Baffinland Iron Mines Corporation
Mary River Project

Surface Water and Aquatic Ecosystems Management Plan

2013-03-29	0	In Support of the 2013 Work Plan	R. Kapadia	J.Millard	S. Perry	J.Millard
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**	**Approved By**	**Approved By**
			HATCH			**Client**

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Revision History for SWMP and SWAEMP*

Revision No.	Revision	Revision Date	Approval
0	Issued in Final under Type B Water Licence	October 25, 2007	KDE
0 - SWMP	Updated for 2008 Field Season under Type B Water Licence	March 31, 2008	KDE
1 - SWMP	Updated for 2009 Field Season under Type B Water Licence	March 31, 2009	JM
2 - SWMP	Updated for 2010 Field Season under Type B Water Licence	March 31, 2010	JM
3 - SWMP	Updated for 2011 Field Season under Type B Water Licence	March 2011	JM
F - SWAEMP	Updated for FEIS	November, 2011	JB
4 - SWMP	Updated for 2012 Field Season under Type B Water Licence	March 2012	JM
0- SWAEMP	In Support of the 2013 Work Plan	March 2013	JM

Index of Major Changes / Modifications from Last Revision

Item No.	Description of Change	Relevant Section
1	Updated to refer to 2013 Work Plan and regulatory transitional period	1, 1.2
2	The status of other management plans updated.	1.3
3	The health, safety and environment policy has been added to the sustainable development policy.	2
4	Have addressed NIRB commitment # 16 related to design and construction practices for water related infrastructure. Also addressed NIRB commitment # 25 related to protecting sensitive landforms from damage. Addressed NIRB commitment # 47 related to ensuring fish movement is not limited in fish bearing streams and rivers.	4.1
5	Have addressed NIRB commitments # 45 and 48 related to fish habitat concerns	4.4
6	Added reference to mine site water flows during 2013. Addressed NIRB commitment #29 related to requirement to provide for-construction drawings to authorities before new construction	6
7	Revised to reflect the work scope of the 2013 Work Plan.	6.1, 6.2, 6.3 and Tables 6.1 and 6.2
8	Added reference to site drainage plans (newly added to Appendix A)	6.1.2 and 6.3.3
9	Addressed NIRB commitments # 23 and 41 relating to requirement for vegetated buffer zones and groundwater monitoring	6.1.3, 6.3.4, 6.4.2, 6.4.7 and 6.5.5
10	Updated section with new organization chart	8.1
11	Added new organization block flow diagram	8.7
12	Added toxicity as a performance indicator for surface water samples	Table 9-2
13	Have addressed NIRB commitments # 28 related to maintaining the integrity of the permafrost	10.1

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14	Added new table summarizing not only monitoring locations (as in previous revision) but also monitoring and reporting frequency and which parameters are to be monitored at each location	10.2.1
15	New reference to Type A Water Licence Proposed Terms and Conditions (Feb. 2013) added	13
16	Drainage plans added for Mine Site and Milne Port	Appendix D
17	A table of concordance added to identify how NIRB commitments have been addressed	Appendix A
18	References to tables and figures have been updated throughout as required based on the revisions to the document	All sections

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Table Of Contents

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List of Tables

List of Appendices

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Appendix D – Site Drainage Plans

Milne Port - Site Layout Drainage Plan	H349000-2100-10-015-0002
Mine Site – Site Layout Drainage Plan	H349000-4100-10-015-0001

References to Figures Contained in Appendix 3B of the FEIS, Type 'A' Water License, Attachment 9 - Drawings

H337697-4690-10-014-0001	Steensby Inlet Temporary Works Site Layout
H337697-4210-10-014-0009	Mine Site Proposed Drainage Works
H337697-4310-10-042-0001	Mine Site Permanent Works Water Supply and Wastewater Disposal GA Plan
H337697-4610-07-042-0003	Steensby Inlet Environmental Monitoring Plan Site Layout

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1. Introduction

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 Surface Water and Aquatic Ecosystems Management Plan presented, herein, replaces the current Site Water Management Plan (Revision 5, dated March 2012) and is an update to the plan presented in the FEIS (Appendix 3B, Attachment 5). This Plan supports activities of the 2013 Work Plan under the existing Type B Water Licence, future Type B and the transition to the new Type A. The Plan presents site drainage plans for the Milne Port and Mine Sites as well as mitigation strategies. These will be a requirement under the Type A Water Licence.

