Baffinland Iron Mines Corporation
Mary River Project

Fresh Water Supply, Sewage, and Wastewater Management Plan

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Table Of Contents

1. Introduction 2

2. Regulations, Standards, and Codes 3

3. Sustainable Development Policy 4

4. Fresh Water 7

4.1 General Mitigation Measures for Water Use 7
4.2 Fresh Water Sources 7
4.3 Fresh Water System Process Description 9

5. Sewage Treatment 14

5.1 Sewage Generation Rate 14
5.2 Sewage Discharge Criteria 14
5.3 Treated Wastewater Generation and Discharge/Outfall Locations 15
5.4 Sewage Treatment Process Description 17

6. Oily Water/Wastewater Treatment 24

6.1 Oily Water Treatment Plant Discharge Criteria 24
6.2 Mobile Oily Water Treatment System Discharge Criteria 25
6.3 Oily Water/Wastewater Treatment Process Description 25

7. Operations and Maintenance (O & M) 29

7.1 Potable Water Treatment System O & M Plan 29
7.2 Mobile Oily Water Treatment System O & M Plan 30
7.3 Oily Water Treatment Plant (for vehicle washwater) O & M Plan 31

8. Contingency Measures 34

9. Sampling, Monitoring, and Reporting 35

9.1 Potable Water System Monitoring 35
9.2 Sewage Treatment System Monitoring 35
9.3 Oily Water Treatment System Monitoring 36

10. Roles and Responsibilities 37

10.1 Organization Chart for Environment 37
10.2 Monitoring and Inspection 39
10.3 Training and Awareness 42
10.4 Communication 43
10.5 External Communications 43
10.6 Construction 43
10.7 Operation & Closure 44

List of Tables

Table 2-1: Applicable Regulations, Standards and Codes
Table 4-1: Estimated Fresh Water Demand
Table 5-1: STP Average Sewage Flow Design Basis
Table 5-2: Treated Sewage Proposed Discharge Limits
Table 5-3: Estimated Treated Effluent Generation and Discharge/Outfall Locations
Table 6-1: Oily Water Treatment Plant Proposed Discharge Limits
Table 6-2: Mobile Oily Water Treatment System Proposed Effluent Discharge Limits
Table 7-1: Recommended Maintenance Schedule- Potable Treatment Plants
Table 7-2: Maintenance Activities, Locations and Their Recommended Frequencies
Table 7-3: Monitoring Tasks, Locations and Frequencies

List of Figures

Figure 10.1: Organizational Chart

List of Appendices

Appendix A - Table of Concordance with NIRB Project Certificate

Appendix B - 2013 Work Plan and Site Layouts

Milne Port – Site Layout	H349000-2000-00-015-0002
Mine Site –Site Layout	H349000-4000-00-015-0002
Mine Site – Enhanced Layout	H349000-4000-00-015-0003

Appendix C - Water Balance Block Flow Diagrams

Milne Port – Water Balance Block Flow Diagram	H337697-7000-10-002-0001
Mine Site – Water Balance Block Flow Diagram	H337697-4210-10-002-0001
Steensby Port – Water Balance Block Flow Diagram	H337697-4510-10-002-0001
Mid Rail – Water Balance Block Flow Diagram	H337697-7000-10-002-0004
Ravn River – Water Balance Block Flow Diagram	H337697-7000-10-002-0003
Cockburn South – Water Balance Block Flow Diagram	H337697-7000-10-002-0006

Appendix D - Sample Sewage Treatment Plant Manual

Index of Major Changes / Modifications from Last Revision

Item No.	Description of Change	Relevant Section
1	The most recent version of the health, safety and environment policy has been added into this section.	3
2	Revised annual fresh water demand requirements to be in accordance with Type A Water Licence Proposed Terms and Conditions (Feb. 2013)	Table 4-1
3	Added 2013 fresh water work plan description for Milne Port	4.3.1
4	Added 2013 fresh water work plan description for Mine Site	4.3.2
5	Revised treated effluent discharge rates to be in accordance with future Type A Water Licence Proposed Terms and Conditions (February 2013). Also make reference to sewage handling for tote road camp.	Table 5-3
6	Added 2013 sewage treatment work plan description for Milne Port. Elaborated the description of off-spec effluent handling.	5.4.1
7	Added 2013 sewage treatment work plan description for Mine Site. Elaborated the description of off-spec effluent handling.	5.4.2
8	Modified to make reference to handling of off-spec treated effluent	5.4.6
9	Added definition of two types of oily water and oily water treatment performed at site. Fuel berm and maintenance facility oily water. Previously these were grouped into a single oily water category.	6
10	Revised treated oily water discharge limits to be in accordance with Type A Water Licence Proposed Terms and Conditions (Feb. 2013)	Table 6-1
11	Added this section to describe treatment limits for mobile oily water treatment system	6.2
12	Added 2013 oily water treatment work plan description for Milne Port. Elaborated the description of off-spec effluent handling.	6.3.1
13	Added 2013 oily water treatment work plan description for Mine Site. Elaborated the description of off-spec effluent handling.	6.3.2
14	Removed previous revision operating and maintenance manual sample for the sewage treatment plant. This has been replaced by a more project specific operating and maintenance manual in the appendices	7
15	Updated fresh water sample points to be consistent with the AEMP Framework (February 2013) and other documents.	9.1
16	Updated fresh water sampling frequency to align with existing applicable regulations and guidelines.	9.1
17	Updated treated sewage sampling frequency to be consistent with the AEMP Framework and other documents (February 2013).	9.2
18	Match sewage discharge criteria to AEMP Framework(Feb. 2013)	Table 5-2
19	Updated treated oily water sampling frequency to be consistent with the AEMP Framework (February 2013) and other documents.	9.3
20	Match treated oily water discharge criteria to AEMP Framework (February 2013) and other documents	Table 6-1
21	Added Appendix C to incorporate the water balance block flow diagrams directly into the document	Appendix C
22	A table of concordance added to identify how NIRB commitments have been addressed	Appendix A
23	Added more project specific sewage treatment maintenance and	Appendix D

	operation manual	
24	Added site layouts for Milne Port and Mine Site	Appendix B
25	Updated and simplified monitoring section to align with AEMP Framework (Febraury 2013)	9.0
26	Updated roles and responsibilities section and have added an organizational chart.	10.0

1. Introduction

This document describes the fresh water supply and wastewater management plan for the various camp sites to be developed for the Mary River Project during the construction and operation phases of the project. Specifically, this document focuses on freshwater supply and wastewater treatment and disposal at Milne Port, Mine Site, Steensby Port and various rail camps.

In accordance with Part B, Item 6 of Baffinland's Type B Water Licence No. 2BB-MRY1114 for the Mary River Project, an annual review of the project environmental management plans developed under the licence needs to be undertaken. The year 2013 is a regulatory transition year that will see the granting of a new Type B licence (likely early May) to allow for the site preparation that includes the construction of limited infrastructure prior to the anticipated receipt of the Type A Water Licence (likely late June or early July). In consideration of this, project environmental management plans have been updated to support the 2013 Work Plan (see Appendix B) which spans the applicability between the existing Type B Water Licence, proposed revised Type B Water Licence, as well as the incorporation of the proposed Type A Water Licence. It is recognized that there may be requirements to further update project environmental management plans based on the specific terms and conditions of approval of the proposed Type A Water Licence and QIA commercial lease once known.

The Fresh Water Supply, Sewage, and Wastewater Management Plan (the Plan) is an update to the plan presented in the FEIS (Appendix 3B, Attachment 5) and supplements the existing Wastewater Management Plan (Revision 3, dated March 2012). The existing March 2012 Wastewater Management Plan will continue to support the existing Sewage Treatment Plants (STPs) at the Mine Site and Milne Port which service existing exploration camps, while the new Plan will support the construction and commissioning of the new STPs for new camps at the Mine Site and Milne Port, as well as supporting potable water supply and oily water treatment activities under the anticipated Type A Water Licence.

2. Regulations, Standards, and Codes

As a minimum standard of acceptability, all actions undertaken will be compliant with appropriate sections of both Federal and Provincial legislation as indicated in the table below:

Table 2-1: Applicable Regulations, Standards and Codes

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

3. Sustainable Development Policy

Baffinland Iron Mines Corporation

1.0 SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation, we are committed to conducting all aspects of our business in accordance with the principles of sustainable corporate responsibility and always with the needs of future generations in mind. Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and to create authentic relationships. We expect each and every employee, contractor, and visitor to demonstrate a personal commitment to this policy through their actions. We will communicate the Sustainable Corporate Policy to the public, all employees and contractors and it will be reviewed and revised as necessary on an annual basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Investing in our Communities and People
4. Transparent Governance

2.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness from the very earliest of planning stages. Why? Because our people are our greatest asset. Nothing is as important as their health and safety.
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness. We allow our workers and contractors the right to stop any work if and when they see something that is not safe.

