a maximum of six hundred and eighty-nine thousand (689,000) cubic metres of Water annually, during the Construction Phase of the Project. **Table 2: Water Use Authorized for Domestic and Industrial Purposes during Project Construction Phase** Site / Source / Volume (m^3/day) / Combined Volume (m^3/year) Milne Port (Milne Inlet) — Phillips Creek (summer) / Km 32 Lake (winter) — 367.5 — ~134,000 Mine Site (Mary River) — Camp Lake — 657.5 — 240,000 Steensby Port (Steensby Inlet) — ST 347 Km Lake / 3 km Lake — 435.8 — 155,400 Ravn River — Camp Lake — 145.2 Mid-Rail — Nivuk Lake (summer) / Ravn Camp Lake (winter) — 79.5 Cockburn North (Tunnels Camp) — Cockburn Lake — 101.4 Cockburn South Camp — Cockburn Lake — 111.1 **Annual Total** — **~ 689,000 m^3/Annually**	Table 3.1
E	5	The Licensee may recycle water and use reclaimed water from the various Treatment Facilities, surface water management ponds and embankment dams and approved discharge locations under the licence if such waters meet appropriate discharge limits for those facilities.	3.3 and 3.4
E	6	The Licensee shall equip all Water intake hoses with screens of an appropriate mesh size, consistent with the requirements of Fisheries and Ocean Canada's (DFO) Freshwater Intake End-of-Pipe Fish Screen Guidelines (1995), to prevent the entrainment of fish are and shall withdraw Water at a rate such that fish do not become impinged on the screen.	3.1.3
E	8	Streams cannot be used as a water source unless authorized and approved by the Board in writing.	3.1.1
E	9	The Licensee shall notify the Inspector and the Board at least ten (10) days in advance of using Water from any sources not identified in the Application or requiring approval as per Part E, Item 8.	10 days in advance of using Water from any sources not identified in the Application or requiring approval.
E	10	The Licensee shall update or revise annually following the commencement of the Operations Phase and/or the Early Revenue Phase, the Project Blockflow Diagram Water Supply Balance information for the various Project sites, provided with the Application and submit for review of the Board. The submission shall be included with the Annual Report under Part B, Item 4.	The Plan is updated to include the planned construction numbers as well as the current Work Plan. Updates will be provided as required to include the Operations Phase.