The Plan, herein, is also intended to address specific terms and conditions under the NIRB Project Certificate . To this end, a concordance table is provided in Appendix A.

1.1 Purpose

The "***Surface Water and Aquatic Ecosystem Management Plan"*** (the plan) outlines the processes and procedures to document the quality and quantity of water that will interact with Project components over the life of the Project. It includes management practices to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitat. The Plan details the management of drainage and runoff systems at Project facilities and addresses point and non-point discharges to surface waters from Project components and discharge quality and quantity relative to the receiving water system.

The plan outlines specific mitigation measures required for stream/river crossings works as well as for general operation and construction activities in proximity of water courses. The Plan identifies the roles and responsibilities, specific requirements, and mitigation and management actions for erosion and sedimentation controls for the Project. The Plan includes methods for controlling erosion for both temporary and long-term stabilization efforts.

The Plan has been updated to support the 2013 Work Plan activities for the Project and will be updated subsequently throughout the Project life as a condition of the company's water licenses.

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1.2 Regulatory Requirements

Water use is regulated by the Nunavut Water Board (NWB) through the water licensing process. As discussed in Section 1., the Project is currently subject to an existing Type B Licence but a new Type B Licence is anticipated that would allow for site preparation involving the construction of minor infrastructure, followed by the issuance of a new Type A Water Licence in late June or early July. Refer to Appendix B for the 2013 Work Plan and related site plans for Milne Port and the Mine Site that illustrate the sequence of work for 2013 relative to the existing and future regulatory framework.

1.3 Relationship to other Management Plans

This plan should be viewed in concert with all the other Environmental Monitoring and Mitigation Plans as it is an integral part of each EMMP. As well, this Plan should be viewed with the following management plans:

- Health, Safety and Environmental Management Framework, FEIS, Appendix 3B
- Environmental Design Basis (FEIS, Appendix 3B, Attachment 3)
- Environmental Protection Plan (FEIS, Appendix 3B, Attachment 5) – to be updated after Type A Water Licence is issued.
- Comprehensive Environmental Monitoring Plan - updated March 2013.
- Emergency Response and Spill Contingency Plan - updated March 2013
- Milne Port and Steensby Port Oil Pollution Emergency Plan – Milne Port OPEP to be updated prior to 2013 Shipping Season
- Explosives Management Plan – to be updated after Type A Water Licence is issued.
- Waste Rock Management Plan (FEIS, Appendix 3B, Attachment 5, to be updated prior to commencement of mining operations)

  Borrow Pits and Quarry Management Plan (updated March 2013)

1.4 Baffinland's Commitment

Baffinland provides adequate resources to implement and maintain the EHS Management System including the necessary human, material and financial resources. Baffinland's Sustainable Development and Health, Safety & Environment Policies are presented in Section 2.0.

1.5 Update of this Management Plan

This Plan is intended to be a "living document" and its content reflects the activities described in the 2013 Work Plan (Appendix B) on the Project site as well as providing an overview of water management activities that are proposed and presented under the Project Description, FEIS Volume 3. Throughout the course of the Project, the Plan will be regularly updated on the basis of Work Plan development and changes, management reviews (as outlined in Section 11), incident investigations, regulatory changes or other Project related changes. Commencement of the Construction Phase in 2013 is a major milestone for the Project.

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2. 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.

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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

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Baffinland
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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

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3. Targeted VECS

The targeted VECs for the “Surface Water, Aquatic Ecosystem Management Plan” are:

1. Water quantity,
2. Surface water quality,
3. Aquatic ecosystems,
4. Fish, and,
5. Fish habitat.

Water is considered a valued ecosystem component and the protection of regional water quality and quantity is important to residents of Baffin Island. There are no reasonably foreseeable long-term downstream users (i.e. local residents), but there is potential for incidental water use by hunters and others using the land. There is also potential to affect fish and fish habitat from either water withdrawals that are too large, or by degrading water quality.