3.0 ENVIRONMENT

- We employ a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- We apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop pioneering new processes and more sustainable practices.
- We understand the importance of closure planning. We ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.

4.0 INVESTING IN OUR COMMUNITIES AND PEOPLE

- We respect human rights and the dignity of others. We honour and respect the unique culture, values and traditions of the Inuit people.
- We contribute to the social, cultural and economic development of sustainable communities adjacent to our operations.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

5.0 TRANSPARENT GOVERNANCE

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

Tom Paddon
President and Chief Executive Officer
September 2011

Baffinland
Iron Mines Corporation

Mary River Project
Health, Safety and Environment Policy

The Baffinland Iron Mines Corporation (BIMC) Mary River Project Health, Safety and Environment Policy 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 goal.

The Mary River Project implements 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 Environment 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.
- Rehabilitation of disturbed lands to a safe, acceptable, and localized state.

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

- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution is essential and required.
- Management is responsible 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 Mary River Project has no higher priority than the health and safety of all people working on our behalf and the responsible management of the environment. In ensuring our overall profitability and business success every Baffinland and business partner employee working at one of our work sites is required to adhere to this policy.

Tom Peddon
President and Chief Executive Officer
March 2013

4. Fresh Water

4.1 General Mitigation Measures for Water Use

4.1.1 Water Intakes

4.1.1.1 Engineering Intake Structures

Engineered intake structures will be designed to minimize erosion, avoid sediment issues, and provide protection from ice and peak water flow. Care will be taken to ensure that disturbance to aquatic environments is minimized during installation and maintenance of infrastructure. Rip rap used in construction will be clean, free of fine sediment, non-acid leaching, and non-metal generating.

4.1.1.2 Screens on Intake Pipes

All intakes will be screened in accordance with the Department of Fisheries and Oceans (DFO) Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO Guideline) to ensure no entrapment of fish. This guideline requires a 2.54 mm mesh size on the water intake pipeline to prevent entrainment of fish greater than 25 mm in length. It also requires a water withdrawal rate such that fish do not become impinged on the screen.

4.1.1.3 Selection of Short-Term Water Take Locations

Short-term water intake will be required at many locations for a variety of needs. This includes concrete manufacture, dust suppression, drill water, etc. A screening process will be used to confirm whether water sources are considered adequate as water take locations. Source selection begins by looking for the largest possible water body that is feasible for use. Lakes are considered first, followed by ponds and then large rivers. Streams and creeks will not be used for short term water take without prior approval of the Water Licence Inspector. The DFO guideline used for water take 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 (2) m of non-frozen water (as the top two (2) m of water contain the majority of oxygen for fish). During the open water season water taking guideline states that no significant drawdown can be caused. There must be no impact to fish or fish habitat.

4.1.2 Water Metering and Water Conservation Measures

Water meters are installed at strategic locations to monitor water consumption and enable the development of management strategies to reduce water usage/consumption. These strategies include the installation of low flow water taps, water use for drilling operation, etc.

4.2 Fresh Water Sources

The source of fresh water for the mine sites as well as approximate consumptions during the construction phase are estimated as follows:

Table 4-1: Estimated Fresh Water Demand*

Camp / Site	Intake	Coordinates (approximate)	Permit Limit (m3/yr)
Milne Inlet (Port)	Phillips Creek (summer) Km 32 Lake (winter)	N: 7964579 E: 521714 N: 7951862 E:514503	25,000
Mary River (Mine Site)	Camp Lake	N:7914695 E:557818	240,000
Steensby Port	Unnamed Lake (ST 347 Lake) (permanent camp) Unnamed Lake (3 km Lake) (dust suppression & other minor uses)	N: 7804826 E: 596600 N: 7800206 E: 596698	155,000
Ravn River Area	Unnamed Lake (Ravn Camp Lake)	N: 7895658 E: 594510	53,000
Mid-Rail Area	Unnamed Lake (Nivek Lake) (summer) Unnamed Lake (Ravn Camp Lake) (winter)	N: 7876430 E: 595602	29.000
Cockburn Lake Tunnels Camp	Cockburn Lake	N: 7833929 E: 603882	37,000
Cockburn South Camp	Cockburn Lake	N: 7820563 E: 597661	41,000

*Source**:** Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 2 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013).

Notes**:**

1. The table provides approximate coordinates for the water intake locations. Exact intake location shall be established **in** cooperation with the Inspector at time of installation.
2. Table will be updated based on specific terms and conditions outlined in future Type A Water Licence.

For remote fresh water requirements such as dust suppression, tunnelling, geotechnical and exploration drilling, some water may be drawn by truck from nearby lakes and ponds and used directly.

The dust suppressant will be DL-10. This is an asphalt based emulsion and as such some water will be consumed for the dilution of the solution. This is an approved dust suppressant as specified by the Nunavut Department of Sustainable Development Environmental Protection Service (Environmental Guideline for Dust Suppression).

For drilling/tunnelling activities a Calcium Chloride brine solution will be used.

4.3 Fresh Water System Process Description

The following sections describe the fresh water systems at the various sites.

Each site will also include a potable water treatment system which will produce drinking water for the personnel at the site during construction and operation phases. These systems will treat water to meet the Guidelines for Canadian Drinking Water Quality as well as the Ontario Drinking Water Quality Standards.

Minimum process equipment requirements will be 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 practice.

4.3.1 Milne Port

2013 Work Plan

A camp currently operates in Milne Port to support exploration activity at the Mine Site. During the summer of 2013 new equipment will begin to arrive onsite for use during the future construction and mining operation phase of the site. Throughout the remainder of 2013 the construction and operation phase facilities will need to be installed, commissioned and brought into service. The existing potable water facilities at Milne Port accommodate approximately 50 people. The number of personnel at site will gradually increase from this number. Current estimates of the work force are as follows:

- Pre-sealift period: 70 person
- Sealift period: 60 to 120 people
- Post sealift period: ramp up to ~ 150 person (full camp capacity)

During start-up and commissioning of the new potable water treatment plant personnel levels will remain below the existing potable water supply capacity at site. Potable supplies will be rationed as necessary during this period. Once the new facility is installed and operating in accordance with design criteria the existing facility will be decommissioned. A raw water truck will draw water from 32 km lake (in winter) and Phillips Creek (in summer) and deliver the water to a water storage tank near the camp. Milne Inlet Camp Layout including locations for potable water related infrastructure for the 2013 Work Plan is presented in Appendix B.

Future Construction and Operation Phase

During the construction phase the on-site population will be approximately 150 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The existing fresh water equipment will not be used. The fresh water demand for construction and operation are shown on the drawing Milne Inlet - Water Supply Balance Block Flow Diagram in Appendix A.

A heated and insulated pump house will be built with duty/standby pumps to deliver fresh water from Phillips Creek to a fresh water tank during summer. During winter fresh water from

32 Km lake will be trucked to the fresh water tank. Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and concrete manufacturing will be provided directly from nearby lakes and ponds by truck.

The potable water treatment scheme will consist 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.

4.3.2 Mary River Site

2013 Work Plan

A camp currently operates at the Mine Site to support exploration activity. For the existing system fresh water supply for the Mary River Camp was obtained using a diesel pump positioned adjacent to the shoreline of Camp Lake. Water was then pumped directly from the lake source to water storage tanks located at the camp. The system was originally designed for a camp population of 120 people.

During the summer of 2013 new equipment will begin to arrive onsite for use during the construction and mining operation phase of the site. Throughout the remainder of 2013 the construction and operation phase facilities will need to be be installed, commissioned and brought into service. The existing potable water facilities at the Mine Site accommodate approximately 120 people. The number of personnel at site will gradually increase from this number. The number of personnel at site will gradually increase from this number. Current estimates of the work force are as follows:

- Pre-sealift period: 8 to 12 persons
- Sealift period: ramp up to 250 persons
- Post sealift period: ramp up to 180 person

During start-up and commissioning of the new potable water treatment plant personnel levels will remain below the existing potable water supply capacity at site. Potable supplies will be rationed as necessary during this period. Once the new facility is installed and operating in accordance with design criteria the existing facility will be decommissioned. Mine Site Camp Layout including locations for potable water related infrastructure for the 2013 Work Plan is presented in Appendix B.