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></tr>
<tr><td>E</td><td>11</td><td>The Licensee shall carry out weekly inspections of all structures designed to contain, withhold, divert or retain Waters or Wastes during periods of flow and maintain records of the inspections and findings, for review upon the request by the Board or an Inspector.</td><td>3.3; 3.4</td></tr>
<tr><td>E</td><td>12</td><td>The Licensee shall not remove any material from below the ordinary HWM of any water body unless authorized.</td><td>3.1.1</td></tr>
<tr><td>E</td><td>25</td><td>The Licensee is authorized to withdraw up to 1,500 m^3/day to a maximum of 547,500 m^3 annually of Water specifically for use in dust suppression or control along the Tote Road during the Early Revenue Phase (ERP) of the Project. Water for dust suppression or control shall be obtained from the sources in accordance with thresholds established in Table 2-3.
Table 2-3: Water use Authorized for Dust Suppression
<table>
<tr><th>Site</th><th>Source</th><th>Proved Maximum Volume (m^3/day)</th><th>Restriction</th></tr>
<tr><td rowspan="14">Tote Road</td><td>Phillip's Creek</td><td>212</td><td rowspan="3">None</td></tr>
<tr><td>Km 82 Lake</td><td>364</td></tr>
<tr><td>CV128</td><td>579.5</td></tr>
<tr><td>CV099</td><td>110</td><td rowspan="3">June –July only during low flow(less than mean flow) years</td></tr>
<tr><td>CV087</td><td>90</td></tr>
<tr><td>CV078</td><td>75</td></tr>
<tr><td>Kanâktok Lake</td><td>318</td><td rowspan="2">None</td></tr>
<tr><td>BG50</td><td>150</td></tr>
<tr><td>BG32</td><td>120</td><td>June –July only during low flow(less than mean flow) years</td></tr>
<tr><td>CV217</td><td>130</td><td rowspan="2">None</td></tr>
<tr><td>Muriel Lake</td><td>212</td></tr>
<tr><td>David Lake</td><td>132</td><td>June –July only during low flow(less than mean flow) years</td></tr>
<tr><td>BG17</td><td>75</td><td></td></tr>
<tr><td>CV233 (Tom River)</td><td>135</td><td rowspan="2">None</td></tr>
<tr><td>Camp Lake</td><td>50</td></tr>
</table></td><td>Table 3.2</td></tr>
<tr><td>E</td><td>26</td><td>The Licensee shall obtain authorization from the Board in writing prior to using Water authorized under Part E, Item 25, for purposes other than that authorized in Part E, Item 25.</td><td>3.1.1</td></tr>
<tr><td>F</td><td>9</td><td>The Licensee shall treat oily water and wastewater generated by the Project at the Oily Water/Wastewater Treatment Facilities authorized under the scope of the Licence.</td><td>3.4</td></tr>
<tr><td>F</td><td>11</td><td>The Licensee shall provide at least ten (10) days' notice to the Inspector prior to planned Discharges from any Waste Management Facility, Oily Water/Wastewater Treatment Facilities, Sewage Treatment Facilities, and any other relevant facilities associated with the Project. The notice shall include the estimated volume proposed for Discharge and the location and description of the receiving environment.</td><td>10 days prior to the commencement of any treated effluent discharge.</td></tr>
<tr><td>F</td><td>12</td><td>The Licensee shall, unless otherwise approved by the Board in writing, discharge effluent at a distance of least thirty-one (31) metres above the Ordinary HWM of any Water body, where direct flow into the Water body is not possible, such that surface erosion is minimized and no additional impacts are created.</td><td>3.2.3</td></tr>
</table>

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></tr>
<tr><td>F</td><td>14</td><td>The Licensee shall direct all Sewage generated from the relevant Project sites to the Sewage Treatment Facilities or as otherwise approved by the Board in writing.</td><td>3.2</td></tr>
<tr><td>F</td><td>15</td><td>The Licensee shall treat all Sewage waste generated at the Ravn River and Mid-Rail camps and Sewage generated at the Cockburn North and Cockburn South camps at either the Mine Site Sewage Treatment Facility or the Steensby Port Sewage Treatment Facility, unless otherwise approved by the Board in writing.</td><td>In active</td></tr>
<tr><td>F</td><td>16</td><td>The Licensee shall provide to the Board for review, at least sixty (60) days prior to installation, detailed specifications and operational requirements for the Sewage storage tanks proposed for the Railway camps.</td><td>60 days prior to installation.</td></tr>
<tr><td>F</td><td>17</td><td>All discharge from the Sewage Treatment Facilities including the Polishing Waste Stabilization Ponds directly into fresh Water bodies at Monitoring Stations MP-01, MP-01a, MP-MRY-04, MP-MRY-04a, MS-01, MS-01a, MS-MRY-04, MS-MRY-04a, and/or from monitoring stations as otherwise approved by the Board in writing, must not exceed the following Effluent quality limits:
Table 4: Effluent Quality Discharge Limits for Sewage Treatment Facilities to Freshwater Receiving Environment
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>BOD_5</td><td>30</td></tr><tr><td>Total Suspended Solids</td><td>35</td></tr><tr><td>Faecal Coliform</td><td>1000 CFU/100 mL</td></tr><tr><td>Oil and Grease</td><td>No visible sheen</td></tr><tr><td>pH</td><td>Between 6.0 and 9.5</td></tr><tr><td>Ammonia (NH3-N)</td><td>4.0</td></tr><tr><td>Total Phosphorous (MS-01)</td><td>4.0</td></tr><tr><td>Total Phosphorous (MS-01a)</td><td>1.0</td></tr><tr><td>Toxicity</td><td>Not acutely toxic</td></tr></table>(Note that treated effluent discharge from MP-01 and MP-01a is directed to the ocean, therefore ocean discharge limits (F18) would therefore apply)</td><td>Table 3.4</td></tr>
<tr><td>F</td><td>18</td><td>All discharge from the Sewage Treatment Facilities including the Polishing Waste Stabilization Ponds at Monitoring Stations SP-01, SP-01a, and/or from monitoring stations as otherwise approved by the Board in writing, directly into the ocean or to ditches flowing into the ocean shall not exceed the following Effluent quality limits:
Table 5: Effluent Quality Discharge Limits for Sewage Treatment Facilities to the Ocean
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>BOD_5</td><td>100</td></tr><tr><td>Total Suspended Solids</td><td>120</td></tr><tr><td>Faecal Coliform</td><td>10,000 CFU/100 mL</td></tr><tr><td>Oil and Grease</td><td>No visible sheen</td></tr><tr><td>pH</td><td>Between 6.0 and 9.5</td></tr><tr><td>Toxicity</td><td>Not acutely toxic</td></tr></table>(Note that treated effluent discharge from MP-01 and MP-01a is directed to the ocean, therefore the above ocean discharge limits are applied for these locations)</td><td>Table 3.4</td></tr>
</table>