Project activities will interact with surface water through several means, examples of which are:

- Water intakes for potable water in camps and shorter-term construction needs;
- Tote Road stream crossings and road maintenance;
- Sewage treatment and disposal at camps;
- Railway watercourse crossing and diversions;
- Railway construction road (construction and maintenance);
- Operations phase runoff from waste rock and ore stockpiles (subject of the Waste Rock & Ore Stockpile Management Plan);
- Potential surface water runoff from Project developed areas at Milne Port, Mine Site and Steensby Port and;
- General site runoff from land disturbances.

A complete matrix of Project interaction with these VECs is provides in Volume 7 of the FEIS (Freshwater Aquatic Environment).

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4. Mitigation Measures

4.1 General Mitigation Measures for Sediment Control and Erosion

The sediment and erosion control measures described in this section will be applied throughout the duration of the Construction Phase of the Project. Stream, river crossings, and lakes/ponds adjacent to construction activities will receive focussed attention in this respect. Depending on site specific conditions, a variety of civil design structures may be used to prevent erosion. Such structures are described in the Railway Management Plan and the Roads Management Plan.

The construction and ongoing operations of the Mary River Project will result in soil disturbance and water diversions that require sediment and erosion control planning to prevent the discharge of soil contact water. Best management practices, including preventative measures, will be used throughout the duration of the Project. This section details measures that will be used to mitigate potential environmental impacts arising from the storage and discharge of site contact water.

Experience gained from the Bulk Sample Program, for example, during the upgrading of the Milne Inlet Tote Road has resulted in an improved understanding of the unique site conditions that factor into the selection of appropriate sediment and erosion control measures. The climate, topography, and limited vegetation combine to produce short term, high intensity discharge during May, June and July. Frozen conditions between September and May can result in sediment deposition that can be mobilized during freshet. Due to the extremely slow vegetation growth rate, sediment and erosion control techniques that involve vegetative covers (e.g., hydroseeding, bioremediation, erosion control blanket) have been dismissed as potential mitigation options. Also, straw bales are not permitted in the Arctic due to the possibility of introducing foreign species.

All water related infrastructure and facilities including the modification of culverts, diversion of watercourses, and diversion of runoff into watercourses along the railway, access roads, the Milne Tote Road, and other areas of the Project site, shall be designed and constructed in a manner consistent with those proposed in the FEIS in terms of type, location, and scope and such that the requirements of all relevant regulatory authorities are satisfied in advance of constructing those facilities.

Prior to the development of any new water related infrastructure and/or facilities geotechnical investigations will be undertaken to ensure that no sensitive landforms will be impacted (i.e. ice-rich soils or easily erodible soil).

All Project infrastructure in watercourses will be designed and constructed in such a manner that they do not unduly prevent and limit the movement of water in fish bearing streams and rivers.

In the event that the erosion control measures presented in Section 4.2, 4.3, and 4.4 fail to prevent a siltation event, downstream fish bearing waters can be protected by various standard methods such as silt fences, silt curtains, construction of temporary sedimentation

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sumps/ponds. These various methods are detailed in standard work practices being developed for the 2013 season.

4.2 General Mitigation Measures for Erosion Control

A description of the general mitigation measures for erosion control is provided in below.

Table 4.1: Sediment and Erosion Control Measures	
Armouring	
Description	Armouring is used as a barrier between water flow and materials susceptible to erosion. Quarry rock and/or naturally occurring granular borrow material are used to protect underlying fined grained materials from scour and erosion.
Installation Locations	Armouring may be used in areas of cuts/excavations and for installation of culverts, typically on exposed erodeable slopes.
Substitute	Water diversion, berms, sumps and/or silt fencing may be used where armouring is impracticable or due to low risks of impacts to downstream receptors.
Riprap	
Description	A rock lining that can be installed on the ground surface or structures to prevent erosion of underlying material. Can be placed over non-woven geotextile to provide additional protection.
Installation Locations	• On sides of road embankment. • On upstream and downstream ends of culverts. • At any location where flows exist than might cause erosion of the existing surface materials. • In areas where there is concentrated flow.
Performance Issues	Shortage of available material (that can be used for riprap) at many locations at the Project site
Benefits	• Constructed from local materials - if available. • Effective in protecting embankments and preventing erosion. May be used in combination with non-woven geotextile.
Geotextile (Woven and Non-Woven)	
Description	Low erodible material placed as temporary erosion protection.
Installation Locations	As a liner along water channels / ditches. Use on stream embankments often in combination with riprap.
Performance Issues	Needs to be well anchored or will be ineffective. Difficult to remove from streambeds, etc, when no longer required.
Benefits	Very effective as an erosion barrier on a variety of embankments. Ease of installation.

