Baffinland Iron Mines Corporation

Fresh Water Supply, Sewage, and Wastewater Management Plan

BAF-PH1-830-P16-0010

Rev 7

Prepared By: Connor Devereaux
Department: Environment
Title: Environmental Superintendent
Date: March 31 2020
Signature:

Approved By: Brian Marshall
Department: Operations
Title : General Manager
Date: March 31 2020
Signature:

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Index of Major Changes/Modifications in Revision 7

Item No.	Description of Change	Relevant Section
1	Reorganized sections for consistency with other management plans	NA
2	Added information about water truck water withdrawals	5.1.14
2	Included updated information for accommodations and sewage treatment plants	5.3.1, 6.4.1, 6.4.2
4	Updated information for management of oily water	7.2.2
5	Addition of Waste Rock Facility Water Treatment Plant information	7.7
6	Added additional information regarding contingency measures	10
7	Updated appendices for site layout diagrams, and PWSP Treatment and Discharge Plan	Appendices

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Appendix I – Oily Water Treatment Plant

(For Vehicle Wash Water) O & M Manuals

Appendix J – BAF-PHl-340-PRO-048 – Waste Pond Water Treatment Plant Operations

Appendix K – BAF-PH1-830-P16-0047– Metal and Diamond Mining Effluent Regulations Emergency Response Plan

Appendix L - Oily Water Treatment and Discharge Plan

1 INTRODUCTION

This document describes the plan to manage the fresh water supply and wastewater for the various camp sites for the Mary River Project during the Project's construction and operation phases. Specifically, this document focuses on freshwater supply and wastewater treatment and disposal at Milne Port, the Mine Site, Steensby Port, and various temporary camps.

The Fresh Water Supply, Sewage, and Wastewater Management Plan is an update to the existing plan and supersedes the BAF-PH1-830-P16-0010, Revision 6, dated March 2019. This Plan will continue to support the Membrane Biological Reactor (MBR) sewage treatment plants (STPs) installed in 2014 which service the Mine Site Complex (MSC) and Port Site Complex (PSC) camps, the MBR sewage treatment plant installed in 2018 to service the Sailiivik Camp, the MBR sewage treatment plant installed in 2019 to service the 380 Person Camp and the potable water supply and oily water treatment activities under the Type A Water Licence 2AM-MRY1325 – Amendment No. 1 (Type A Water Licence). This Plan will also support future upgrades and additions to the MBR STPs necessary to service future MSC, PSC and Sailiivik camp expansions at the Mine Site and Milne Port.

This Plan should be used in conjunction with the Aquatic Effects Monitoring Plan (AEMP)[1] (BAF-PH1-830-P16-0039) and the Sampling Program – Quality Assurance and Quality Control (QA/QC) Plan[2] (BAF-PH1-830-P16-0001).

2 REGULATIONS, STANDARDS, AND CODES

This Plan has been developed under the requirements of Baffinland's Type A Water Licence (refer to the concordance table for the Type A Water Licence presented in Appendix B). Furthermore, all actions undertaken under this Plan will be compliant with the appropriate sections of both Federal and Territorial legislation as indicated in Table 2-1.

TABLE 2-1: 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	--

[1] Baffinland Iron Mines Corporation. Mary River Project – Aquatic Effects Monitoring Plan, Rev. 1. March 2016.
[2] Baffinland Iron Mines Corporation, Mary River Project - Sampling Program – Quality Assurance and Quality Control (QA/QC) Rev. 2, March 2017.

TITLE	NUMBER/ACRONYM
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	--
Drinking Water System Components	NSF/ANSI Standard 61
Filtering Material	AWWA Standard B100
Granular Activated Carbon	AWWA Standard B604
Canada Occupational Health and Safety Regulations	OSH
Metal and Diamond Mining Effluent Regulations	MDMER

3 CORPORATE POLICIES

Baffinland's Sustainable Development 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. The Sustainable Development Policy is provided in Appendix A.

Baffinland's Health, Safety and Environment Policy is the company's commitment to achieve a safe, health and environmentally responsible workplace. The policy is provided in Appendix A.

All employees and contractors are expected to comply with the contents of both above mentioned policies.

4 ENVIRONMENTAL RESPONSIBILITIES

4.1 ROLES AND RESPONSIBILITIES

Responsibilities for the management and monitoring of surface water flows, potable water systems and effluents at the Project are as follows:

4.1.1 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.

4.1.2 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.

4.1.3 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 the Mine Site Crusher Facility, including culverts, ditches, surface water management ponds and any associated water treatment systems.

4.1.4 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.

4.1.5 ROAD MAINTENANCE MANAGER/SUPERINTENDENT

- Reports to the COO/General Manager
- Provides oversight for all Road Maintenance operations, including the operation, construction and maintenance of surface water management infrastructure for the Tote Road that runs between Milne Port and the Mine Site, including culverts, bridges, ditches and swales.

4.1.6 Environment (Sustainable Development) Department

- Support the management of the Project's surface water management infrastructure by advising operational departments and obtaining the appropriate regulatory approvals for necessary changes and modifications.
- Advise operational departments on the implementation of the appropriate controls to manage surface water flows and effluents at the Project, including the implementation of sedimentation and erosion controls.
- 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.

4.1.7 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.

4.1.8 All Project Personnel

All personnel Project personnel are responsible for complying with the requirements of this Plan in the management of surface water flows and effluents at the Project.

5 FRESH WATER

5.1 GENERAL MITIGATION MEASURES FOR WATER USE

5.1.1 WATER INTAKES

5.1.1.1 ENGINEERING 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.

5.1.1.2 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. The guideline also requires a water withdrawal rate such that fish do not become impinged on the screen.

5.1.1.3 SELECTION OF SHORT-TERM WATER TAKE LOCATIONS

Short-term water intake will be required at several locations for a variety of needs including concrete production, drilling, and dust suppression, etc. In accordance with the Type 'A' Water Licence for the project, streams or water bodies may not be used as a water source unless authorized and approved by the NWB in writing. A screening process is 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. Streams and creeks will not be used for short-term water withdrawal without prior approval of the Water Licence Inspector. The DFO guideline used for sourcing water from water bodies is to restrict removal of water to a maximum of 5% of the total volume. During winter under ice conditions, water must be drawn from below two metres (2 m) of non-frozen water (as the top two metres (2 m) of water provides higher oxygenation for resident fish). During the open-water season, the water taking guideline states that no significant drawdown shall be caused. There must be no impact to fish or fish habitat. Any water intake locations not identified the below Table 5-1 and Table 5-2 must be approved by the Environment Department prior to use.

5.1.1.4 WATER TRUCK WATER WITHDRAWALS

Water trucks withdraw water from Km 32 Lake to supply Milne Port, and from Camp Lake to supply the Mine Site for domestic and industrial water needs. A number of water sources are relied upon for use in dust control. Intakes on the extraction hoses are screened in accordance with the DFO guideline. Water withdrawals are short-term (approximately 20 minutes to fill a water truck) and the approved and proposed water withdrawals are based on guidance established by Knight Piésold (2014).

5.1.1.5 WATER USAGE AND 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 the installation of low flow water taps. If water meters aren't available, water use will be estimated using flow rates.

Water withdrawn from approved water intake locations within the Project is recorded and reported to the Environment Department. All personnel involved with water use activities are to follow the Type A Water Licence to ensure that daily withdrawal limits are not exceeded. 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 and effective communication between day shift and night shift operators.

5.2 FRESH WATER SOURCES

All fresh water for domestic camp use and industrial purposes, during Construction and Operation Phases of the Project shall be obtained in amount and from sources listed in Table 5-1. Domestic water use is for camp operations, and industrial uses are primarily for firewater and other industrial uses (e.g. concrete production).

TABLE 5-1: WATER USE FOR DOMESTIC AND INDUSTRIAL PURPOSES DURING THE CONSTRUCTION AND OPERATION PHASES*

Site	Source	Construction Phase	Operation Phase		
		Volume (m^3/day)	Domestic	Industrial	Combined
			Volume (m^3/day)		
Milne Port (Milne Inlet)	Phillips Creek (summer) Km 32 Lake (Winter)	367.5	300	67.5	367.5
Mine Site (Mary River)	Camp Lake	657.5	203.8	151.6	355.4
Steensby Port (Steensby Inlet)	ST 347 Km Lake 3 Km Lake	435.8	101	142.6	243.6
Raven River	Camp Lake	145.2	N/A	N/A	N/A
Mid-Rail	Nivek Lake (Summer) Ravn Camp Lake (Winter)	79.5	N/A	N/A	N/A

Cockburn North (Tunnels Camp)	Cockburn Lake	101.4	N/A	N/A	N/A
Cockburn South Camp	Cockburn Lake	111.1	N/A	N/A	N/A
TOTAL		**1,898**	**604.8**	**361.7**	**966.5**

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

Table 5-2 outlines approved water sources under the Type A Water Licence for dust suppression. Table 5-2 includes approved water sources which are smaller streams. Water can be extracted from these streams during June and July in any year, with the exception of dry years where water withdrawals are prohibited during August and September. The Environment Department will be consulted before withdrawing water from these streams listed in Table 5-2 to verify if it is a wet or dry year and if water withdrawals are authorized.