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></tr>
<tr><td>F</td><td>19</td><td>Sludge generated from the Sewage Treatment Facilities or any other facilities shall be confirmed to be non-hazardous and the results provided to the Board for review prior to disposal at any Landfill Facility or as otherwise approved by the Board in writing.</td><td>3.2.2; 3.2.4</td></tr>
<tr><td>F</td><td>20</td><td>All discharge from the Oily Water/Wastewater Treatment Facilities at Monitoring Stations MP-02, MS-02, SP-02 must not exceed the following Effluent quality limits:
Table 6: Effluent Quality Discharge Limits for Oily Water Treatment Facilities
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>pH</td><td>Between 6.0 and 9.5</td></tr><tr><td>TSS</td><td>35</td></tr><tr><td>Ammonia</td><td>4.0</td></tr><tr><td>Phosphorous</td><td>4.0</td></tr><tr><td>Benzene</td><td>0.370</td></tr><tr><td>Ethylbenzene</td><td>0.090</td></tr><tr><td>Toluene</td><td>0.002</td></tr><tr><td>Oil and Grease</td><td>15 and no visible sheen</td></tr><tr><td>Arsenic</td><td>0.50</td></tr><tr><td>Copper</td><td>0.30</td></tr><tr><td>Lead</td><td>0.20</td></tr><tr><td>Nickel</td><td>0.50</td></tr><tr><td>Zinc</td><td>0.50</td></tr></table></td><td>Table 3.10</td></tr>
<tr><td>F</td><td>21</td><td>All discharge from the Landfill Facilities at Monitoring Stations MS-MRY-13a, MS-MRY-13b and SP-08 must not exceed the following Effluent quality limits:
Table 7: Effluent Quality Discharge Limits for the Landfill Facilities
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>pH</td><td>Between 6.0 and 9.5</td></tr><tr><td>Total As</td><td>0.5</td></tr><tr><td>Total Cu</td><td>0.3</td></tr><tr><td>Total Pb</td><td>0.2</td></tr><tr><td>Total Ni</td><td>0.5</td></tr><tr><td>Total Zn</td><td>0.5</td></tr><tr><td>Total Suspended Solids</td><td>15</td></tr><tr><td>Oil and Grease</td><td>No visible sheen</td></tr></table></td><td>In Surface Water Aquatic Ecosystem Management Plan Table 3.4</td></tr>
<tr><td>F</td><td>22</td><td>All discharge from the Bulk Fuel Storage Facilities at Monitoring Stations MP-03, MP-MRY-7, MS-03, MS-04, MS-MRY-6, SP-04 and SP-05 must not exceed the following Effluent quality limits:
Table 8: Effluent Quality Discharge Limits for the Bulk Fuel Storage Facilities
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (ug/L)</th></tr><tr><td>Benzene</td><td>370</td></tr><tr><td>Toluene</td><td>2</td></tr><tr><td>Ethylbenzene</td><td>90</td></tr><tr><td>Lead</td><td>1</td></tr><tr><td>Oil and Grease</td><td>15,000 and no visible sheen</td></tr></table></td><td>Table 3.11</td></tr>
</table>