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4.3 Stream Crossings

A description of the general mitigation measures for stream crossings is provided below.

Table 4.2: Stream Crossings, Culverts, Drains and Bridges	
Pumping	
Description	Pump used to transfer water from one side of the road or structure to the other.
Installation Locations	At crossings where culverts were not installed, improperly installed or installed with insufficient capacity. Can be used prior to culvert installation to lower the water level. Use pumps as a temporary solution during freshet or prior to culvert installation. Siphons can be used as an alternative, but require a pump to prime the system, and adequate elevation difference between upstream and downstream locations.
Performance Issues	Ineffective if flows are high. Erosion control measures required at discharge point from the pump (e.g., energy dissipater). Risk of fuel spills. Secondary containment required. Temporary solution, labour and resource intensive.
Benefits	Effective temporary solution to lower water level in places where water level is high or prior to culvert installation. Useful at low flow locations where culverts not yet installed.
Culverts	
Description	Pipes install through embankments to allow the passage of water while maintaining access over the site. A hydraulic design study is conducted to assess suitable hydraulic design criteria to avoid flooding or washouts. Culvert capacities are assessed using hydraulic analysis methods assuming an appropriate return period with an allowance for ice accumulation.
Installation Locations	At points where roads intersect streams, rivers, or seasonal drainages. At locations where there is potential for water flow over road. To allow fish passage under road at crossings that are classified as fish habitat.
Performance Issues	Some siltation is caused during installation. Require labour and equipment to properly install using compacted backfill. Water flow is concentrated which can create erosion at downstream discharge point. Clearing of snow/ice prior to spring freshet is required to minimize the potential for blockages.
Benefits	Can handle large amounts of flow - depending upon the size of the culvert. Maintains access while passing flows.

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French Drain	
Description	A ditch or channel filled with rock to provide a flow path for water. The rock material can be covered with a non-woven geotextile to prevent the ingress of finer material which could reduce the permeability of the drain.
Installation Locations	At points where roads intersect streams/drainages and where fish passage is not a consideration. As an alternative to a culvert if pipes are not available. Use as a culvert substitute if culverts are not required or available.
Performance Issues	Ice blockage potential in French drains has not been adequately assessed. Long-term performance has not been assessed.
Benefits	Constructed of natural materials.
Bridges	
Description and Installation Locations	Bridges are required for the crossing of larger streams or rivers. For such cases, a hydraulic design study is carried out to assess suitable hydraulic design criteria to avoid flooding or any unexpected damage to the adjacent ground. Bridge locations are assessed using a river hydraulics analysis assuming an appropriate return period with an allowance for ice accumulation. The identification of appropriate engineering options for each river crossing is carried out using a systematic decision making process to evaluate each crossing. This process takes into account engineering and environmental factors at each crossing location. Screening and detailed evaluations are performed to aid in determining the optimum site-specific crossing at each location (i.e. culvert or bridge). Decision-making criteria which were used included: potential impacts to freshwater aquatics, hydraulic conditions, ease of construction and cost.

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4.4 General Mitigation Measures for Fish and Fish Habitat

Table 4.3: Mitigation Measures for Fish and Fish Habitat

Freshet Mitigation

Extreme flows occurring during the freshet can result in significant erosion and damage to creek crossing structures and fish habitat. Several operating procedures have been developed to mitigate the negative impacts caused by freshet events. These measures include:

- Establishing/marking locations of susceptible crossings so that they can be identified in the spring, prior to snow / ice melt;
- Clearing of snow from roads where culverts / crossings are located;
- Excavate downstream and upstream of crossing prior to the onset of freshet;
- Monitor culverts for clearance of snow and ice;
- Where snow and ice blockage occur, ensure that the blockage is removed to re-establish adequate flow;
- Regular monitoring of crossing conditions to ensure acceptable conditions for fish migration. Perform repairs / modification to crossing structures as required, based on results of monitoring and assessment of risk.