TABLE 5-2: WATER USE LOCATIONS AUTHORIZED FOR DUST SUPPRESSION*

Site	Source	Proposed Maximum Volume (m3/day)	Restriction
Tote Road	Phillip's Creek	212	None
	Km 32 Lake	364	
	CV128	579.5	
	CV099	110	June – July only during low flow (less than mean flow) years
	CV087	90	
	CV078	75	
	Katiktok Lake	318	None
	BG50	150	
	BG32	120	June – July only during low flow (less than mean flow) years
	CV217	130	None
	Muriel Lake	212	
	David Lake	132	June – July only during low flow (less than mean flow) years
	BG17	75	
	CV233 (Tom River)	135	None
	Camp Lake	86	

*Source: Type 'A' Water Licence (2AM-MRY1325 – Amendment No. 1)

The above water sources have been approved by the Nunavut Water Board (NWB) as freshwater sources for dust suppression. Authorization by the NWB in writing must be obtained prior to withdrawing water at the 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 NWB 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 purposes if the source is pre-approved by Baffinland's Type A Water Licence or by application to the NWB.

Sources that are restricted by low flow years will have a visual inspection completed by environmental personnel to determine if restrictions need to be put in place on a regular basis. Environment 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 rating curves of representative streams around the Project. This data will be compared to low flow indices from current monitoring locations for a representative stream in consultation with a hydrologist to determine if it is a low flow year. The Environment Department will inform operators of any restrictions.

Water used for the purposes of exploration drilling and domestic camp use at supporting satellite exploration camps will be withdrawn under the authorization of Baffinland's Exploration Type B Water Licence (Type B Water Licence; 2BE-MRY1421). 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^3 per day. Therefore, the volume of water withdrawn for all purposes under the Type B Water Licence will not exceed 299 m^3 per day.

5.3 FRESH WATER SYSTEM PROCESS DESCRIPTION

The following sections describe the fresh water systems at the 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 Guidelines for Canadian Drinking Water Quality (Health Canada, 2017) as well as the Ontario Drinking Water Quality Standards (Government of Ontario, 2018a). Minimum process equipment requirements are based upon the Northwest Territories Water Supply System Regulations, NWT Regulation 108-2009, Ontario Design Guidelines for Drinking Water Systems 2008, Ontario Regulation 170/03 – Drinking Water Systems, the Procedure for Disinfection of Drinking Water in Ontario, as well as best management practices.

5.3.1 MILNE PORT

Currently on site at Milne Port there are three (3) camps that support operations and construction activities. These camps include the Port Weatherhaven (PWH) Camp, Port Site Complex (PSC) Camp and the 380-Person Camp. 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 freshwater demand for construction and operation are shown on drawing 'Milne Inlet – Water Supply Balance Block Flow Diagram' in Appendix D of this Plan.

A raw water truck draws water from either Km 32 Lake (in winter/summer) or Phillips Creek (in summer) and delivers the water to a water storage tank near the camp. Water from this tank is used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank ensures that fire water is always available in the tank. The Milne Port camp layout, including the locations of potable water related infrastructure, is presented in Appendix C. 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.

5.3.2 MINE SITE

Currently on site at the Mine Site there are three (3) camps that support construction, operations and site wide exploration activities. These camps include the Mine Site Weatherhaven (MWH) Camp, the Sailiivik Camp Complex, and the Mine Site Complex (MSC) Camp. Each camp contains a PWTP within or near the camp as well as freshwater tanks to store raw water being delivered. The freshwater demand for construction and operation are shown on the drawing 'Mine Site – Water Supply Balance Block Flow Diagram' in Appendix D of this Plan.

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 fresh water requirements of the site. A stand pipe within each tank ensures that fire water is always available in the tank. The Mine Site camp layout, including locations of potable water related infrastructure, is presented in Appendix C of this Plan.

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.

Some fresh water requirements such as road dust suppression, exploration drilling, quarry dust suppression, and concrete and explosives manufacturing will be provided directly from Camp Lake and other nearby lakes using water trucks. Exploration drilling will continue throughout the construction and operation phases of the Project.

6 SEWAGE TREATMENT

6.1 SEWAGE GENERATION RATE

The estimated generation of sewage is based upon a per capita generation as shown in Table 6-1.

TABLE 6-1: STP AVERAGE SEWAGE FLOW DESIGN BASIS

Parameter	Design Value	Source
Sewage Generation per Capita	300 L/person/day	Design Basis – Sewage Treatment Plant, Doc. No. H337697-4000-10-109-0002 (FEIS, Appendix 3B).

6.2 SEWAGE DISCHARGE CRITERIA

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 constructs and operates infrastructure and facilities designed to contain, withhold, divert, or retain Water and/or Waste in accordance with applicable legislation and industry standards. Effluent is discharged such that surface erosion is minimized and no additional impacts are created. Effluent discharge locations are regularly monitored for erosion and control measures are 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 as listed in Table 6-2.

TABLE 6-2: EFFLUENT DISCHARGE QUALITY LIMITS FOR SEWAGE TREATMENT FACILITIES TO FRESHWATER AND TO THE OCEAN*

Parameter	Unit	Maximum Concentration of Any Grab Sample discharging into Freshwater (mg/L)	Maximum Concentration of any Grab Sample discharging into the Ocean (mg/L)
		Monitoring Locations: MS-01, MS-01B, MS-01A, MS-MRY-04, MS-MRY-04A	Monitoring Locations: MP-01, MP-01A, SP-01, SP-01A,
BOD_5	mg/L	30	100
TSS	mg/L	35	120
Faecal Coliform	CFU/100 mL	1,000 CFU /100 ml	10,000 CFU /100 ml
Oil and Grease*	mg/L	No visible sheen	No visible sheen
pH	---	Between 6.0 and 9.5	Between 6.0 and 9.5
Ammonia (NH3-N)	mg/L	4.0	-
Total Phosphorus (MS-01, MS-01B, MS-MRY-04A)	mg/L	4.0	-

Parameter	Unit	Maximum Concentration of Any Grab Sample discharging into Freshwater (mg/L)	Maximum Concentration of any Grab Sample discharging into the Ocean (mg/L)
		Monitoring Locations: MS-01, MS-01B, MS-01A, MS-MRY-04, MS-MRY-04A	Monitoring Locations: MP-01, MP-01A, SP-01, SP-01A,
Total Phosphorus (MS-01A)	mg/L	1.0	-
Toxicity	---	Final effluent not acutely toxic	Final effluent not acutely toxic

*Source: Type A Water Licence (2AM-MRY1325 - Amendment No. 1) Table 4 and 5.

Locations MP-01 and MP-01A discharge directly into the ocean, therefore ocean discharge criteria apply.

Recycled water and use of reclaimed water from the various Treatment Facilities (STPs, OWSs, etc.), surface water management ponds, and embankment dams and approved discharge locations may be used if waters meet appropriate discharge criteria for those facilities. Sludge generated from Sewage Treatment Facilities or any other facilities shall be incinerated using the Milne Port and Mine Site on-site incinerators, or backhauled for disposal off site in Southern Canada.

6.3 TREATED WASTEWATER GENERATION AND DISCHARGE/OUTFALL LOCATIONS

Treated sewage and wastewater for the Project are discharged to the locations listed in Table 6-3:

TABLE 6-3: TREATED EFFLUENT GENERATION AND DISCHARGE/OUTFALL LOCATIONS*

Camp/Site	Discharge/Outfall Location		Coordinates (UTM)
	Summer	Winter	
Milne Port	Ocean at Milne Inlet		N: 7976338 E: 503636
Mine Site	Sheardown Lake for Exploration Camp	Storage Ponds (PWSPs)	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

Camp/Site	Discharge/Outfall Location		Coordinates (UTM)
	Summer	Winter	
Tote Road Work Sites	Conveyed to Mine Site or Milne Port Sewage Treatment Facilities		N/A
Steensby (Port)**	Ocean at Steensby Inlet		N: 7801412 E: 593378
Ravn River Area**	Conveyed to Mine Site Sewage Treatment Facilities		N/A
Mid-Rail Area**	Conveyed to Mine Site Sewage Treatment Facilities		N/A
Cockburn Tunnels Area**	Conveyed to Steensby Sewage Treatment Facilities		N/A
Cockburn South Camp**	Conveyed to Steensby Sewage Treatment Facilities		N/A

*Refer to Site Block Flow Diagrams in Appendix D for Milne Port and Mine Site anticipated annual effluent discharge.