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></tr>
<tr><td>F</td><td>23</td><td>All discharge from the Landfarm Facilities at Monitoring Stations MP-04, MS-05 and SP-06 must not exceed the following Effluent quality limits:

Table 9: Effluent Quality Discharge Limits for the Landfarm Facilities
<table><tr><th>Parameters</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>pH</td><td>Between 6.0 and 9.0</td></tr><tr><td>Total Suspended Solids</td><td>15</td></tr><tr><td>Oil and Grease</td><td>15 and no sheen</td></tr><tr><td>Total Lead</td><td>0.001</td></tr><tr><td>Benzene</td><td>0.370</td></tr><tr><td>Toluene</td><td>0.002</td></tr><tr><td>Ethylebenzene</td><td>0.090</td></tr></table></td><td>Table 3.12</td></tr>
<tr><td>F</td><td>24</td><td>All Discharge from the Bulk Sample Open Pit, Bulk Sample Weathered Ore Stockpile, Bulk Sample Processing Stockpile Area and Bulk Sample Stockpile Area Seepage and runoff from the at Milne Inlet at Monitoring Stations MS-MRY-09, MS-MRY-10, MS-MRY-11, MP-MRY-12 and/or monitoring stations as otherwise approved by the Board shall not exceed the following Effluent quality limits:

Table 10: Effluent Quality Discharge Limits for Open Pit, Stockpiles, and Sedimentation Ponds
<table><tr><th>Parameter</th><th>Maximum Concentration of Any Grab Sample (mg/L)</th></tr><tr><td>Total Arsenic</td><td>0.50</td></tr><tr><td>Total Copper</td><td>0.30</td></tr><tr><td>Total Lead</td><td>0.20</td></tr><tr><td>Total Nickel</td><td>0.50</td></tr><tr><td>Total Zinc</td><td>0.50</td></tr><tr><td>Total Suspended Solids</td><td>15.0</td></tr><tr><td>Oil and Grease</td><td>No visible sheen</td></tr><tr><td>Toxicity</td><td>Not acutely toxic</td></tr><tr><td colspan="2">The waste discharge shall have a pH of between 6.0 and 9.5</td></tr></table></td><td>Table 3.6</td></tr>
<tr><td>F</td><td>26</td><td>All discharge from the Ponds associated with the Run of Mine Ore Stockpile, Ore Stockpile, West and East Sediment Ponds at Monitoring stations MS-06, MS-07, MS-08 MS-09 and SP-07 shall not exceed the Effluent quality limits of Part F, Item 25.</td><td>3.3 and Table 3.6
Monitoring stations MS-09 and SP-07 are not yet active because the associated Project components have not been built.</td></tr>
</table>