Future Construction and Operation Phase

During the construction phase the peak on-site population will be approximately 1000 people. This is in addition to the existing exploration camp which will continue to house up to 120 people. Two new potable water treatment systems will be installed to support the construction and operation phases. One of the potable water treatment systems will be for the construction phase only and will support a population of 500 people. The other potable system will be a permanent system to support the other 500 people during both construction and operation phases. The existing fresh water equipment will not be used for construction and a new fresh

water distribution system will be installed. The fresh water demand for future construction and operation are shown on the drawing Mine Site - Water Supply Balance Block Flow Diagram in Appendix A. Note that water demand in 2013 will be much lower than the flows anticipated for the future construction and operation phase.

A new heated and insulated pump house at Camp Lake will be built with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plants). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression, exploration drilling, quarry dust suppression, concrete and explosives manufacturing will be provided directly from nearby lakes using vacuum truck. Exploration drilling will continue throughout the construction phase.

The potable water treatment scheme will consist 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.

4.3.3 Steensby Port Site

During 2013, there are no construction activities planned for Steensby Inlet. During the future construction phase the on-site population will be approximately 600 people. Half the camp personnel will be accommodated on a barge which will be equipped with potable water treatment systems. The potable system onboard the barge will be a reverse osmosis based system. The full configuration will include coagulation, filtration by media filter, reverse osmosis and chemical disinfection. The remaining personnel will be accommodated by a land based potable water treatment system. This system will continue to operate during the operation phase while the barge based system will only be used during the construction phase.

The existing fresh water equipment will not be used and a new fresh water distribution system will be installed. The fresh water demand for construction and operation are shown on the drawing Steensby Site - Water Supply Balance Block Flow Diagram in Appendix A.

For the land based system, a heated and insulated pump house will be built at Lake ST347 with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression, stockpile dust suppression, concrete and explosives manufacturing will be provided directly from nearby lakes using vacuum truck.

The land based potable water treatment scheme will consist 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. The applicable guidelines specify minimum required levels of chlorine residual free chlorine. The vessel based potable water treatment scheme will include the same equipment as well as a membrane based system to desalinate the seawater source.

4.3.4 *Mid-Rail Site*

During 2013, there are no construction activities planned for the Mid-Rail Site. During the future construction phase the on-site population will be approximately 200 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Mid-Rail - Water Supply Balance Block Flow Diagram In Appendix A.

A heated and insulated pump house will be built at adjacent Unnamed Lake with duty/standby pumps to deliver fresh water to a fresh water tank during summer. During winter water will be trucked from Ravn Camp Lake to the fresh water tank. This tank will be located in close proximity to the new potable water treatment plant. Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by truck.

The potable water treatment scheme will consist 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. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

4.3.5 *Ravn River Site*

During 2013, there are no construction activities planned for the Mid-Rail Site. During the future construction phase the on-site population will be approximately 400 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Ravn River - Water Supply Balance Block Flow Diagram in Appendix A.

A heated and insulated pump house will be built at Ravn Camp Lake with duty/standby pumps to deliver fresh water to a fresh water tank (to be located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by truck.

The potable water treatment scheme will consist 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. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

4.3.6 *Cockburn Tunnels Camp Site (Cockburn North Camp)*

During 2013, there are no construction activities planned for the Cockburn Tunnels Camp Site. During the future construction phase the on-site population will be approximately 100 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for

construction and operation are shown on the drawing Cockburn Lake Tunnels Camp - Water Supply Balance Block Flow Diagram in Appendix A.

A heated and insulated pump house will be built at Cockburn Lake with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by truck.

The potable water treatment scheme will consist 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. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

4.3.7 Cockburn South Camp Site

During 2013, there are no construction activities planned for the Cockburn South Camp Site. During the future construction phase the on-site population will be approximately 400 people. A new potable water treatment system and fresh water distribution system will be put in place to support the construction phase operations. The fresh water demand for construction and operation are shown on the drawing Cockburn South - Water Supply Balance Block Flow Diagram in Appendix A.

A heated and insulated pump house will be built at Cockburn Lake with duty/standby pumps to deliver fresh water to a fresh water tank (located in close proximity to the new potable water treatment plant). Water from this tank will be used to provide fire water as well as meet the fresh water requirements of the site. A stand pipe within the tank will ensure that fire water is always available in the tank. Some fresh water requirements such as road dust suppression and tunnel drilling will be provided directly from nearby lakes by truck.

The potable water treatment scheme will consist 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. The applicable guidelines specify minimum required levels of chlorine residual free chlorine.

5. Sewage Treatment

5.1 Sewage Generation Rate

The estimated generation of sewage is based upon a per capita generation as shown below:

Table 5-1: STP Average Sewage Flow Design Basis

Parameter	Design Value	Source
Sewage Generation per Capita	360 L/person/day	Design Basis – Sewage Treatment Plant, Doc. No. H337697-4000-10-109-0002 (FEIS, Appendix 3B). Includes a 20% design allowance.

Note**:** The rate of sewage generation given above may be reduced after a review of possible re-use of some sewage for urinal flushing. Additional reductions may be achieved by water conservation.

5.2 Sewage Discharge Criteria

The quality of the sewage treatment plant effluent shall be in accordance with the applicable site discharge limits as listed in the following table:

Table 5-2: Treated Sewage Proposed Discharge Limits*

Parameter	Unit	Proposed Type A License Req.		Design - Mary River/ Construction Camps	Design - Milne Inlet/ Steensby Port
		Milne Inlet	Mary River		
BOD_5	mg/L	100	30	<10	<20
TSS	mg/L	120	35	<10	<20
Faecal Coliform	cfu/100 mL	<10,000 counts per 100 ml	<1000 counts per 100 ml	<200 counts per 100 ml	<200 counts per 100 ml
Oil and Grease*	mg/L	No visible sheen	No visible sheen	No visible sheen	No visible sheen
pH	---	Between 6.0 and 9.5	Between 6.0 and 9.5	Between 6.0 and 9.5	Between 6.0 and 9.5
Toxicity	---	Final effluent not acutely toxic	Final effluent not acutely toxic	Final effluent not acutely toxic	Final effluent not acutely toxic
Ammonia	mg/L NH3-N	N/A	4 avg.,8 max grab	<2	<2
Total Phosphorus	mg/L	N/A	4 avg., 8 max. grab	<0.1	N/A
Turbidity	NTU	N/A	N/A	<5	<5
Escherichia Coli	cfu/ 100 mL	N/A	N/A	<200 counts per 100 ml	<200 counts per 100 ml
Thermo - tolerant Coliforms	cfu /100 mL	N/A	N/A	<200 counts per 100 ml	<200 counts per 100 ml

*Source: Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 3 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013). Design limits source: Design Basis – Sewage Treatment Plant, Doc. No. H337697-4000-10-109-0002, FEIS, 2012.

Notes:

1) For the discharge to Sheardown Lake, the phosphorus discharge criteria shall be 1 mg/L average concentration and 2 mg/L maximum grab concentration.
2) The discharge limits presented in the table above will be revised, as needed, in accordance with the approved Type A Water Licence issued by the Nunavut Water Board.

5.3 Treated Wastewater Generation and Discharge/Outfall Locations

Treated sewage and wastewater for the mine sites will be discharged to the following locations:

Table 5-3: Approximate Treated Effluent Generation and Discharge/Outfall Locations*

Camp/Site	Discharge/Outfall Location		Coordinates	Annual Effluent (m^3/year)
	Summer	Winter		
Milne Port	Ocean at Milne Inlet		N: 7976482 E: 503211	25,000
Mine Site	Mary River	Storage Pond	Mary River: N:7912429 E:562962	322,000
	Sheardown Lake for existing camp (see notes)			13,140 m^3/year to Sheardown Lake
Tote Road Camp	Conveyed to Mine Site or Milne Port Sewage Treatment		N/A	N/A
Steensby (Port)	Ocean at Steensby Port		N: 7801412 E: 593378	233,000
Ravn River Area	Conveyed to Mine Site Sewage Treatment		N/A	N/A
Mid-Rail Area	Conveyed to Mine Site Sewage Treatment		N/A	N/A
Cockburn Tunnels Area	Conveyed to Steensby Sewage Treatment		N/A	N/A
Cockburn South Camp	Conveyed to Steensby Sewage Treatment		N/A	N/A

Source: Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 4 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013).