** These sites are part of the Southern Railway Corridor and are not expected to be active in the foreseeable future.

Treated wastewater effluent will be discharged at a distance of 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.

6.4 SEWAGE TREATMENT PROCESS DESCRIPTION

The process description for the sewage treatment systems at each site are described in the sections that follow. Note that for design purposes a per capita sewage generation rate of 344 L/person/day had been considered originally, which is higher than the per capita potable water consumption rate of 300 L/person/day. This was to ensure that the sewage treatment systems would have a higher design allowance. For consistency 300 L/person/day will now be used for both potable water consumption and sewage generation. On average sewage generated per person ranges from approximately 100 to 300 litres per day. In addition, 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.

6.4.1 MILNE PORT

The original on-site STP for Milne Port is a 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 PWH camp is stored in a raw sewage bladder until it is transported using a vacuum truck to the Milne Port MBR for treatment. A second STP is adjacent to the 380-Person Camp.

Treated effluent from the MBR sewage treatment plant servicing the PSC and PWH accommodations is stored in a series of treated effluent tanks. 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 criteria. Such delay allows the effluent to be mixed, re-treated, and retested before discharge. Once sampling indicates that effluent meets discharge criteria the treated effluent stream is directed to discharge via truck or pipeline to the ocean outfall discharge location (see Table 6-3 for coordinates). The discharge location at Milne Inlet is shown on the Milne Port Site Layout (Appendix C).

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 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 STP(s) to become inoperable, raw sewage will be temporarily trucked to local existing PWSPs until the STP(s) come on line again. Partially or untreated sewage from the PWSPs from this event will either be trucked back to the treatment plant(s) for treatment/reprocessing or treated in situ at the pond location (refer to Appendix G - PWSP Effluent Discharge Plan). The PWSP Effluent Discharge Plan is used as a reference guideline by the onsite environmental team. 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 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 double bagged. 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 C.

6.4.2 MINE SITE

The Mine Site has two (2) MBR STP facilities to service the MSC and the Sailiivik Camp Complex. Effluent is discharged via a direct effluent discharge line from the STP servicing the Sailiivik Camp Complex and Mine Site Complex to the approved discharge locations near the Mary River. The Rotating Biological Contactor (RBC) STP (Seprotech manufactured), previously used to treat sewage from the Mine Site

Weatherhaven Camp, is currently 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 STPs for treatment.

Treated effluent from the MBR STPs is stored in a series of treated effluent tanks. 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 criteria. Such delay allows the effluent to be mixed, retreated, and retested before discharge. Once sampling indicates that effluent meets discharge criteria the treated effluent stream is directed to discharge via pipelines to the Mary River discharge locations; one pipeline from the MSC MBR and one pipeline for the Sailiivik Camp MBR (refer to Table 6-3 for winter and summer discharge co-ordinates). The discharge locations at the Mine Site are shown on the Mine Site Layout presented in Appendix C.

To reduce potential sedimentation and/or erosion, riprap (i.e. coarse aggregate) has been used at the approved Mary River discharge locations. Mary River discharge locations are presented in the Mine Site Layout found in Appendix C.

In the event that there is an electrical power outage that causes the STP(s) to become inoperable, raw sewage will be temporarily trucked to local existing PWSPs until the STP(s) come on line again. Partially or untreated sewage from the PWSPs from this event will either be trucked back to the treatment plant(s) for treatment/reprocessing or treated in situ at the pond location (refer to Appendix G - PWSP Effluent Discharge Plan). The PWSP Effluent Discharge Plan is used as a reference guideline by the onsite environmental team. 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 is limited as a result of the sludge being aerobically digested, de-watered and double bagged. 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 STPs are designed to also process raw or partially treated sewage from the Raven and Mid-Rail camps in the event these facilities are operational.

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 camps, sewage treatment plants and ancillary facilities is presented in Appendix C.

7 WASTEWATER MANAGEMENT – OILY WATER

There are two sources of potentially oily water that have been identified at Milne Port and the Mine Site. There is the wash-water generated at the vehicle maintenance facilities, waste management building, emergency response garage, and truck wash, as well as the surface water that collects within the bulk fuel storage berms, hazardous waste storage berms and Landfarm facilities at Project sites. Based on the different nature of these two wastewater sources, distinct discharge criteria (and treatment plans) have been developed for each.

7.1 OILY WATER TREATMENT DISCHARGE CRITERIA

All discharge from the Oily Water/Wastewater Treatment Facilities for monitoring stations MP-02, MS-02, and SP-02 will not exceed the following effluent quality limits provided in Table 7-1.

TABLE 7-1: EFFLUENT DISCHARGE QUALITY LIMITS FOR OILY WATER TREATMENT FACILITIES*

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

*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 7-2. Applicable monitoring stations include MP-03, MP-MRY-7, MS-03, MS-04, MS-MRY-6, SP-04 and SP-05.

TABLE 7-2: EFFLUENT DISCHARGE QUALITY LIMITS FOR THE BULK FUEL STORAGE FACILITIES*

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

*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 7-3. Applicable monitoring stations include MP-04, MS-05 and SP-06.

TABLE 7-3: EFFLUENT DISCHARGE QUALITY LIMITS FOR THE LANDFARM FACILITIES*

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

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

7.2 OILY WATER/WASTEWATER TREATMENT PROCESS DESCRIPTION

Oily water and wastewater generated by the Project shall be treated at the Oily Water/Wastewater Treatment Facilities allowed under the scope of the Type A Water Licence. The process description for both oily water/wastewater treatment systems at each site are described in the sections that follow.

7.2.1 MANAGEMENT OF OILY WATER AT MILNE PORT

Sources of oily water that may be generated at Milne Port (excluding minor oily water generated from accidental spills which is addressed under the Spill Contingency Plan; SCP) are:

- Vehicle maintenance and wash facilities (i.e. truck wash, snow/ice melt, equipment and floor wash down water);
- Bulk fuel storage facility (water in the tank farm containment areas);
- Concrete sumps in buildings such as Maintenance Shops, Waste Management Building, Emergency Response Building, etc.;

- Lined containment facilities (i.e. hazardous waste and product storage berms); and,
- Landfarm Facility including the Contaminated Snow Containment Facility.

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

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 OWS. The prefabricated mobile OWS uses a series of skimmers, filters, clay, and activated carbon to capture and remove hydrocarbons from oily water.

Wash and melt water generated at the vehicle 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 is pH adjusted, if required, and resampled to ensure effluent water quality meets the applicable discharge criteria 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 to meet effluent discharge criteria outlined in Section 7.1. The Oily Water Treatment and Discharge Plan is included in Appendix L.

7.2.2 MANAGEMENT OF OILY WATER AT THE MINE SITE

Sources of oily water that may be generated at the Mine Site (excluding minor oily water generated from accidental spills which is addressed under the SCP) are:

- Vehicle maintenance and wash facilities (i.e. truck wash, snow/ice melt, equipment and floor wash down water);
- Bulk fuel storage facilities (water in the tank farm containment areas);
- Concrete sumps in buildings such as Maintenance Shops, Waste Management Building, Emergency Response Building, etc.; and,
- Lined containment facilities (i.e. hazardous waste and product storage berms).

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

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 Truck Wash Facility is equipped with an oily water treatment plant as well as 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 treatment plant which utilizes a series of skimmers, 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. Should there need to be a discharge from the facility to the receiving environment, the wastewater is further treated with the facility's reverse osmosis unit and pH controller to ensure the final effluent meets all discharge criteria outlined in the Type A Water Licence.

Treated effluent from the truck wash's oily water treatment plant will be pumped to the discharge outfall at the Mary River or other on land location as agreed to by the Water Licence Inspector. Most water is recycled and reused within the facility. The separated waste oil will be stored in a local tank. Periodically, the oil from the tank will be drained and shipped off site or incinerated. Accumulated suspended solids will be periodically removed by bucket loader vehicle and sent to the Landfarm Facility for treatment if contaminated with hydrocarbons or the landfill if demonstrated to be non-hazardous.

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 mentioned prior, 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 criteria outlined in the Type A Water Licence. The Oily Water Treatment and Discharge Plan is included in Appendix L.

8 WASTEWATER MANAGEMENT – CONTACT WATER

Contact water for the purposes of this Plan is defined as water that has come in contact with ore or waste rock; it is considered to be the equivalent to mine effluent as defined under the MDMER. The water management ponds described in the sections below retain runoff water from the Milne Port ore stockpile pad and the Mine Site crushing pad, Run of Mine Stockpile (ROM), and waste rock stockpile. In the event of abnormal conditions at an existing surface water management pond, Baffinland will consult an engineer for recommendations on required improvements or upgrades.