TABLE A.2 CONCORDANCE TABLE - TYPE B WATER LICENCE 2AM-MRY1325 AMENDMENT NO 1

Part	Item	Condition	Section/Commitment
C	1	Licensee shall obtain all water for domestic camp use from sources proximal to each camp. Total camp water use shall not exceed forty-nine (49) cubic metres per day. Drill water shall be obtained from water source(s) proximal to drilling targets, as outlined in the application, and shall not exceed 250 cubic metres per day. The volume of water for all purposes under this licence shall not exceed two hundred and ninety-nine (299) cubic metres per day.	Section 3.3
C	2	The Licensee shall provide to the Board and an Inspector, at least fifteen (15) days' notice prior to the use of Waters from any sources not currently identified, for the purposes outlined under Part C, Item 1.	Section 3.3
C	3	Streams cannot be used as a water source unless authorized and approved by the Board in writing.	Section 3.3
C	4	The Licensee shall submit to the Board for approval in writing, at least thirty (30) days prior to the use of Water, in cases where the Licensee required Water in sufficient volume that the source Water body may be drawn down, the following information: volume required, hydrological overview of the Water body, details of impacts, and proposed mitigation measures.	Section 3.3
C	5	The Licensee shall equip all Water intake hoses with a screen of an appropriate mesh size to ensure that fish are not entrained and shall withdraw water at a rate such that fish do not become impinged on the screen.	Section 3.3
C	6	The Licensee shall not remove any material from below the ordinary High Water Mark of any water body unless authorized.	Section 3.3
C	7	The Licensee shall not cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.	Section 3.3; Section 3.1.5 of SWAEMP
C	8	The Licensee shall implement sediment and erosion control measures prior to and maintain such measures during the undertaking to prevent entry of sediment into Water.	Section 3.1.5 of SWAEMP

Appendix B
Corporate Policies

Baffinland Iron Mines Corporation

Health, Safety and Environment Policy

BAF-PH1-800-POL-0001

Rev 2

Approved By: **Brian Penney**

Title: **Chief Executive Officer**

Date: **April 20th, 2018**

Signature: 

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
05/07/15	0	EM	TP	For Use
03/07/16	1	JS	BP	Minor edits
04/20/18	2	TS	SA/BP	Minor edits

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto “Safety First, Always” and our actions Health and Safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.

Brian Penney
Chief Executive Officer
April 2018

Sustainable Development Policy

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The four pillars of our corporate responsibility strategy are:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

Health and Safety

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is “Safety First, Always”
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe

Environment

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment
- We apply the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices. We strive to develop more sustainable practices
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met

Upholding Human Rights of Stakeholders

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region

Sustainable Development Policy

- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance

Transparent Governance

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

Brian Penney
Chief Executive Officer
March 2016

Appendix C
Adaptive Management Process

C ADAPTIVE MANAGEMENT

C.1 PRINCIPLES OF ADAPTIVE MANAGEMENT

C.1.1 DEFINING THE ADAPTIVE MANAGEMENT PROCESS

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes (Canadian Environmental Assessment Agency, 2016). Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

Baffinland has developed an Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2019). The adaptive management process is iterative and starts with a planning phase; followed by implementation of monitoring; ongoing evaluation of the effectiveness of the plans based on monitoring results; and adjustment of the management strategies and responses as needed. This process is illustrated on Figure C.1.

C.1.2 CONCEPTUAL RESPONSE FRAMEWORK

The AMP establishes a systematic approach to respond to monitoring results through the establishment of a conceptual response framework that includes:

- Establishment of thresholds, and in some instances, early warning triggers
- Monitoring of key indicators relative to triggers and thresholds
- Specific pre-defined actions to be implemented if triggers or thresholds are exceeded
- A required follow-up process to evaluate, learn and adjust plans

The thresholds are defined in the individual management plans and may be qualitative or quantitative. For key indicators with quantitative thresholds, early warning triggers may be defined to initiate precautionary actions.

The response framework identifies the following action levels to be taken in response to exceedances of thresholds:

- **Low Action -** Implemented if monitoring shows that indicators are moving away from baseline conditions or predicted levels; actions could include investigating the change to determine a cause and/or assessing if additional monitoring is needed.
- **Moderate Action -** Implemented if there is a significant difference between reference and exposure areas or if effects appear to be trending toward a defined threshold; actions could include confirming and investigating the effect or evaluating the effectiveness of mitigation.
- **High Action -** When effects are well above those predicted and beyond defined thresholds; in this case actions could include applying more intensive mitigation measures or implementing restoration measures to reverse the effects.

FIGURE C.1 BAFFINLAND'S ADAPTIVE MANAGEMENT PROCESS

C.1.3 ADAPTIVE MANAGEMENT CHECKLIST FOR ENVIRONMENTAL MANAGEMENT

Checklists have been developed and populated for each management plan that describe how adaptive management has been incorporated into each management plan. Implementation of adaptive management will be an iterative process; not all elements have been addressed in the current plan. These will evolve through ongoing engagement as described below.