Notes:

1) The treated effluent generated at the Mine Site and Steensby Port includes the treated sewage from the rail camps which are trucked to these sites.
2) The sewage generated at the Mine Site from the existing 120-man camp will continue to be discharged to Sheardown Lake while sewage generated by the new sewage treatment systems will be discharged to Mary River (during summer) and a Storage Pond (during winter).
3) The treated effluent generated at Milne Port includes the treated sewage from the tote road camp which will either be treated at this site or at the Mine Site such that the total effluent discharge at either camp falls within the limits prescribed within the applicable water licence.
4) The site specific compliance locations proposed for the Project are presented in the Aquatic Effects Monitoring Framework , Schedule 4 (February 2013). The locations presented are end-of-pipe to final receiver.

5.4 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 originally a per capita sewage generation rate of 344L/person/day had been considered which is higher than the per capita potable water consumption rate (300L/person/day). This was to ensure that the sewage treatment systems would have a higher design allowance. For consistency 300L/person/day will now be used for both potable water consumption and sewage generation. A 20% design allowance is added to this requirement.

5.4.1 Milne Port

2013 Work Plan

A camp currently operates at Milne Port to support exploration activity. Currently sewage generated by the camp site is managed through an existing RBC type sewage treatment plant (Seprotech manufactured) that is operated under the existing Class B Water Licence and Wastewater Management Plan. Sludge is discharged to a dedicated waste pond. Treated effluent is stored in a small heated tank. The effluent is then withdrawn by a vacuum truck and if it meets discharge requirements it is discharged to the overland outfall which drains by gravity to the ocean. If the effluent doesn't meet the discharge requirements the vacuum truck delivers it to a local polishing/waste stabilization storage pond for additional treatment. During the winter, latrines are used and the waste collected is incinerated; any small quantities of grey water are collected in a greywater sump and allowed to infiltrate into the subsurface.

During the summer of 2013 new equipment will begin to arrive onsite for use during the construction and mining operation phase of the site. Throughout the remainder of 2013 the construction and operation phase facilities will need to be installed, commissioned and brought into service. . The site layout showing the location of camp, sewage treatment and ancillary facilities for the 2013 Work Plan is presented in Appendix B. The existing sewage treatment facilities at Milne Port accommodate approximately 50 people. The number of personnel at site will gradually increase from this number. Current estimates of the work force are as follows:

- Pre-sealift period: 70 person - operated under existing Type B Water Licence and current Wastewater Management Plan (March 2012).
- Sealift period: 60 to 120 people – operated under future Type A Water Licence
- Post sealift period to January 2014: ramp up to ~ 150 person (full camp capacity) – operated under future Type A Water Licence.

To accommodate the additional sewage waste generated a new sewage treatment system (using membrane based technology) will be installed adjacent and in parallel to the existing unit. This new unit will be designed to meet the project sewage effluent discharge limits. Once the new sewage plant is onsite, installation of the unit will begin. Vendor projections indicate that this can be completed within a week. Once installed commissioning of the system will begin. During start-up and commissioning of the new sewage treatment plant personnel levels will remain below the existing sewage plant treatment capacity at site. Water saving

measures will be implemented as necessary (such as reduced shower use) during this period.

Once the new system is ready a small portion of the camp wastewater will be directed through the unit. In addition biosolids from the existing RBC treatment system will be added into the new unit aeration tank to 'seed' the unit with biomass. Vendors have committed to meeting discharge criteria after a 2 week start-up period. During this period, effluent generated by the newly installed sewage plant will be directed to the existing or new Polishing Waste Stabilization Pond (PWSP). A new Type B Water Licence application was submitted (March 11, 2013) for the proposed construction of an additional PWSP, prior to unit start-up. The flow rate for the treatment unit will be steadily be increased until the unit is operating at full capacity.

Treated effluent will be stored in a treated effluent tank which will have a hydraulic retention of time of 8 hours (at minimum) based upon nominal flows. It is intended that the effluent tank will be at a low level during operation such that if sampling indicates that the effluent quality does not meet the applicable criteria further discharge can be delayed to allow this effluent to be mixed, retreated, and retested. Once sampling indicates that effluent is meeting discharge criteria the treated sewage stream will be directed to discharge via truck or pipeline to the ocean discharge. Off-spec effluent remaining in the pond will be removed by vacuum truck and fed into the new sewage plant feed tank for re-processing or treated by means of a pond treatment system that is described and approved in the existing Wastewater Management Plan under the existing Type B Water Licence.

In the event that there is an outage that causes the sewage treatment plant to be completely inoperable raw sewage will be temporarily trucked to local existing polishing waste stabilization ponds until the sewage plant is operating again. At that time untreated raw sewage from the polishing ponds will be trucked back to the treatment plant for treatment.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary. The incinerator design will consider the solids content of the sludge from the dewatering device.

Future Construction and Operation Phase

The requirements for future construction and operations for the existing approved Project will be similar to the requirements under the 2013 Work Plan with respect to sewage treatment requirements. Therefore, it is anticipated that the sewage treatment system basis as described above will be applicable for future construction and operations requirements.

5.4.2 Mary River Site

2013 Work Plan

A camp currently operates at the Mine Site to support exploration activity. Currently the mine site has a functioning RBC based sewage treatment system designed to accommodate 120

people. The RBC and ancillary facilities (three PWSPs and discharge pipeline) operate under the existing Type B Water Licence and Wastewater Management Plan (March 2012). As such, the existing equipment will continue to be used during the 2013 period under the existing and approved Type B Water Licence. It is anticipated that there will be year round operations of the existing exploration camp and RBC during 2013 to 2014, with the camp and sewage treatment system operating seasonally, thereafter. Sludge is currently vacuumed from the existing RBC unit periodically and allowed to settle in Polishing Waste Stabilization Ponds (PWSP) No. 1; the supernatant from these ponds is tested, mixed, then reprocessed / discharged to Sheardown Lake. Once a new Type A Water Licence is issued, the sewage treatment plant and ancillary facilities at the existing Mine Site Exploration Camp will migrate to the Type A.

During the summer of 2013, new equipment will begin to arrive onsite for use during the early construction phase of the Project. Throughout the remainder of 2013 the early construction phase facilities will need to be installed, commissioned and brought into service. The site layout showing the location of camp, sewage treatment and ancillary facilities for the 2013 Work Plan is presented in Appendix B. The existing sewage treatment facilities at the Mine Site accommodate approximately 120 people. The number of personnel at site will gradually increase from this number. Current estimates of the work force are as follows:

- Pre-sealift period: Up to 120 persons- operated under existing Type B Water Licence and current Wastewater Management Plan (March 2012).
- Sealift period: Up to 150 persons – operated under future Type A Water Licence.
- Post sealift period to January 2014: ramp up to 180 person) – operated under future Type A Water Licence.

Once the new sewage plant is onsite, installation of the unit will begin. Vendor projections indicate that this can be completed within a week. Once installed commissioning of the system will begin under the new Type A water licence. During start-up and commissioning of the new sewage treatment plant personnel levels will remain below the existing sewage plant treatment capacity at site. Water saving measures will be implemented as necessary (such as reduced shower use) during this period.

Once the new system is ready a small portion of the camp wastewater will be directed through the unit. In addition biosolids from the existing RBC treatment system will be added into the new unit aeration tank to ‘seed’ the unit with biomass. Vendors have committed to meeting discharge criteria after a 2 week start-up period. During this period, effluent generated by the newly installed sewage plant will be directed to a PWSP (one of the existing PWSPs or a newly constructed PWSP). The flow rate to the unit will then steadily be increased until the unit is operating at full capacity. Off-spec effluent remaining in the pond will be removed by vacuum truck and fed into the new sewage plant feed tank for re-processing or treated at the PWSP using established methods currently used for the Exploration Camp.

Once sampling indicates that effluent is meeting discharge criteria, then normal operations can be undertaken. The treated sewage stream will be directed to discharge via truck or pipeline to Mary River during the open water season and to a treated effluent storage pond during the October to June period. In the early summer of each year the treated effluent storage pond will be discharged to Mary River over a two to three week period, typically in early to late June.

Sludge generated by the new treatment plant will be dewatered mechanically using a filter press and then incinerated.

Future Construction and Operation Phase

For the future construction and operation phase, the existing RBC for the exploration camp will operate on a seasonal basis with sludge and effluent discharged as described above. The camp population will increase during future construction to a maximum size of 1000 people. This is in addition to the existing exploration camp which will house up to 120 people. The new sewage treatment plants will be designed to process raw or partially treated sewage from Ravn and Mid-Rail camps which will be conveyed to the Mary River permanent sewage treatment facility usually by truck.