Fish Habitat Protection

- For locations where there is a problem with culvert outlet scour and erosion, the construction of rocky ramps downstream of the crossings is considered. Occasionally reinstalling culverts is required, or the installation of additional overflow culverts will be required.
- During construction of the docks, for all works requiring the use of explosives (blasting) in or near water bodies, the “Guidelines for Use of Explosives In or Near Canadian Fisheries Water, 1998” will be followed. For any locations where the guidelines cannot be conformed with, the DFO will be consulted prior to commencing blasting.
- For dock construction (dredging, piling, backfilling), silt curtain may be used to prevent the dispersion of sediments in marine waters.
- Use of bubble curtains to attenuate noise in marine water.
- Baffinland shall adhere to the No-Net-Loss principle at all phases of the project to prevent or mitigate direct or indirect fish and fish habitat losses.
- Baffinland shall also engage with Fisheries and Oceans Canada and the Qikiqtani Inuit Association in exploring possible Project specific thresholds for blasting that would exceed the requirements of Fisheries and Oceans Canada’s Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (D.G. Wright and G.E. Hopky, 1998).

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5. Hydrology, Water Supply and Surface Water Runoff

The region is characterized by long cold winters and short cool summers, with continuous daylight from approximately May to August, and continuous darkness from November through February. The ground is snow-covered from September to June and ice persists in the marine offshore throughout most of the year.

5.1 Regional Landscape

Surface landforms and deposits are associated with recent, widespread glaciation on Baffin Island. Surface geology consists of locally abundant Holocene glaciolacustrine sediments, fluvial sediments (alluvial deposits), marine and glacio-marine deltaic sediments, and end moraine till, with occasional outcrops of pre-Quaternary bedrock. The North Baffin region and Mary River area lies within the Committee Belt, a granite-greenstone terrain with intermixed rift basin sediments and volcanic rocks, and bounded by Precambrian mountains to the east and Palaeozoic lowland plateaus to the west. The Project lies within the zone of continuous permafrost, with an active layer thickness of up to two metres and a permafrost depth that may be as much as 700 m deep, based on extrapolation from temperature gradients measured in a 400 m-deep thermistor-instrumented drillhole located on site. The active layer throughout the Project area ranges from approximately 1 to 2 m thickness, but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds or at bedrock topographic highs.

The presence of permafrost greatly increases ground stability at depth but at surface it can affect the rates of soil erosion through the formation of ice wedges and patterned ground, pingos and palsas, massive ground ice, thermokarst, and mass wasting (i.e., solifluction).

5.2 Climate

Baffin Island is one of the northernmost and coldest parts of Canada and the Mary River Project is situated towards the northern end of the Island. Regional data near the Project site indicate a mean annual temperature of approximately -15^{o}C. Mean daily temperatures are below -20^{o}C from November through April, and are only above freezing (0^{o}C) during June through August, with July mean daily maximum temperatures reaching only 6-10^{o}C. The long length of the sub-zero degree temperatures in this region results in a very short runoff period that typically occurs from June through September, but may extend to late October in systems where large lakes are present. The frigid temperatures also result in very low precipitation values for northern Baffin Island, from the combined effect of the low moisture carrying capacity of cold air and the scarcity of liquid water for much of the year. According to Natural Resources Canada, the mean annual total precipitation ranges from 200 to 400 mm in the Project area, classifying it as semi-arid. Mean annual precipitation at the closest regional climate stations is closer to the 200 mm end of this range Pond Inlet experiences 24-hour darkness (with less than 2 hours of twilight) from November 12 to January 29, and continuous daylight from May 5 to August 7.

5.3 Regional Hydrology

The extremely cold temperatures of the region, combined with permafrost ground conditions, result in a short period of runoff that typically occurs from June to September and possibly

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October in watersheds with significant lake area. All rivers and creeks, with perhaps the exception of the very largest systems, freeze solid to the bottom during the winter months. For example, the Sylvia Grinnell River near Iqaluit (watershed area of ~4000 km^2), which has been monitored by Water Survey of Canada (WSC) since 1971, freezes solid by April every year. Streams and rivers usually begin to flow in late May with the melting of snow and ice, then peak in June or July with rising temperatures and rapid corresponding snowmelt, before dropping steadily through to September or October when flows essentially cease. The peak runoff period is quite short and the volume of the annual hydrograph is low, relative to the rest of Canada, due to the region's very low average annual precipitation of approximately 200 mm. However, the proportion of annual precipitation that is realized as runoff is very high, due to the low temperatures (low evaporation) and the permafrost ground conditions (low infiltration) and minimal vegetative cover (low transpiration). Correspondingly, surface water is abundant, and the region is dotted with thousands of small lakes and streams. Groundwater infiltration and storage in the region is limited due to the permafrost. The groundwater flow is restricted to the upper one to two metre summer active layer.