8.1 DISCHARGE CRITERIA

All discharge from the water management ponds (MS-06, MS-07, MS-08, MS-09, and SP-07) associated with the Project's mining operations (crushing, ore, and waste rock stockpiles) will not exceed the effluent quality limits outlined in the Type A Water Licence and provided in Table 8-1.

In addition, effluent discharged from water management ponds at the Mine Site (MS-06, MS-07, MS-08, MS-09) will not exceed the effluent quality limits within the MDMER provided in Table 8-2. When the maximum limit for a parameter differs between the MDMER and the Type A Water Licence discharge criteria, the more conservative (lower) limit for the parameter will be adopted.

TABLE 8-1: EFFLUENT DISCHARGE QUALITY LIMITS FOR OPEN PIT, STOCKPILES, AND SURFACE WATER MANAGEMENT PONDS (NWB)*

Parameter	Maximum Concentration of Any Grab Sample (mg/L)
Total Arsenic	0.50
Total Copper	0.30
Total Lead	0.20
Total Nickel	0.50
Total Zinc	0.50
Total Suspended Solids	15
Oil and Grease	No visible sheen
Toxicity	Not acutely toxic
pH	6.0 – 9.5

*Source: Type A Water Licence (2AM-MRY1325 – Amendment No. 1) Table 10.

TABLE 8-2: EFFLUENT DISCHARGE QUALITY LIMITS FOR OPEN PIT, STOCKPILES, AND SURFACE WATER MANAGEMENT PONDS (ECCC)*

Parameter	Mean Monthly Limit (mg/L)[1]	Maximum Concentration of Any Grab Sample (mg/L)
Total Arsenic	0.50	1.00
Total Copper	0.30	0.60
Total Lead	0.20	0.40
Total Nickel	0.50	1.00
Total Zinc	0.50	1.00
Total Suspended Solids	15	30
Radium-226	0.37 Bq/L	1.11
pH	6 – 9.5	6 – 9.5
Toxicity	Not acutely toxic	Not acutely toxic
Un-ionized Ammonia	0.50	1.00

*Source: Metal and Diamond Mining Effluent Regulations, Schedule 4

[1] Parameters listed above are sampled weekly during discharge.

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. For additional information on the MDMER requirements pertaining to the Project refer to Appendix I.

8.2 MILNE PORT STOCKPILE SURFACE WATER MANAGEMENT PONDS

The three (3) Milne Port stockpile surface water management ponds were constructed to retain the runoff water from the Milne Port ore stockpile 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 will 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.

In the case that the surface water management pond effluent quality does not meet the discharge criteria 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.

8.3 MINE SITE ORE CRUSHER PAD SURFACE WATER MANAGEMENT POND

The Mine Site ore crusher pad surface water management pond is designed to 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 unloaded surface water to drain through a controlled discharge to Sheardown Lake. 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.

The pond is also equipped with a pump pad on the northwest side. The normal operation of the pond is to test the water quality for MDMER and applicable Type A Water Licence requirements and when on spec, control discharge using a portable pump arrangement. The pump arrangement connects into the treated effluent discharge pipeline originating at the MSC STP for 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.

8.4 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 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 weir designed for extreme weather periods (e.g. greater than a 1 in 200 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.

8.5 MINE SITE WASTE ROCK STOCKPILE POND

The Waste Rock Facility 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 Waste Rock Stockpile is intercepted by the Facility's perimeter collection ditches and directed to the WRF Pond. The WRF Pond for the Mine Site was constructed in 2016 and is designed to retain surface water runoff. Controlled transfers of in pit mine water to the WRF Pond

for treatment through the WTP may also occur in accordance with Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP).

Water from the WRF Pond is pumped into the Water Treatment Plant (WTP) for pH adjustment, and subsequently discharged into a geotube adjacent to the WTP for solids removal via filtering and settling. The WTP has a design treatment rate of 280 m^3/hr capacity, consisting of two 140 m^3/hr treatment trains. For each train, the water flow rate and pH in Reactor Tanks 1 and 2 is continuously monitored. Ferric sulfate and polymer is added based on flow rate, while the lime dosage is based on the pH in Reactor Tank 1. The chemical dose rate is adjusted by the plant operator using the PLC to achieve water quality requirements. Monitoring of the treated effluent at various stages of the treatment system is conducted to monitor the treatment system's performance. The Waste Pond Water Treatment Plant Operations SOP, which includes plant operating procedures as well as an overview of the treatment process, and General Arrangement Drawings is provided in Appendix K. 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 criteria and then controlled discharged intermittently using a portable pump arrangement. Sludge generated from the operation of the WRF WTP is 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.

In high rainfall periods (e.g. greater than a 1 in 10 year, 24 hour design storm), the WRF 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 WRF 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, controlled discharges from the pond via active pumping are implemented.

9 LANDFILL

9.1 DISCHARGE CRITERIA

All runoff and seepage from the Landfill Facilities at monitoring stations MS-MRY-13A, MS-MRY-13B and SP-08 will not exceed the following effluent quality limits presented in the table below:

TABLE 9-1: EFFLUENT DISCHARGE QUALITY LIMITS FOR THE LANDFILL FACILITIES*

Parameter	Maximum Concentration of Any Grab Sample (mg/L)
pH range	Between 6.0 and 9.5
Total As	0.5
Total Cu	0.3
Total Pb	0.2
Total Ni	0.5
Total Zn	0.5
TSS	15
Oil and Grease	No visible sheen

*Source: Type A Water Licence (2AM-MRY1325 - Amendment No. 1) Table 7

9.2 MINE SITE LANDFILL

The Mine Site Landfill Facility is located just south of the NE Basin of Sheardown Lake. Both Facility's monitoring stations, MS-MRY-13A and MS-MRY-13B, are sampled monthly during the open water season and are situated on a small stream down gradient of the Landfill Facility. The small stream drains into the NE Basin of Sheardown Lake on its southern shoreline. Refer to the Mine Site Layout presented in Appendix C for the exact location of the monitoring stations and Landfill Facility.

10 OPERATIONS AND MAINTENANCE (O & M)

The project specific O&M Manual for Sewage Treatment Systems is provided by Newterra Ltd in Appendix E. Sample plans for operation and maintenance of the potable water and oily water systems are given below. These plans were provided by the vendors of the potable and oily water treatment systems.

10.1 POTABLE WATER TREATMENT SYSTEM O & M PLAN

10.1.1 REGULAR MAINTENANCE SCHEDULE

The potable water system is fully automatic, and only requires limited supervision and regular maintenance. The following maintenance schedule provided in Table 10-1 is subject to regulations from local government, and instructions from original equipment manufacturers. The following maintenance schedule is common for all potable treatment plants.

TABLE 10-1: RECOMMENDED MAINTENANCE SCHEDULE - POTABLE TREATMENT PLANTS

Items	Description
Daily	• Alarm check. • Chemical storage level check. • Controller time check. • Pressure gauge check. • Total and free chlorine testing. • Turbidity check.
Monthly	• Turbidity analyzer check/calibration. • Residual chlorine/pH analyzer check/calibration.
Annual	• Filter media level check, and refill if required. • UV lamp replacement.

10.1.2 MONITORING PLAN

The monitoring plan is subject to local regulations of drinking water and other related codes. The following instruments are used to monitor the operation and performance of the potable water system.

- Inlet flow meter: to monitor feed flow, backwash flow, rinse flow and filtered flow;
- Effluent turbidity analyzer: to monitor turbidity in produced water; and,
- Effluent pH/residual chlorine analyzer: to monitor pH and residual chlorine of produced water.

The PLC system in the control panel will totalize raw water, produced water, backwash water, chemical injection, pump running time etc.

Periodically sampling and lab tests for raw water and treated water will be applied to ensure the treated water meets drinking water standards. The frequency of the sampling and testing will be determined by the ministry and outlined in the certificate of approval.

10.2 MOBILE OILY WATER SEPARATOR (OWS) SYSTEM

10.2.1 SYSTEM OVERVIEW

The mobile OWS is a prefabricated system (Newterra Ltd.) housed in a 40' seacan and is designed to remove oil, grease and BTE compounds from hydrocarbon contaminated water. The unit includes an API type separator to remove free product, a bag filter for solids removal and three adsorption units (one clay, two granular activated carbon) for oil/grease and BTE removal. In the event that the contaminated water has lead concentrations that exceed the discharge limits outlined in Baffinland's Type A Water Licence, additional treatment barrels containing lead removal media are added to the end of the mobile OWS unit. Figure 10-1 shows the Process Flow Diagram for the OWS. The OWS (Newterra Ltd. model OWS-24) is sized for a water temperature of 7°C, specific gravity of 0.88 (diesel/furnace oil), TOG concentration of 50mg/L and flow rate of 50 gpm.