Similar to early construction, treated sewage effluent will be stored in a treated effluent tank. The effluent tank will have a hydraulic retention of time of 8 hours (at minimum) based upon nominal flows.

It is intended that the effluent tank will be at a low level during operation such that if sampling indicates that the effluent quality does not meet the applicable criteria further discharge can be prevented to allow this effluent to be mixed, retreated, and retested.

Treated effluent will be discharged to Mary River during summer and stored in a storage pond during winter. Prior to discharge of stored sewage from the winter period the regional compliance officer will be notified.

The equalization tank that feeds the new sewage treatment plants will be sized to accommodate the sewage from the rail camps. The rail camp sewage will be added during periods of low sewage generation at the mine site in order to reduce excessive surge volumes building up in the tank.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge cake will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary. The incinerator design will consider the solids content of the sludge from the dewatering device.

Off-spec treated sewage will be sent to the winter storage pond temporarily. The quality of the treated sewage in the pond will be given an opportunity to improve as new treated effluent enters the pond and mixes in with the treated effluent already in the pond. If this blended water meets discharge criteria it shall be discharged. If not, a vacuum truck will remove the

effluent and allow it to be re-treated through the sewage treatment plant. In the event that there is an outage that causes the sewage treatment plant to be completely inoperable raw sewage will be temporarily trucked to local existing polishing waste stabilization ponds until the sewage plant is operating again. At that time untreated raw sewage from the polishing ponds will be trucked back to the treatment plant for treatment.

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5.4.3 Steensby Site

During the construction and operation phase the camp population will increase to approximately 600 people. There is no planned construction at Steensby Site during 2013.

During construction start-up, sewage generated by the workforce will be treated in an existing sewage treatment plant that is on-site but not yet installed. During the construction phase 300 people will be accommodated by a temporary sewage treatment system in place for the construction period. In addition, the temporary sewage treatment plant will be designed to process raw or partially treated sewage from the Cockburn lake rail camps which will be conveyed to the Steensby temporary sewage treatment facility by truck. The remaining workforce will be accommodated by a permanent sewage treatment system which will remain in service during the operation phase.

These sewage treatment plants will be housed in a temperature controlled areas and as such their performance will not be negatively impacted by arctic conditions.

Effluent from the sewage treatment plants will be stored in effluent tanks. The effluent tanks will have a hydraulic retention time of two days (at minimum) based upon nominal flows. It is intended that the effluent tank will be at a low level during operation such that if sampling indicates that the effluent quality does not meet the applicable criteria further discharge can be prevented for a period in excess of a day to allow this effluent to be mixed, retreated, and retested. In addition this retention volume will allow for a minimal amount of recirculation through the STP using any spare STP capacity. This will improve the quality of the effluent in the tank. The volume is sufficient to allow for periodic sampling and testing of the treated effluent before discharge or reuse. The new permanent sewage treatment facility will be RBC based technology or superior. Treated effluent will be discharged to the ocean.

The equalization tank that feeds the temporary sewage treatment plant will be sized to accommodate the sewage from the Cockburn Lake and Cockburn South rail camps. The rail camp sewage will be added during periods of low sewage generation at Steensby in order to reduce excessive surge volumes building up in the tank.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge cake will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary. The incinerator design will consider the solids content of the sludge from the dewatering device.

The equalization tank that feeds the new sewage treatment plant will be sized to accommodate the sewage from the Cockburn Lake and Cockburn South rail camps. The rail camp sewage will be added during periods of low sewage generation at Steensby in order to reduce excessive surge volumes building up in the tank.

The sludge generated will be dewatered using a mechanical dewatering device such as belt filter or filter press and then incinerated. Sludge cake will be stored in an animal proof secure area. Odour generation will be limited because the sludge will be aerobically digested, dewatered and incinerated regularly such that the sewage cake is not stored for significant periods. Odour control carbon vents will be installed where deemed necessary.

5.4.4 Mid-Rail and Ravn River Sites

Sewage generated at these sites will be conveyed to the Mary River permanent sewage treatment facility by truck. During the first year when there will only be access to the camp via an ice road, sewage can only be trucked from January to April. During the remaining months the sewage will be stored. There would be an opportunity to partially or fully treat sewage prior to storage. Sewage storage facilities may be aerated to prevent the waste becoming septic (generating odours and noxious gases). Sludge will form and settle in the facility depending on how long the sewage resides there. This sludge will be withdrawn and delivered separately to the dewatering system at the mine site. Given the quantity of waste to be moved or stored every effort will be made to reduce this volume by using low flow showers and toilets and potentially segregating gray water to be treated and reused as urinal flush water. Other potential waste minimization techniques will also be reviewed. These will be evaluated during the detailed design. In addition the surrounding water bodies will be modelled and sampled to potentially support having sewage treatment and waste discharge near the camp sites. An amendment to the Type A Water Licence would be required to support this option.

The equalization tank at Mary River will be sized to provide sufficient residence time for freshly added sewage from the Mid-Rail or Ravn River to mix with sewage generated at the Mine Site. Given that sewage generation follows diurnal patterns the sewage from the remote sites will be added during the low generation periods at the mine site.

5.4.5 Cockburn Tunnels (Cockburn North) and Cockburn South Sites

Sewage generated at these sites will be conveyed to the Steensby permanent sewage treatment facility by truck. Raw to partially treated sewage will be conveyed to Steensby Inlet by means of established roads along the rail alignment or by ice road. Depending on the volume of sewage to be stored at site, the sewage storage facilities will be sized accordingly. At the north camp there will only be access to the camp via an ice road and as such sewage can only be trucked from January to April. During the remaining months the sewage will be stored. Sewage storage facilities will be aerated to prevent the waste becoming septic (generating odours and noxious gases). There will be the opportunity to partially or fully treat sewage prior to storage. Sludge will form and settle in the facility depending on how long the sewage resides there. This sludge will be withdrawn and delivered separately to the dewatering system at the Steensby site. Given the quantity of waste to be moved every effort will be made to reduce this volume by using low flow showers and toilets and potentially

segregating gray water to be treated and reused as urinal flush water. Other potential waste minimization techniques will also be reviewed. These will be evaluated during the detailed design. In addition the surrounding water bodies will be modelled and sampled to potentially support having sewage treatment and waste discharge near the camp sites. An amendment to the Type A Water Licence would be required to support this option.

The equalization tank at Steensby will be sized to provide sufficient residence time for freshly added sewage from the Cockburn Tunnels (Cockburn North) and Cockburn South camps to mix with sewage generated at the Steensby site. Given that sewage generation follows diurnal patterns the sewage from the remote sites will be added during the low generation periods at the Steensby site.

5.4.6 Design Considerations from 'Lessons Learned'

Previous studies had recommended the use of Polishing Waste Stabilization Ponds (i.e. Mary River Project Appendix 10D-3 Wastewater Management Plan SD-EMMP-003, March 31, 2010) followed by a secondary waste polishing system. The existing infrastructure at the Mary River (mine site) and Milne sites includes these ponds in part to allow for secondary treatment of the sewage treatment plant (STP) effluent which was not meeting the phosphorus discharge limit. However, based upon practical experience at the site with the STP it was projected that a secondary polishing system will not be required in the future.

The new systems will be installed with temporary storage ponds for off-spec water but will not require secondary polishing for the following reasons:

- The proposed new STPs will be based on membrane technology. This technology produces better quality effluent, is less susceptible to the impact of varying loads and have shorter start-up periods.
- The STP trains will be better able to handle upsets by using the available spare capacity to operate the equipment at more conservative flow rates.
- The existing equipment (at the Mine Site) was designed to meet a phosphorus discharge criteria of 0.5 mg/L. The new STPs shall be designed to meet a much lower phosphorus discharge criteria of <0.1 mg/L.

Sewage Treatment equipment vendors will be assessed based upon their experience producing equipment for arctic environments.