C.1.4 ENGAGEMENT IN THE ADAPTIVE MANAGEMENT PROCESS

An effective AMP relies on ongoing communication with the appropriate external parties. A key part of Baffinland's approach to adaptive management is incorporation of community review and feedback to improve or extend the effectiveness of the Environmental Management System (EMS) for the Project. Baffinland's recently developed Inuit Qaujimanituqangit (IQ) Management Framework proposes the establishment of an Inuit Committee to participate in the adaptive management process of environmental management on the Project. The interaction of the Inuit Committee with the Adaptive Management Plan and the EMS centres around the integration of IQ to the extent possible, as shown on Figure C.2.

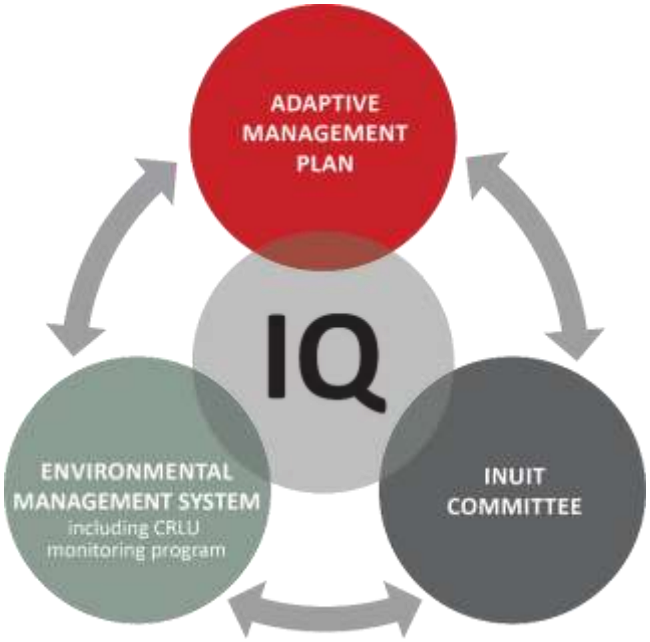


FIGURE C.2 INCORPORATION OF IQ IN ADAPTIVE MANAGEMENT

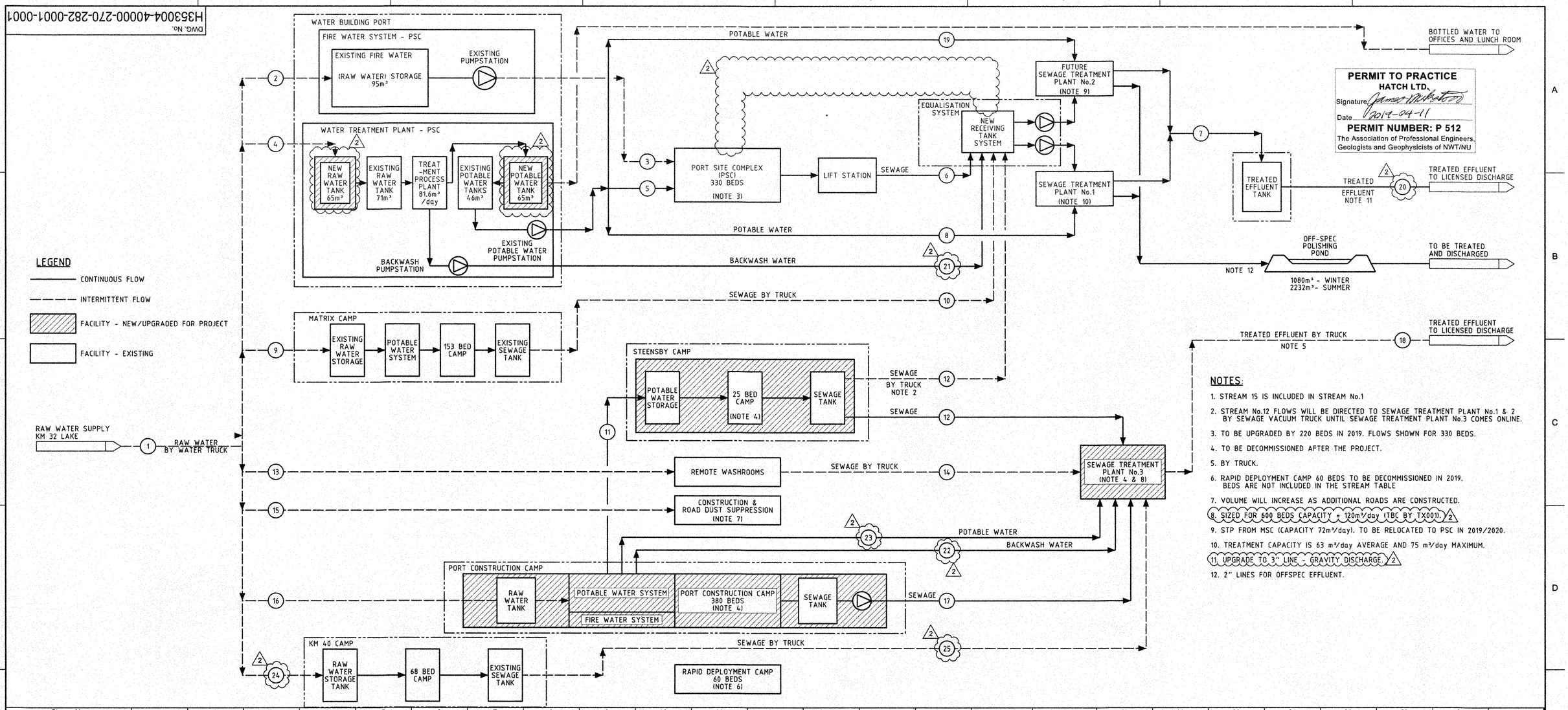
Existing advisory groups will also contribute to the adaptive management process; this includes:

- Marine Environment Working Group (MEWG)
- Terrestrial Environment Working Group (TEWG)
- Socio-economic Working Group (SEWG)