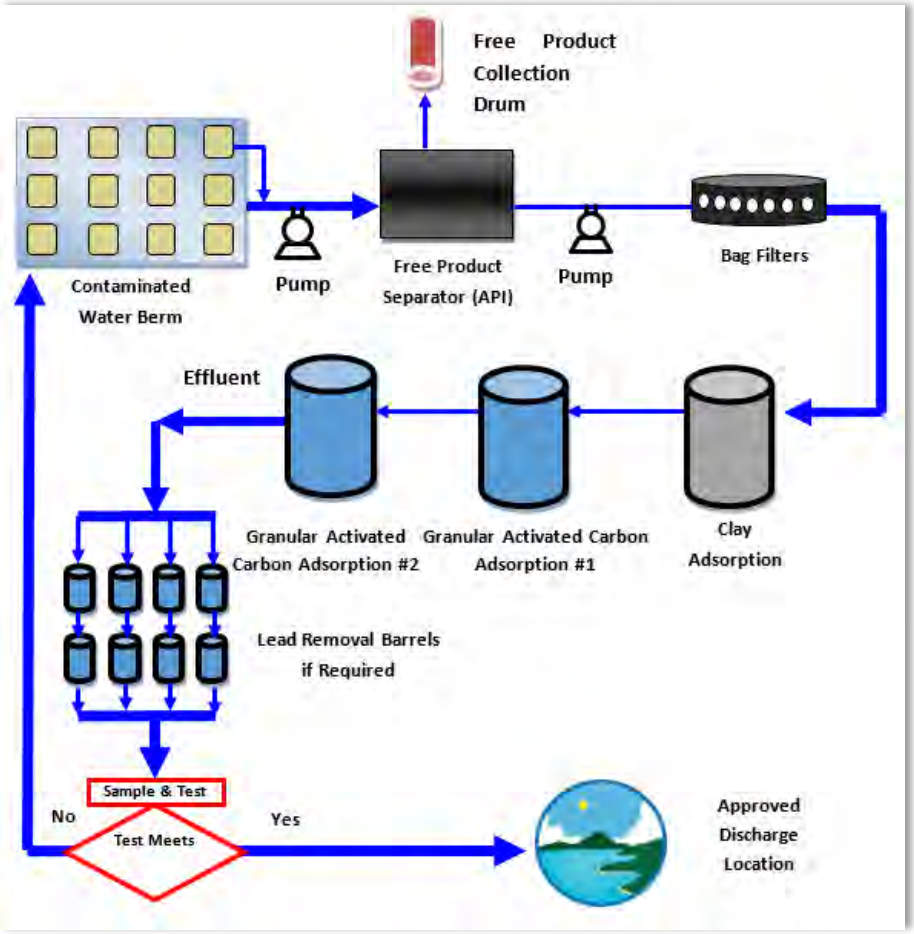

FIGURE 10-10-1 – MOBILE OWS FLOW PROCESS DIAGRAM

10.2.2 OPERATION AND MAINTENANCE PLAN

For the O&M procedures and schedule relating to the mobile OWS unit, refer to the Baffinland Mobile Oily Water Separator (OWS) Manual provided in Appendix H.

10.3 OILY WATER TREATMENT PLANT (FOR VEHICLE WASH WATER) O & M PLAN

10.3.1 REGULAR MAINTENANCE AND MONITORING SCHEDULE

Regular system maintenance entails routine inspection of mechanical and electrical components. It is recommended that the system be inspected weekly to ensure that components are in good working order. Spare parts lists are included with the Operations and Maintenance Manuals, with critical spare parts and system expendables highlighted. Recommended stock quantities are be given.

Operational maintenance is mainly comprised of waste removal and expendable replacement in addition to some preventative maintenance on mechanical components. Maintenance activities, locations and their recommended frequencies are given in Table 10-2.

TABLE 10-2: MAINTENANCE ACTIVITIES, LOCATIONS AND THEIR RECOMMENDED FREQUENCIES

Maintenance Task	Location	Frequency
Sludge/sediment removal	De-muck tank	Twice/week
Oil Removal	Waste oil storage	Weekly
Media change out	CMAFU-2	TBD
Media change out	DPL30	TBD
Filter change out	Reverse Osmosis Unit	TBD
Membrane cleaning	Reverse Osmosis Unit	TBD
Media change out (plates)	Oil Coalescing System	TBD
Pump seals	Various	Annually

Additional, non-routine maintenance will be required throughout the life of the equipment. The recommended spare parts list and appropriate site stock levels are designed to keep the system running continuously with only scheduled downtime.

In addition to maintenance, monitoring the system performance and effluent quality are also necessary. A flow totalizer will be used at the effluent discharge to accurately summate the volume of treated water being released. This in conjunction with the quality data from the various system flows will allow forecasting for media and consumable change-out as well as waste oil and sludge/sediment generation. Residual contaminants below the regulatory limits can also be used in conjunction with treated volumes to determine area loadings over certain periods of time.

Monitoring tasks, locations and frequencies are listed in Table 10-3. The prefix, GI, in the task column denotes “General Inspection”. The Truck Wash Facility layout and component O & M manuals are presented in Appendix J.

TABLE 10-3: MONITORING TASKS, LOCATIONS AND FREQUENCIES

Monitoring Task	Location	Frequency
GI – solids/liquid separators (levels, appearance, pump operation)	De-muck system, CMAFU-2	Daily
Sample – solids/liquid separator effluent	CMAFU-2 effluent	TBD
GI – OWS (levels, appearance, dosing pump)	OWS room	Daily
Sample – OWS Inlet	CMAFU-2 effluent	TBD
GI – Chemical Treatment (tanks, totes, levels, appearance, mixers, dosing pumps, effluent pump, pressures)	Chemical room	Daily
GI – Filtration (units, pressures)	Reverse Osmosis Unit	Daily
GI – Media Vessels (units, pressures, backwash pump, treated water storage)	OCS Tank, DPL30	Daily
Sample – OWS outlet	DPL30 effluent	Quarterly/Monthly
Sample – Reverse osmosis effluent	Reverse Osmosis Unit effluent	Quarterly/Monthly
GI – Miscellaneous (vertical heaters, air compressors, air dryers, controls)	Various	Daily

A joint maintenance/monitoring log is kept to ensure that operational data and changes/responses are properly documented.

The monitoring guidelines are recommended as a minimum to ensure proper operation, health, safety and the protection of the surrounding environment. If corporate or regional policies in effect or enacted require more stringent monitoring, the scope and schedule will be adjusted to meet these requirements.

11 CONTINGENCY MEASURES

Design criteria for the potable, sewage and oily water treatment systems and discharge criteria 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 11-1). Each level of emergency, based on its severity, requires 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; and/or
- Negligible environmental impact to receiving environment.

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

- Some threat to public safety; and/or
- Potential Moderate environmental impact to receiving environment

Level 3 (High) – Uncontrolled hazard which:

- Jeopardizes project personnel safety: and/or
- Potential significant environmental impacts to receiving environment.

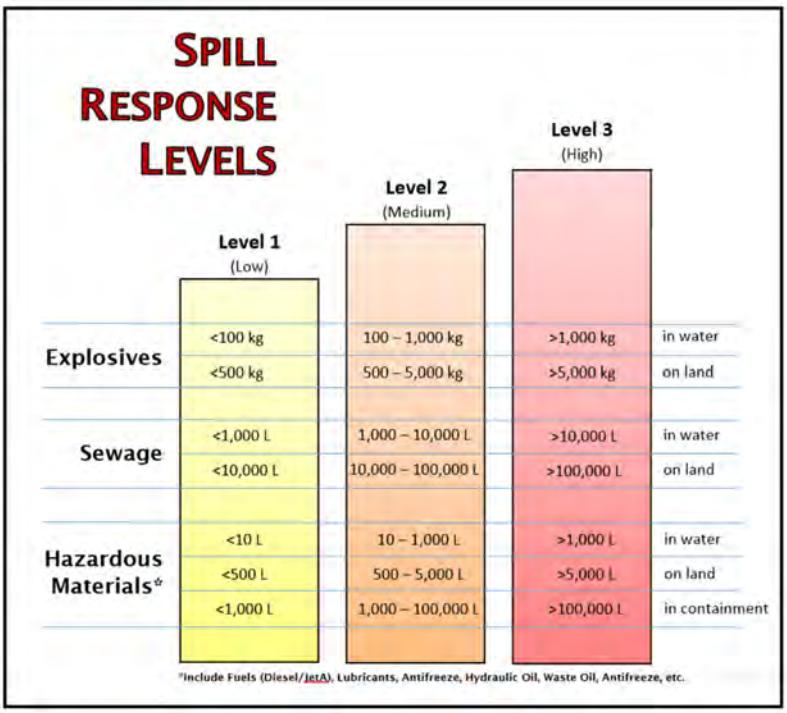

FIGURE 11-1 - EMERGENCY SPILL REPONSE LEVELS

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 SCP and Emergency Response Plans. In the event that sewage discharge does not meet applicable discharge criteria, raw sewage will be temporarily trucked to the existing PWSPs or to another on-site STP for treatment. Partially or untreated sewage from the PWSPs from this event will either be trucked back to the treatment plant(s) for treatment/reprocessing or treated in situ at the pond location (refer to Appendix G - PWSP Effluent Discharge Plan). The PWSP Effluent Discharge Plan is used as a reference guideline by the on-site environmental team. 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.