6. Oily Water/Wastewater Treatment

There are two sources of potentially oily water that have been identified at Milne Port and the Mine site. There is the waste vehicle washwater generated at the vehicle maintenance facilities and then there is water that collects within the fuel berms at the sites. Based on the different nature of these two wastewater sources, distinct discharge criteria (and treatment plans) have been developed for each. The Type A Water Licence Proposed Terms and Conditions (February 2013) identifies these two sources using the following terms:

- Oily Water Treatment Plant – refers to vehicle maintenance facility washwater
- Mobile Oily Water Treatment System – refers to treatment system for fuel berm water

6.1 Oily Water Treatment Plant Discharge Criteria

Limits have been proposed to the Nunavut Water Board for the quality of the oily water treatment plant effluent. A summary is provided below:

Table 6-1: Oily Water Treatment Plant Proposed Discharge Limits*

Parameter	Discharge Limits
pH	6 – 9.5
TSS	35
Ammonia	4 mg/L average concentration; 8 mg/L max. grab concentration
Phosphorous	4 mg/L average concentration; 8 mg/L max. grab concentration
Benzene	0.370 mg/L
Ethylbenzene	0.090 mg/L
Toluene	0.002 mg/L
Oil and Grease	15 mg/L and no visible sheen
Arsenic	0.5 mg/L
Copper	0.30 mg/L
Lead	0.20 mg/L
Nickel	0.50 mg/L
Zinc	0.50 mg/L

*Source: Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 3 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013).
Note: The discharge limits presented in the table above will be revised, as needed, in accordance with the approved Type A Water Licence issued by the Nunavut Water Board. The discharge locations proposed for the Project are presented in the Aquatic Effects Monitoring Framework , Schedule 4 (February 2013).

6.2 Mobile Oily Water Treatment System Discharge Criteria

Limits have been proposed to the Nunavut Water Board for the quality of the mobile oily water treatment system effluent. A summary is provided below:

Table 6-2: Mobile Oily Water Treatment System Proposed Effluent Discharge Limits*

Parameter	Maximum Average Concentration (mg/L)
Benzene	0.370
Toluene	0.002
Ethyl benzene	0.090
Lead	0.001
Oil and Grease	15 and no visible sheen

*Source: Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 3 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013).
Note: The discharge limits presented in the table above will be revised, as needed, in accordance with the approved Type A Water Licence issued by the Nunavut Water Board. The discharge locations proposed for the Project are presented in the Aquatic Effects Monitoring Framework , Schedule 4 (February 2013).

6.3 Oily Water/Wastewater Treatment Process Description

The process description for both oily water/wastewater treatment systems at each site are described in the sections that follow.

6.3.1 Milne Port

2013 Work Plan

There currently exists an oily water treatment system to treat highly impacted run-off from the fuel tank (bladder) farm at Milne Port. This system will be operational during 2013 and will be available to treat oily water generated throughout the site which can be transferred by vacuum truck. A separate mobile trailer based oily water treatment system will also be brought on-site to handle minor oily water contamination. This system will be ideal for treating minor contamination expected to be present in stormwater within the steel fuel tank containment berms. A maintenance facility will be constructed in 2013 that has an oily water treatment plant to treat contaminated wash water from routine operations. Site layouts showing the locations of the maintenance facility and fuel containment/other berm expansions are presented in Appendix B. The existing bulk fuel bladder farm will be decommissioned during 2013 and 2014. The treatment system that services this facility will not likely be needed for normal operations after that time, but if the need arises, can be re-commissioned for that purpose.

Future Construction and Operation Phase

The oily water generated from the expanded tank farm will be collected in a sump located at the tank farm. The water will then be treated directly by the mobile trailer based oily water treatment system.

The vehicle maintenance and wash facility will have a sump located in close proximity to the maintenance facilities. Wash water produced in the maintenance facility (truck washing, equipment and floor washdown) will flow by gravity and be collected in the local sump. Suspended material in the wastewater will settle in the sump. Free oil in the wastewater will be removed by an oil/water separator system in order to meet the required oil discharge limits. The waste will then be further treated in the oily water treatment plant by activated carbon and clay to meet other specific parameters. The effluent will then be pH adjusted, if required, to meet discharge criteria.

Some small amounts of propylene glycol will be used for de-icing of aircraft. The spent propylene glycol will be collected, stored in containers and sent by ship off-site to a licensed treatment/disposal facility. Some interim treatment of the spent propylene glycol may occur to reduce the overall waste volume generated. This will be evaluated during the detailed design. Treated oily water will be blended with treated sewage and discharged or discharged directly based on sampling.

6.3.2 Mary River and Steensby Sites

2013 Work Plan

During 2013 potentially oily water generated throughout the site during 2013 will be treated using a mobile trailer based oily water treatment system to handle any spills. Treated oily water will be blended with treated sewage and discharged or discharged directly based on sampling.

Future Construction and Operation Phase

Oily water may be generated from the following sources (this neglects minor oily water generated from accidental spills which will be handled by the spill management plan):

- Vehicle maintenance and wash facilities (i.e. truck wash, equipment and floor wash down water).
- Fuel tank farm run-off.
- Emulsion plant wash water.
- Freight dock.
- Airstrip.

The vehicle maintenance and wash facility will have a sump located in close proximity to the maintenance facilities. Wash water produced in the maintenance facility (truck washing, equipment and floor washdown) will flow by gravity and be collected in the local sump. Suspended material in the wastewater will settle in the sump. Free oil in the wastewater will be removed by an oil/water separator system in order to meet the required oil discharge limits. The waste will then be further treated in the oily water treatment plant by activated

carbon and clay to meet other specific parameters. The effluent will then be pH adjusted, if required, to meet discharge criteria.

Treated effluent from the oily water treatment plant will be pumped to discharge, or recycled and reused as washdown water at the maintenance shops. The separated waste oil will be stored in a local tank. Periodically, the oil will be drained and reused if possible or incinerated. Accumulated suspended solids will be periodically removed by bucket loader vehicle and sent to a land fill for disposal.

Run-off from the tank fuel storage areas will have to be treated by a local oily water separator system that will be used as needed. The resulting water will be discharged directly to the receiving body (Mine Site - Mary River, Steensby – Ocean). The water will be periodically tested such that if any parameter is out of compliance the water will be removed by vacuum truck and treated in the vehicle maintenance shop wastewater treatment plant.

Run-off water from the freight dock will be collected and treated in a manner similar to the treatment scheme for the run-off from the tank fuel storage areas.

The emulsion plant shall be supplied with its own wastewater treatment plant which utilizes an evaporation system to evaporate the water leaving solid residue and oil. This residue will be tested for toxicity and if necessary taken off-site for disposal in a licensed facility otherwise the waste will be land filled.

Run-off water from the air strip run-off also has the potential for some oily water content. As such, this water will be collected through a drainage system and transported as needed by vacuum truck to the vehicle maintenance shop wastewater treatment plant.

Small amounts of propylene glycol will be used for de-icing of aircraft. The spent propylene glycol will be collected, stored in containers and sent by ship off-site to a licensed treatment/disposal facility. Some interim treatment of the spent propylene glycol may occur to reduce the overall waste volume generated. This will be evaluated during the detailed design.

Some dust suppression solution will be applied to roads at both Mary River and Steensby sites. The suppressant will be DL-10. This is an asphalt based emulsion and as such some water will be consumed for the dilution of the solution. This is an approved dust suppressant as specified by the Nunavut Department of Sustainable Development Environmental Protection Service (Environmental Guideline for Dust Suppression).

In addition some Calcium Chloride solution will be used for drilling activities. The spent brine will be applied to nearby roads as a dust suppressant. This is an approved dust suppressant as specified by the Nunavut Environmental Protection Service. Treated oily water will be blended with treated sewage and discharged or discharged directly based on sampling.

6.3.3 Rail Camps

Two tunnels are to be built along the railway and a small amount of water will be consumed in the tunnelling operation. Calcium Chloride brine solution is used for tunnelling. This waste brine generated during the tunnelling will be collected and disposed of as per the Waste

Management Plan for Construction, Operation and Closure. In addition some Calcium Chloride solution will be used for drilling activities.

7. Operations and Maintenance (O & M)

Sample plans for the operation and maintenance of the proposed treatment systems are given below. These plans were provided by vendors of potable and oily water treatment systems. A sample sewage treatment operation and maintenance manual is provided in Appendix C. Project specific O & M plans will be provided once equipment vendors have been selected.

7.1 Potable Water Treatment System O & M Plan

7.1.1 Regular Maintenance Schedule

The system will be designed for fully automatic operation, and only requires limited supervision and regular maintenance.

The following recommended maintenance schedule is subject to regulations from local government, and instructions from original equipment manufacturers.

The recommended maintenance schedule is common for all potable treatment plants.

Table 7-1: Recommended Maintenance Schedule- Potable Treatment Plants

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

7.1.2 Monitoring Plan

The monitoring plan is subject to local regulations of drinking water and other related codes. The following instruments will be provided to monitor the operation and performance of system.