These advisory groups already review and discuss monitoring results with Baffinland on an annual or semi-annual basis and have provided important feedback that have resulted in modifications to mitigation measures and/or monitoring programs.

Appendix D
Water and Sewage Process Flow Diagrams

DWG. No. H353004-40000-270-282-0001-0001



PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 2019-04-11
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

NOTES:

1. STREAM 15 IS INCLUDED IN STREAM No.1
2. STREAM No.12 FLOWS WILL BE DIRECTED TO SEWAGE TREATMENT PLANT No.1 & 2 BY SEWAGE VACUUM TRUCK UNTIL SEWAGE TREATMENT PLANT No.3 COMES ONLINE.
3. TO BE UPGRADED BY 220 BEDS IN 2019. FLOWS SHOWN FOR 330 BEDS.
4. TO BE DECOMMISSIONED AFTER THE PROJECT.
5. BY TRUCK.
6. RAPID DEPLOYMENT CAMP 60 BEDS TO BE DECOMMISSIONED IN 2019. BEDS ARE NOT INCLUDED IN THE STREAM TABLE
7. VOLUME WILL INCREASE AS ADDITIONAL ROADS ARE CONSTRUCTED.
8. SIZED FOR 600 BEDS CAPACITY = 120m³/day (TBC BY TX001). 2
9. STP FROM MSC (CAPACITY 72m³/day). TO BE RELOCATED TO PSC IN 2019/2020.
10. TREATMENT CAPACITY IS 63 m³/day AVERAGE AND 75 m³/day MAXIMUM.
11. UPGRADE TO 3" LINE - GRAVITY DISCHARGE. 2
12. 2" LINES FOR OFFSPEC EFFLUENT.