Effluent from the mobile OWS is sampled regularly to ensure effluent quality meets the applicable discharge criteria outlined in the Type A Water Licence. In the case of an accidental spill of oily water, Baffinland will follow the procedures in its SCP and Emergency Response Plans. In the event of a release of oily water in exceedance of applicable discharge criteria, discharge will be ceased immediately and treatment options will be evaluated. Prior to resuming discharge, resampling will occur to ensure effluent water quality meets the applicable discharge criteria before the effluent is finally discharged to the receiving environment.

Surface water management ponds are discharged in adherence to the MDMER and Type A Water Licence discharge criteria. Workers involved in the pumping operations exercise caution when setting up and operating pumps on the pond liners. While installing the pump's intake hose on an inner tube in a 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.

Discharge is discontinued if internal or external results are approaching or exceed applicable water quality criteria. In the event of non-compliant water, Baffinland will follow the procedures in its SCP and Emergency Response Plans (see Appendix L for the MDMER Emergency Response Plan). In cases where water retained in water management infrastructure is determined to be non-compliant with applicable discharge limits, retained water (effluent) will be treated as per this Plan, the Phase 1 Waste Rock Management Plan, Waste Pond Water Treatment Plant Operations and the MDMER ERP to ensure compliance with the applicable discharge limits. Potential treatment options include use of temporary treatment systems to alter water chemistry with various mixing and dosing components, arranging equipment on the discharge end of the pump/discharge to provide final polishing before the water enters the receiving environment, or incorporation of additional treatment steps to ensure effluent water quality is compliant.

12 MONITORING

Generally, monitoring of the potable and wastewater treatment systems include the following:

- Regular sampling of sewage and wastewater discharge in accordance with the Type A Water Licence requirements;
- More frequent internal process sampling and monitoring to identify potential upset conditions early that could potentially lead to non-compliance;
- Recording of volumes of sewage and wastewater effluent discharged and sludge generated in accordance with the Type A Water Licence requirements;
- Completion of daily checklists related to O&M requirements for the facilities and reporting of any upset conditions that require action; and,
- Implementation of the Aquatic Effects Monitoring Program to confirm/validate environmental predictions.

12.1 POTABLE WATER SYSTEM MONITORING

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

Samples are collected at active water take locations for select analyses at frequencies specified in applicable regulations/guidelines. A typical list of parameters which are 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 CaCO3, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Turbidity, Phenols, Ammonia (NH_3), Sulphate (SO_4), Cl, Br, Nitrite (NO_2), Nitrate (NO_3), Mercury, Hardness as CaCO3, Chemical Oxygen Demand (COD) and Oil and Grease.

Sampling results are compared to the Guidelines for Canadian Drinking Water Quality (GCDWQ).

12.2 SEWAGE TREATMENT SYSTEM MONITORING

Treated sewage effluent is monitored and sampled at the locations specified in the Type A Water Licence. The effluent discharge criteria is summarized in Table 6-2.

12.3 OILY WATER TREATMENT SYSTEM MONITORING

Treated oily water effluent is monitored and sampled at the locations specified in the Type A Water Licence. The applicable effluent discharge criteria for oily water is summarized in Section 7.1.

12.4 TRAINING AND AWARENESS

Baffinland staff and contractors working on site receive environmental training as part of the site orientation to achieve a basic understanding of their obligations regarding environmental compliance with regulatory requirements, commitments and best practices.

Operations superintendents and contractor supervisors are provided this Plan, and receive additional training with respect to the requirements outlined in this Plan. In addition, supervising level staff and sub-contractors are provided the Operational Environmental Standards (found in the Project's Environmental Protection Plan) as a written guidance for their work.

Targeted environmental awareness training will be provided to both individuals and groups of workers assuming a specific authority or responsibility for environmental management or those undertaking an activity with an elevated high risk of environmental impact. These will be delivered in the form of toolbox meetings or other means as appropriate.

The content of the environmental component of the site orientation will include at a minimum:

a. Location of environmental sensitivities;
b. Location of additional information on environmental matters;
c. Due diligence responsibilities;
d. Responsibilities related to waste management, minimizing noise as necessary, road traffic rules, etc.; and,
e. Principles and necessary steps to avoid encounters with bears or other wildlife and what to do if one such encounter occurs.

12.5 COMMUNICATION

The types of communications for which members of the team will participate include the following:

a. Formal written correspondence and meetings with stakeholders;
b. Site visits by community representatives;
c. Design, construction and planning meetings;
d. Field inspections and monitoring reports disseminated by the Environmental Superintendent;
e. Electronic communications;
f. Toolbox meetings;
g. Formal written correspondence and meetings with government regulatory bodies; and,
h. Formal environmental awareness training.

Communications are appropriately recorded and filed for future reference. Where appropriate, copies of communications will be forwarded to Senior Management and the Environmental Superintendent.

12.6 EXTERNAL COMMUNICATIONS

Effective forms of communication include the proactive notification to external stakeholders of Project activity. Project activity updates will be provided to the communities of North Baffin through various means including regular meetings, public notices and radio announcements as appropriate. Baffinland employs Community Liaison Offices to assist in this regard.

Appendix A - Sustainable Development Policy, and Health, Safety and Environment Policy

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

Appendix B -
Table of Concordance with Type A Water Licence Terms and Conditions

Table A-1 shows the Part, number and Condition of the Type A Water Licence and the location where the condition is located within the Freshwater Supply, Sewage and Wastewater Management 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.

Part	Number	Condition	Section/Commitment
	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.
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 SteensbyPort (Steensby Inlet) — ST 347 Km Lake; 3 km Lake — 435.8 — 155,400 Ravn River — Camp Lake — 145.2 — Mid-Rail — Nivek 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 5-1
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 criteria for those facilities.	6.2

Part	Number	Condition	Section/Commitment
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.	5.1.1.2
E	8	Streams cannot be used as a water source unless authorized and approved by the Board in writing.	6.2
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.
E	11	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.	4
E	12	The Licensee shall not remove any material from below the ordinary High Water Mark of any water body unless authorized.	5.2
E	25	The Licensee is authorized to withdraw up to 1,500 m3 / day to a maximum of 547,500 m3 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 5-2

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></tr>
<tr><td></td><td></td><td>Table 2-3: Water use Authorized for Dust Suppression
<table>
<tr><th>Site</th><th>Source</th><th>Prosed Maximum Volume (m^3/day)</th><th>Restriction</th></tr>
<tr><td rowspan="13">Tote Road</td><td>Phillip's Creek</td><td>212</td><td rowspan="3">None</td></tr>
<tr><td>Km 32 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>Katiktok 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</td></tr>
<tr><td>BG17</td><td>75</td><td>flow(less than mean flow) years</td></tr>
<tr><td>CV233 (Tom River)</td><td>135</td><td rowspan="2">None</td></tr>
<tr><td>Camp Lake</td><td>86</td></tr>
</table></td><td></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>5.2</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>7.2</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 High Water Mark 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>Section 6.3</td></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>6.2</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>Appendix F</td></tr>
</table>

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></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 criteria (F18) would therefore apply)</td><td>Table 6-2</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 criteria are applied for these locations)</td><td>Table 6-2</td></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>6.2</td></tr>
</table>

<table>
<tr><th>Part</th><th>Number</th><th>Condition</th><th>Section/Commitment</th></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 7-1</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>Table 8.1</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 7-2</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 7-3</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 8-1</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>8.1 and Table 8-1</td></tr>
</table>

Appendix C -
Site Layout (Mine Site and Port Site)

503,000 503,500 504,000 504,500

7,976,500 7,976,000 7,975,500 7,975,000 7,974,500 7,974,000

Milne Inlet

ORE DOCK #1

FREIGHT DOCK

BARGE LANDING AREA

EFFLUENT DISCHARGE LOCATION

SURFACE WATER MANAGEMENT POND

MARINE MANIFOLD BUILDING

SURFACE WATER MANAGEMENT POND

MP-C-A

MP-MRY-12

MP-C-H

MP-06A

MP-06

MP-05

MP-C-D

MP-C-E

MP-C-F

MP-03

MP-C-G

MP-02

MODULE OFFLOAD ROAD

MP-MRY-04A

MP-MRY-7

ORE STOCKPILE

MP-01A

MP-01

LP2

MP-MRY-04

MP-C-B

WEATHERHAVEN (MATRIX CAMP)