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

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

Raw water and treated water storage/distribution system will be monitored by systems from others.

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

7.2 Mobile Oily Water Treatment System O & M Plan

7.2.1 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 all components are in good working order. Spare parts lists will be included with the Operations and Maintenance Manuals, with critical spare parts and system expendables highlighted. Recommended stock quantities will also be given.

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. It is further recommended that a flow totalizer 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 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.

7.2.2 Influent Pump

When starting up influent pump make sure all valves are open to allow the process to flow. The influent pump is a gas powered pump. The start up procedure for the pump is:

- Make sure there is oil and gas in each of the tanks.
- Turn the gas switch on.
- Turn the on switch on.
- If the pump has not been running for an extended period of time make sure the choke is on.
- If it has been running for an extended period of time the choke does not have to be on.
- Make sure the throttle in on a low setting.
- Pull the ignition cord until the pump starts.
- Increase the throttle to your desired throughput.

7.2.3 *Particle Filter*

The maximum pressure across the particle filter can be 14 psig. This would indicate that the particle filter has become plugged and must be changed. The bag and spaghetti media are to be changed out once a month during operation.

7.2.4 *Clay Absorption Media Filter*

The media will be changed depending on the differential pressure across the housing. When handling the material a repertory mask must be worn due to inhalation of the silica dust. The MSDS for the material should be reviewed before handling this material.

7.2.5 *MyCelx Filtration System*

The MyCelx filtration system has three polymeric surfactant vessels. The first two vessels operate at 30 and 28 psig respectively. The pressure across the third vessel can decline to as low as 2 psig. At this point the filter cartridges have to be changed.

7.2.6 *Granular Activated Carbon (GAC)*

The frequency of GAC change out is to be determined by testing the internal and external TOG after the first GAC train. When an indication that the GAC was not removing enough TOG, the media would be changed.

A joint maintenance/monitoring log should be kept to ensure all operational data and changes/responses are properly documented.

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

7.3 Oily Water Treatment Plant (for vehicle washwater) O & M Plan

7.3.1 *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 all components are in good working order. Spare parts lists will be included with the Operations and Maintenance Manuals, with critical spare parts and system expendables highlighted. Recommended stock quantities will also 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 below.

Table 7-2: Maintenance Activities, Locations and Their Recommended Frequencies

Maintenance Task	Location	Frequency
Sludge Removal	Primary clarifier	Twice/week
Oil Removal	Waste oil storage	Weekly
De-emulsifier chemical refill (if applicable)	Chemical room	TBD
Sulfuric acid chemical refill (if applicable)	Chemical room	TBD
Alum chemical refill	Chemical room	TBD
Sodium hydroxide chemical refill	Chemical room	TBD
Polymer chemical refill	Chemical room	TBD
Clay chemical refill	Chemical room	TBD
Filter Bag change-out	Media room	Daily
Organoclay change-out	Media room	Every two month
Carbon change-out (both)	Media room	Every two month
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. It is further recommended that a flow totalizer 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 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 the table below. The prefix, GI, in the task column denotes “General Inspection”.

Table 7-3: Monitoring Tasks, Locations and Frequencies

Monitoring Task	Location	Frequency
GI – Clarifier (levels, appearance, pump operation)	Primary clarifier	Daily
Sample – Clarifier	Primary clarifier	Quarterly/Monthly
GI – OWS (levels, appearance, dosing pump)	OWS room	Daily
Sample – OWS Inlet	OWS room	Quarterly/Monthly
GI – Chemical Treatment (tanks, totes, levels, appearance, mixers, dosing pumps, effluent pump, pressures)	Chemical room and Lamella plate clarifier room	Daily
Sample – Chemical treatment inlet	Tank 1 – Lamella plate clarifier room	Quarterly/Monthly
Sample – Chemical treatment effluent	Pump outlet – Lamella plate clarifier room	Quarterly/Monthly
GI – Bag Filtration (units, pressures)	Media room	Daily
GI – Media Vessels (units, pressures, backwash pump, treated water storage)	Media room	Daily
Sample – Organoclay effluent	Media room – post organoclay	Quarterly/Monthly
Sample – Primary carbon effluent	Media room – post Primary carbon	Quarterly/Monthly
Sample – Effluent water	Media room – effluent water storage tank	Quarterly/Monthly
GI – Miscellaneous (vertical heaters, air compressors, air dryers, controls)	Various	Daily

A joint maintenance/monitoring log should be kept to ensure all operational data and changes/responses are properly documented.

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

8. Contingency Measures

Design criteria for the potable, sewage and oily water treatment systems have been reviewed and revised to provide additional safety factor.

The sewage treatment systems will be located sufficiently remote from surface water bodies. The sewage treatment systems will be fully enclosed units. In the event of a spill of untreated or partially treated sewage from these facilities, Baffinland will follow the procedures in its spill response plan. Sewage spills are treated the same as more immediately hazardous hydrocarbon based spills.

9. Sampling, Monitoring, and Reporting

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

- Regular sampling of sewage and wastewater discharge in accordance with water licence requirements.
- More frequent internal process sampling (minimum once per week) and monitoring (daily) to identify potential upset conditions early that could lead to non-compliance.
- Record of volumes of sewage and wastewater effluent discharged and sludge generated in accordance with water licence requirements.
- Completion of daily checklists related to the O & M requirements for the facilities and the reporting of any upset conditions that require action.
- Aquatic effects monitoring program to confirm/validate environmental predictions.

The monitoring program will identify upset conditions related to the sewage treatment plants which will be immediately reported to the Camp Manager for corrective action.

9.1 Potable Water System Monitoring

Untreated Fresh water will be sampled at the locations specified in Table 4.1, or in accordance to final established potable water take locations. Treated potable water will be sampled from the potable treatment plant effluent.

Samples shall be collected at every active water take location for select analyses at frequencies specified in in applicable regulations/guidelines. A typical list of parameters to be tested includes the following:

> Calcium, Magnesium, Sodium, Potassium, Aluminum, Arsenic, Boron, Barium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Vanadium, Zinc, Tin, pH, Conductivity, Alkalinity as CaCO3, TDS (COND-CALC), TSS (total suspended solids), Turbidity, Phenols, N-NH3, SO4, Cl, Br,N-NO2, N-NO3, NO2 + NO3 as N, Mercury, Hardness as CaCO3, COD (chemical oxygen demand), Oil and Grease

A comparison of the sampling results to the the Guidelines For Canadian Drinking Water Quality (GCDWQ) will be completed.

9.2 Sewage Treatment System Monitoring

Treated sewage effluent will be monitored and sampled at proposed locations specified in the Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 4 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013). The proposed effluent discharge criteria was summarized in Table 5.2. The final monitoring locations, frequencies, schedule of analyses and effluent criteria will be in accordance with the future Type A Water Licence issued by the Nunavut Water Board.

9.3 Oily Water Treatment System Monitoring

Treated oily water effluent will be monitored and sampled at proposed locations specified in the Type A Water Licence Application (FEIS, Appendix 3D, 2012), Aquatic Effects Monitoring Framework, Schedule 4 (February 2013), and Draft Water Licence Terms and Conditions submitted for consideration to the NWB (February 2013). The proposed effluent discharge criteria was summarized in Table 5.2. The final monitoring locations, frequencies, schedule of analyses and effluent criteria will be in accordance with the future Type A Water Licence issued by the Nunavut Water Board.

10. Roles and Responsibilities

10.1 Organization Chart for Environment

The Baffinland environmental team is organised into two parts, on site as well as off site. The organisational structure for the Mary River Project in relation to the environment discipline, is shown in Figure 10.1 below. Communication channels are described as liaisons in the tables outlining the responsibilities and accountabilities in the following sections.

10.1.1 The Baffinland Environmental Team

The Baffinland Environmental Team will oversee all environmental and community works on and off site. The Baffinland Corporate Environmental Team responsibilities are summarized in

Table 10-1.

The Baffinland Environmental Team will oversee all environmental activities on site. These responsibilities on site are outlined in Table 10-2.

10.1.2 Construction Contractor's Environmental Team

The Construction Contractor will have their own organisational structure which is yet to be defined, but at a minimum the responsibilities for the environmental portion are summarized in

Table 10-3.

10.2 Monitoring and Inspection

The monitoring and inspection requirements are described in Sections 8 and 9 of this Plan. Responsibilities have been assigned to various personnel on the Project team. Where required, third party resources will be retained to supplement in-house resources and capabilities.