Stream No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Stream Description	RAW WATER FROM KM32 LAKE	RAW WATER TO FIRE TANKS	FIRE WATER TO PSC	RAW WATER TO PSC	POTABLE WATER TO PSC	SEWAGE FROM PSC TO RECEIVING TANK	TREATED EFFLUENT FROM STP# 1 & 2	POTABLE WATER TO STP #1 SCREEN WASH	RAW WATER TO MATRIX CAMP	SEWAGE FROM MATRIX CAMP	POTABLE WATER TO STEENSBY CAMP	SEWAGE FROM STEENSBY CAMP	RAW WATER TO REMOTE WASHROOMS	SEWAGE FROM REMOTE WASHROOMS	CONST. & ROAD DUST SUPPRESSION	RAW WATER TO CONSTRUCTION CAMP	SEWAGE FROM CONSTRUCTION CAMP	TREATED EFFLUENT FROM STP # 3	POTABLE WATER TO STP #2 SCREEN WASH	TREATED EFFLUENT FROM STP # 1 & # 2 TO LICENSED DISCHARGE	BACKWASH WATER TO RECEIVING TANK	BACKWASH WATER TO STP # 3	POTABLE WATER TO STP #3 SCREEN WASH	RAW WATER TO KM 40 TOTE ROAD CAMP	SEWAGE FROM TOTE KM 40 ROAD CAMP TO STP #3
Fluid	RAW WATER	RAW WATER	RAW WATER	RAW WATER	POT. WATER	SEWAGE	TREATED EFFLUENT	POT. WATER	RAW WATER	SEWAGE	POT. WATER	SEWAGE	RAW WATER	SEWAGE	RAW WATER	RAW WATER	SEWAGE	TREATED EFFLUENT	POT. WATER	TREATED EFFLUENT	WASTE WATER	WASTE WATER	POT. WATER	RAW WATER	SEWAGE
Units	m³/day	m³/day	m³/hour	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day	m³/day
Current Permit Limit	367.5	-	-	-	-	-	-	-	-	-	-	-	-	-	Note 1	-	-	-	-	-	-		-		
Calculated Flow (Average)	231	One off fill	113	74	66	66	110	1	31	31	5	5	5	5	20	88	76	102	1	110	6	6	1	14	14
Calculated Flow (Maximum)	280	One off fill	113	91	83	83	135	1	38	38	6	6	5	5	21	108	95	124	1	135	6	6	1	17	17

FOR USE

REGISTERED PROFESSIONAL ENGINEER — J.M. WIKSTON — LICENSEE — 2019-04-11 — NT/NU

No.	DESCRIPTION	BY	CHK'D	DATE
2	DORMITORIES AND STP FROM MSC, ADDITION OF RECEIVING TANK AND NEW WATER TANKS	HV	PC	01-04-2019
1	APPROVED FOR USE	HV	PC	21-08-2018
0	APPROVED FOR USE	HV	PC	07-08-2018

REVISIONS

DRAWING No.	DRAWING TITLE
H353004-40000-221-282-0001	MILNE PORT WATER & SEWAGE PFD - SUPERCEDED BY THIS DRAWING

REFERENCE DRAWINGS

REG. PROFESSIONAL

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT	NR	06-06-2018
DESIGNER		NR	
CHECKER	P CHERRY		2019-04-09
DESIGN COORD.	R GOOSEN		2019-04-08
RESP. ENG.	J Wikston		2019-04-11
LEAD DISC. ENG.	P CHERRY		2019-04-09
AREA LEAD	V LAVRIC		2019-04-11
ENG. MANAGER	R GOOSEN		2019-04-08
AREA MANAGER	T ATIBA		2019-04-12

DRAWING APPROVAL STATUS: Approved for Use

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

PORT SITE WATER AND SEWAGE PROCESS FLOW DIAGRAM

SCALE NTS OR AS NOTED

DWG. No. H353004-40000-270-282-0001-0001

REV 2

SHEET SIZE: D

jdc.pwservice 08-APR-2019 14:20 \\DCPWPDFS03\PDFitems\\730611115106_131\H353004-40000-270-282-0001-0001.dgn