SNOW STOCKPILE

SNOW STOCKPILE

LAND FARM FACILITY

MP-C-B

MP-04

SNOW DUMP

MP-C-B01

W3

Phillips Creek

MP-04A

SNOW STOCKPILE

SNOW STOCKPILE

MP-C-C

MP-Q1-02

W14

MAINTENANCE BUILDING

MP-C-B01

ORE HAUL TRUCK SERVICES PAD

HELICOPTER PAD

MP-Q1-02

MOBILE REFUELING MODULE

MP-01B

W10A

QUARRY Q1

W10B

MP-Q1-01

380-PERSON CAMP

LP5

LP3

LP6

LP7

MP-Q1-01

TOTE ROAD

TOTE ROAD (OLD ALIGNMENT)

LAYDOWN R1

MP-C-D

MP-C-E

HAZARDOUS WASTE BERM

MP-C-F

BULK FUEL FACILITY

WELDING SHOP

MP-03

TK-011

TOROMONT SHOP

TK-004

TK-005

DIESEL REFUELING MODULE

MAIN MAINTENANCE BUILDING

JET-A REFUELING MODULE

TK-003

TK-006

MP-02

MOBILE MAINTENANCE FACILITIES

TK-010

TK-009

TK-007

TK-008

ROAD MAINTENANCE SHOP

TK-003

TK-002

ERT OFFICE / GARAGE

TIRE SHOP

MAIN GENERATORS

WAREHOUSE

PORT SITE COMPLEX

POLISHING WASTE STABILIZATION POND

MP-01A

MP-01

WASTE TREATMENT PLANT

ENVIRONMENTAL LAB

WASTE WATER TREATMENT PLANT

WASTE MANAGEMENT BUILDING

HAZARDOUS WASTE BERM

LEGEND

- Foreshore Lease Boundary
- Borrow Area
- Quarry Area
- Project Development Area
- Commercial Lease Boundary
- Current Infrastructure

SNP Monitoring Station

- Active
- Inactive

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MARY RIVER PROJECT

Milne Port Site Layout

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2019 Digital Global, Inc.
Imagery and Infrastructure are representative as of August 2019.

0 25 50 100 150 200 Meters

Scale 1:8,000

N

Baffinland

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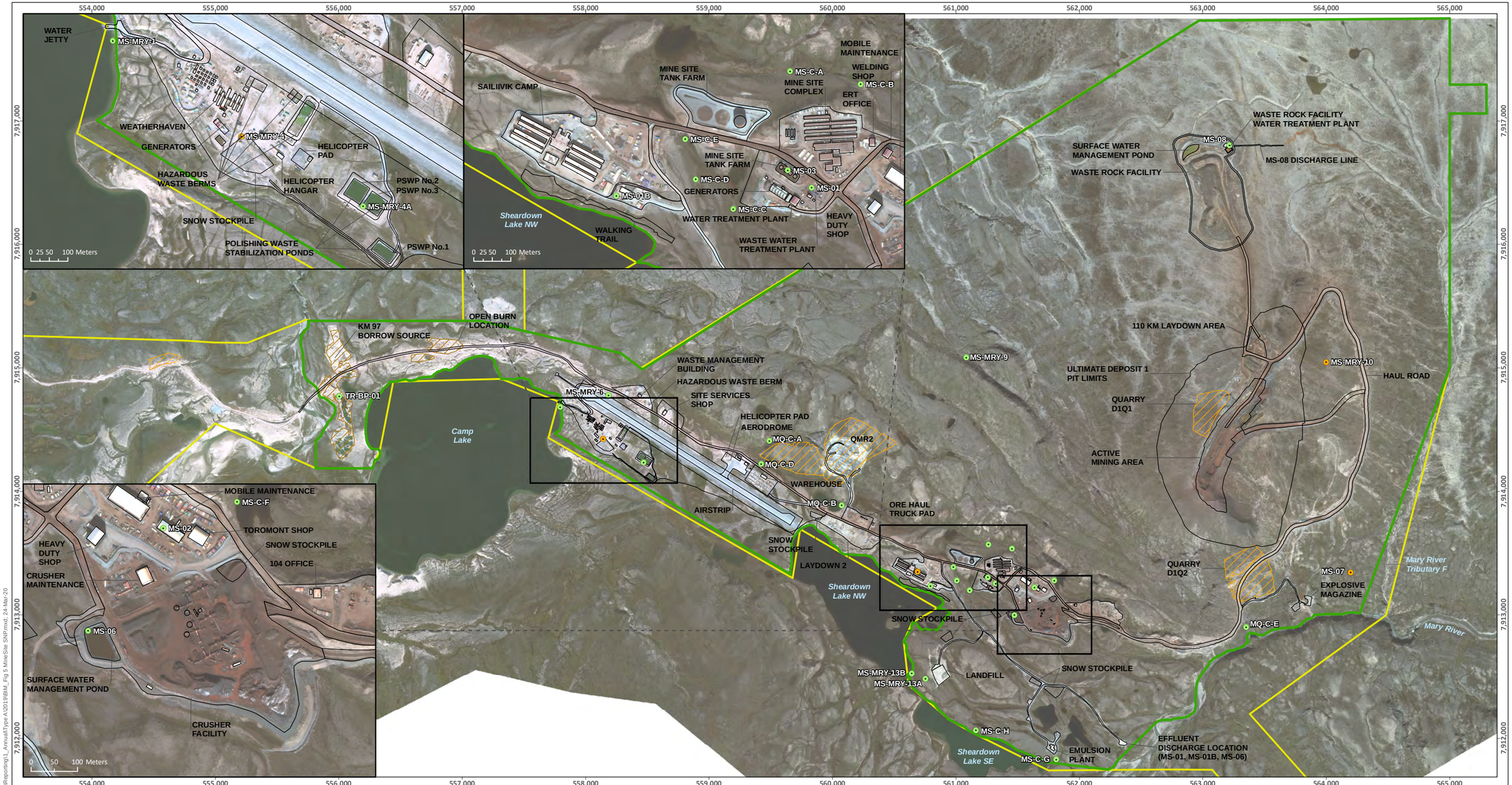
FIGURE 3

SAVED: C:\Users\katie.mcguire\Documents\4 - Maps\Reporting\1_Annual\Type A\2019\BIM_Fig 3 MilnePort SNP.mxd; 24-Mar-20



SAVED: C:\Users\katie.mcguire\Documents\4 - Maps\Reporting\1_Annual\Type A\2019\BIM_Fig 5 MineSite SNP.mxd; 24-Mar-20

LEGEND

- Borrow Area
- Quarry Area
- Project Development Area
- Commercial Lease Boundary
- Current Infrastructure

SNP Monitoring Station

- Active
- Inactive

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Mine Site Layout

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2019 Digital Global, Inc.
Imagery and Infrastructure are representative as of August 2019.

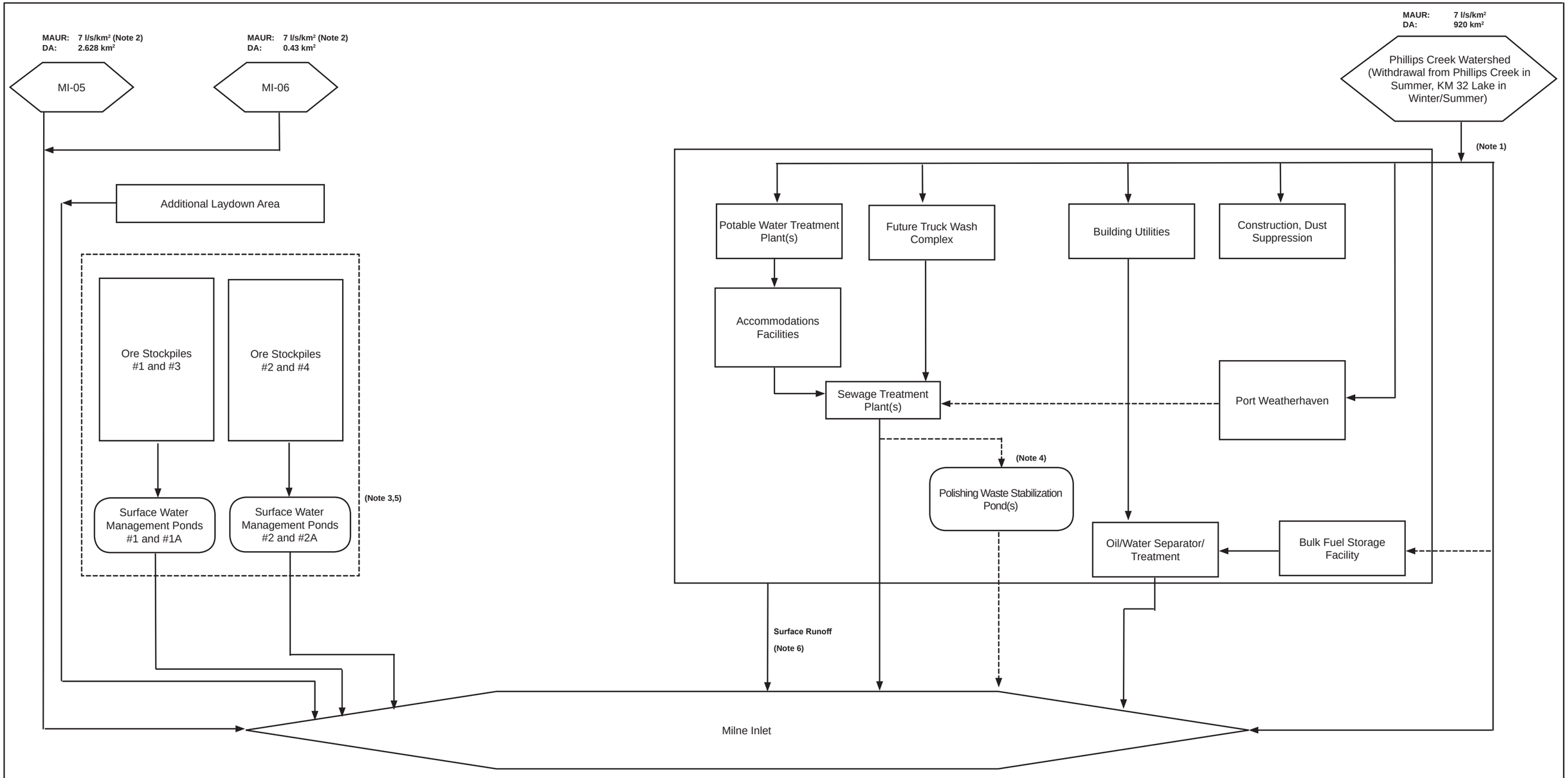
0 100 200 400 600 800 Meters
Scale 1:30,000