Table 10-1: Baffinland Iron Mines Corporation Senior Management

Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
Project Director	- Reports to Baffinland's CEO - Overall accountability for the Project execution - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Construction of the Project - Accountable for on-site environmental, health and safety performance during construction of the Project
VP Operations	- Reports to Baffinland's CEO - Overall accountability for the Operation of the Project once constructed - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Operation - Accountable for on-site environmental, health and safety performance during Operation
VP Sustainable Development, Health, Safety and Environment	- Reports to Baffinland's CEO - Establish corporate environmental policies and objectives - Monitors and reports on Baffinland's performance related to environmental, health and safety policies and objectives - Community liaison - Liaise with regulatory authorities - Obtains necessary permits and authorizations - Monitors compliance with terms and conditions of permits and licences - Routine EHS audit of contractor performance while on site
Manager Purchasing and Contract	- Reports to Baffinland's Project Director - Accountable for procurement and purchasing - Ensure that environmental commitments, policies and objectives are included in all contract documents
VP Corporate Affairs	- Reports to Baffinland's CEO - Accountable for external communication (Governments, media, NGO, others) related to Baffinland's press release and overall communication of site incidents/events

Table 10-2: Baffinland Iron Mines Corporation On-Site Management Team

Baffinland Iron Mines Corporation On-Site Management Team	
Position	**Responsibilities and Accountabilities**
Construction Manager	- Reports to the Project Director - Responsible for daily on-site management of construction activities - Accountable to the Project director for site environmental, health and safety performance - Organize and provides necessary induction, safety and environmental training for all employees - Ensure that all contractors on-site abide by Baffinland's policies, EHS commitments
Environmental Manager	- Reports to VP Sustainable Development, Health, Safety and Environment - Liaises with the Project Director, Construction Manager and the Emergency Response Team - Monitors environmental performance of contractors on site - Monitors compliance with permits, licences and authorizations - Regulatory environmental monitoring and reporting (monthly, annual) - Routine audit of contractor's environmental performance on-site - Initiate/supervise environmental studies - Investigate and reports on accidents and incidents when they occur - Review and update environmental management plans
Environmental Supervisor (s)	- Reports to Environmental Manager - Specific accountabilities for environmental monitoring and reporting - Provides induction and environmental awareness training to new employees and contract workers
Environmental Support Groups	- Reports to the Environmental Manager - Environmental database management - Various sampling, monitoring and reporting activities as required by permits, licences and environmental management plans - Prepare updates to environmental protection plan and management plans
Environmental Monitors	- Reports to the Environmental Manager - Conduct monitoring activities as per the management plans
QIA Monitors	- Various monitoring and follow up activities - Roles will be defined in the IIBA agreement

Table 10-3: Construction Contractor(s)

Construction Contractor(s)	
Position	**Responsibilities and Accountabilities**
Construction Manager	- Reports to the Baffinland's Construction Manager - Accountable for the EHS components of his scope of work - Accountable for implementation of the Construction Environmental Protection Plan - Co-ordination/interaction with Baffinland and Baffinland's Representative Environmental Monitors.
EHS Superviser	- Reports to the Contractor's Construction Environmental Manager - Liaise with Baffinland's Environmental Supervisors and monitors. - Holds daily EHS briefing - Monitors and ensures that Contractor complies with requirements of management plans, terms and conditions of all authorization, licences and permits associated with the Contractor's scope of work - Investigate, reports and follow up on environmental accidents and incident - Provides site specific environmental monitoring - Daily supervision of construction activities for environmental performance - Attendance at all environmental meetings/Project meetings (as required). - Routine interaction with construction crews to ensure all construction activities are in compliance with requirements of the CEPP and Contractors Environmental Method Statements. Monitor the environmental permitting status of the Project to ensure that no work proceeds until appropriate and complete permitting is received for the applicable facility.

10.3 Training and Awareness

Staff and sub-contractors working on site will receive environmental training as part of the Site Orientation, to achieve a basic level of environmental awareness understanding of their obligations regarding compliance with regulatory requirements, commitments and best practices.

Operations superintendents and contractor supervisors will be provided with this Management Plan, and will receive additional orientation with respect to the requirements outlined in this Plan. In addition, all supervising level staff and sub-contractors will be provided with the Operational Standards (the EPP, Appendix 10B) 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/tailgate meetings or other means as appropriate.

The content of the environmental component of the site induction 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.

e) Principles and necessary steps to avoid encounters with bears or other wildlife and what to do if one such encounter occurs

10.4 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 Manager

e) Electronic communications

f) Tailgate/toolbox meetings

g) Formal written correspondence and meetings with government regulatory bodies

h) Formal environmental awareness training

Communications will be appropriately recorded and filed for future reference. Where appropriate, the copies of communications will be forwarded to the Operations Manager(s), and Environmental Manager.

10.5 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 will maintain Community Liaison Offices to assist in this regard.

10.6 Construction

During the construction phase of the Project, the Baffinland Environmental Manager and EPCM (Engineering Procurement and Construction Management) contractor will be responsible for implementing this Plan.

This Management Plan will be updated to take into account the numerous construction sites, and types of construction equipment utilized. The organizational structure of the EPCM contractor will reflect the complexity of the construction phase.

The EPCM contractor and its subcontractors will appoint a Construction Phase Environmental Supervisors who will oversee the application and adherence to all of Baffinland`s EMMP. They will report to the site Construction Manager as well as to the Environmental Manager or his designate.

10.7 Operation & Closure

For the operations and closure phases, Baffinland will revise its organizational structure to reflect the realities of the operation. The Environmental Manager will be responsible for subsequent updates and implementation of the Plan.

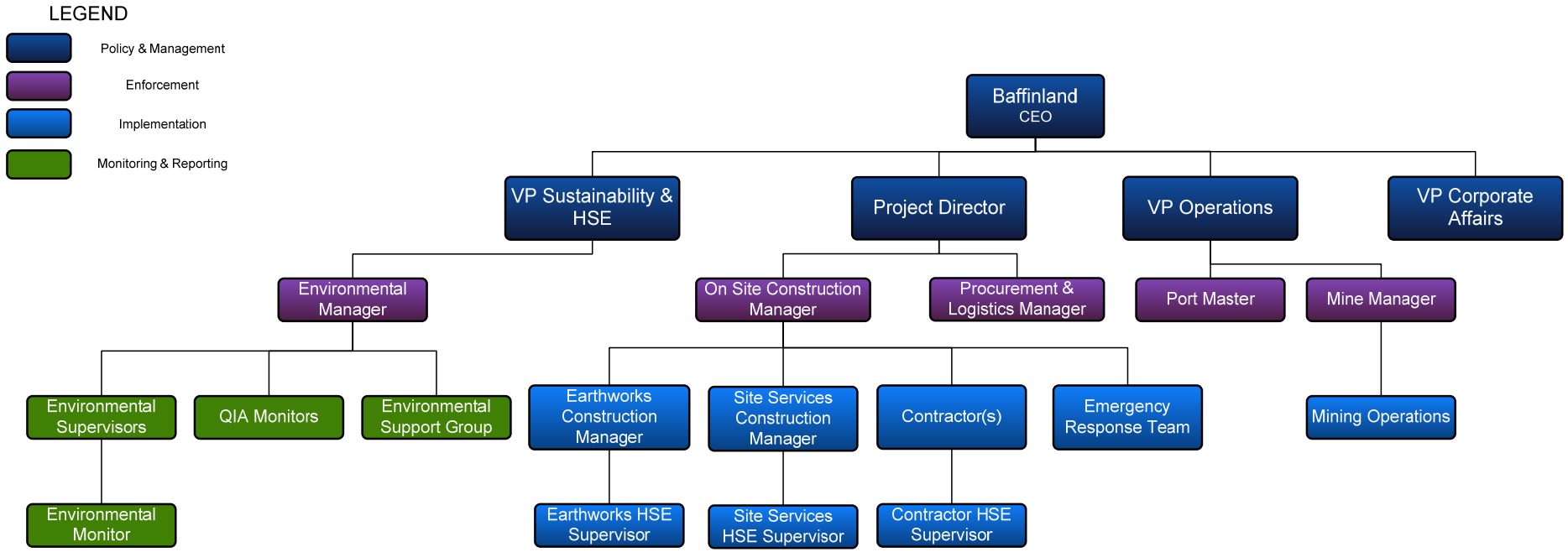

Figure 10.1: Organizational Chart