N

Baffinland

ᑎᑎᕋᐅᖏᓐᓄᑦ FIGURE 5

Appendix D -
Block Flow Diagrams – Milne Port and Mine Site



LEGEND

- Impacted Watershed
- Development Areas
- Surface Water Management Pond
- Continuous Or Watershed Flow
- Intermittent Flow
- A/AA 100,000 — Annual Volume (m^3/year)
- MAUR — Mean Annual Unit Runoff ($l/s/km^2$)
- DA — Drainage Area (km^2)

NOTES:

1) Raw water supply flow rate from Philips Creek (Summer) & KM32 Lake (Winter/Summer) are currently equal to or less than Type A water license 2AM-MRY1325 Amendment No. 1 flow rate limit of 367.5 m^3/day (134,000 m^3/year).
2) Mean Annual Unit Runoff (MAUR) in watersheds MI-05 and MI-06 likely range between 5 and 7.1/s/km^2. Part of the MI-06 natural catchment will be used for proposed infrastructure construction.
3) Ore stockpiles receive only precipitation and no surface water runoff from surrounding areas.
4) Use of Polishing Waste Stabilization Pond(s) will occur on a contingency basis only, should off-spec treated sewage effluent be produced.
5) Per Hatch Project Memo H349000-2133-10-220-0001, the runoff coefficient from ore stockpiles is zero and only road and pad runoff reports to surface water management ponds.
6) Plant site receives only precipitation-runoff and no surface water runoff from surrounding areas.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	26MAR'19	ISSUED WITH TRANSMITTAL	SEF	RAC

BAFFINLAND IRON MINES CORPORATION

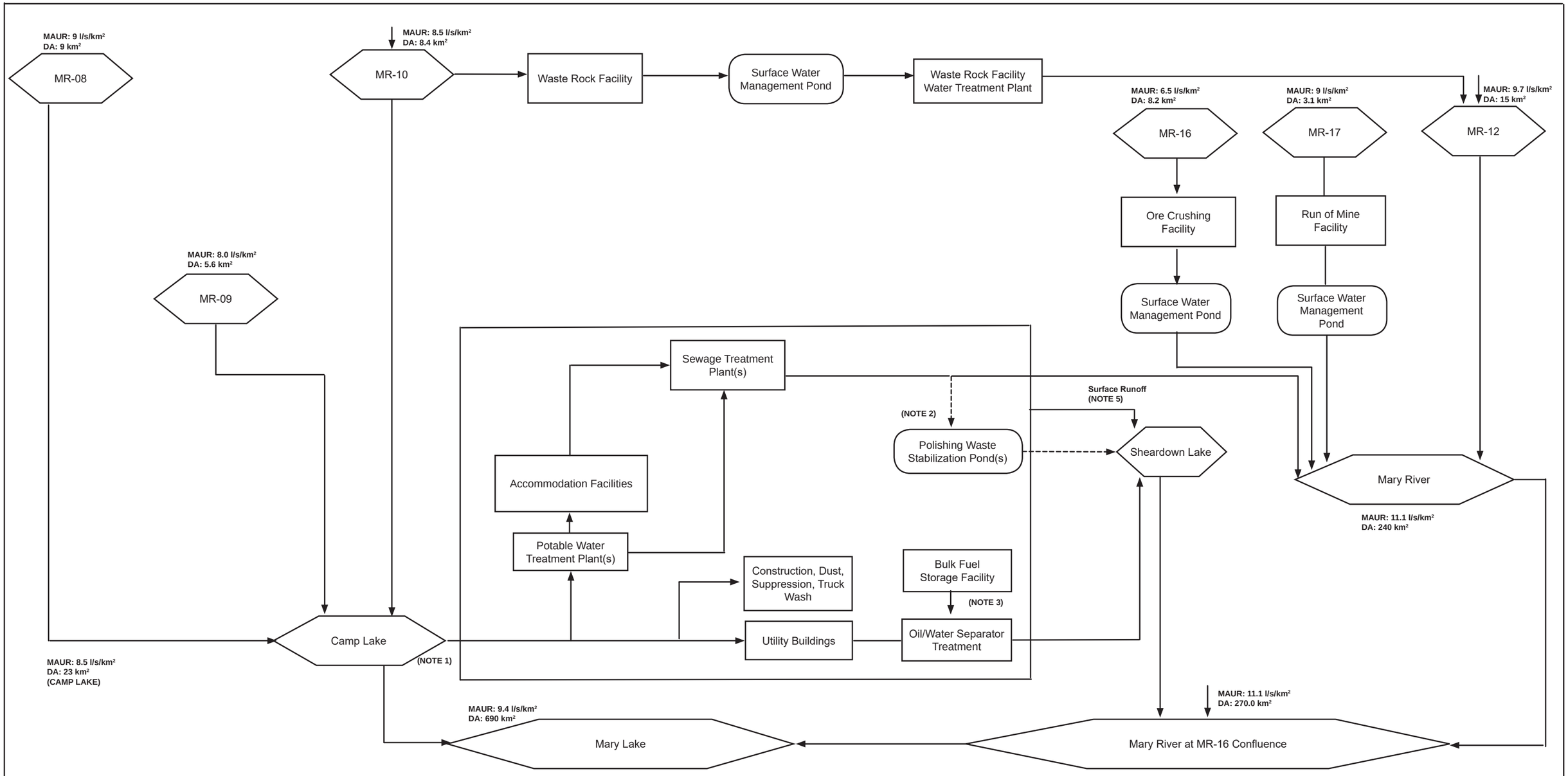
MARY RIVER PROJECT

MILNE PORT
SITE WATER BALANCE - BLOCK FLOW DIAGRAM

Baffinland

PA NO.	REF. NO.
NB102-181/54	NB19-00251

FIGURE A.1 REV 0



LEGEND

Impacted Watershed	---------→	Intermittent Flow	
Development Areas	A/AA 100,000	Annual Volume (m^3/year)	
Surface Water Management Pond	MAUR	Mean Annual Unit Runoff (l/s/km^2)	
Continuous or Uncontrolled Flow	DA	Drainage Area (km^2)	

NOTES:

1) Raw water supply flow rate from Camp Lake are equal to or less than Type A Water Licence 2AM-MRY1325 Amendment No. 1 flow rate limit of 657.5 m^3/day (240,000 m^3/year) total.
2) Use of Polishing Waste Stabilization Pond and Sheardown Lake discharge will occur on a contingency basis only, should capacity be exceeded through the sewage treatment system discharging to Sheardown Lake.
3) Bulk fuel storage area runoff drained to environment if quality satisfies discharge requirements; otherwise is conveyed to oil/water separator for treatment prior to discharge.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
1	29MAR'19	ISSUED WITH TRANSMITTAL	SEF	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MINE SITE
SITE WATER BALANCE - BLOCK FLOW DIAGRAM

Baffinland

PA NO. NB102-181/54

REF. NO. NB19-00268

FIGURE A.2

REV 1