Peak instantaneous flows are quite large due to frozen ground conditions and lack of tall vegetation, which produces very rapid basin runoff response. In larger watersheds, peak instantaneous flows are typically produced by snowmelt during the freshet, but in smaller watersheds (less than a few hundred square kilometres) rainfall, or rain on snow may produce the largest events and may occur at any time during the non-freeze period. Flood water levels in the smaller watersheds typically rise and fall very quickly with run-off response.

Knight Piesold has updated the hydrology estimates with the most recent records. They conducted stream flow measurements in the study area and developed flow estimation equations for use. Their report is contained within Volume 7 'Freshwater Environment' of the Final Environmental Impact Statement (FEIS).

5.3.1 Surface Water Runoff Estimation – Mine Site

The data presented in this management plan are based on field data collected during the 2006 to 2010 field seasons. A summary of the unit surface water runoff rates for the Mary River area is presented on Table 4.1.

The locations of the stream gauging stations are shown in Figure 7-1.1 in the Appendix. The stations are identified as hydrology stations. The limits of the catchment areas are presented in Figures 5.1, 5.3, 5.4, 5.5 and 5.6 of the appendix. The runoff values indicate that from October to May there should be no runoff and that approximately half of the flows occur in July.

A discussion on water management by area is presented in later sections of this document. The surface water direction and expected quantities (where possible) for each catchment area impacted by the Project are discussed.

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Table 5.1 Mary River Monthly Unit Runoff Summary

Station	Drainage Area (km^2)	Unit Runoff (l/s/km2)									
		2006					2007				
		June	July	Aug.	Sep.	Oct.	June	July	Aug.	Sep.	Oct.
H1	250	-	63.3	21.8	17.2	1.2	15.7	27.7	15.1	4.5	0.1
H2	210	-	92.4	25.2	16.2	0.0	21.1	36.8	18.8	4.9	0.0
H3	30.5	-	145.4	27.2	18.0	0.0	26.9	48.2	15.4	3.3	0.0
H4	8.3	-	101.4	34.5	19.1	0.1	13.0	25.5	16.1	4.2	0.0
H5	5.3	-	76.6	29.0	17.8	0.8	19.2	19.3	18.4	5.0	0.0
H6	240	-	105.1	38.2	25.5	0.8	22.2	50.8	23.8	7.4	0.0
H7	14.7	-	118.0	25.2	14.8	0.3	23.7	43.0	16.7	4.2	0.0
H8	208	-	86.9	20.4	13.0	0.0	20.1	45.9	18.4	3.2	0.0
H9	158	-	23.3	11.0	13.0	0.8	11.9	15.8	6.1	4.8	0.7
H11	3.6	-	-	-	-	-	-	-	-	-	-
BR11	52.7	-	-	-	-	-	-	-	-	-	-
BR25	113	-	-	-	-	-	-	-	-	-	-
BR96-2	30.7	-	-	-	-	-	-	-	-	-	-
BR137	314	-	-	-	-	-	-	-	-	-	-
Mary River (06SA001)	690	-	-	-	20.6	1.4	9.3	43.5	15.9	6.8	0.4
Ravn River (06SA002)	8219	-	-	-	31.6	5.7	2.5	44.9	21.8	11.2	1.7
Isortoq River (06SB001)	7172	-	-	-	-	1.2	5.5	99.3	65.0	9.8	0.6
Rowley River (06SB002)	3499	-	-	-	-	1.1	0.9	52.3	15.4	7.7	0.5
Average		-	90.2	25.8	18.8	1.0	14.8	42.5	20.5	5.9	0.3
5^{th} Percentile		-	39.3	14.8	13.0	0.0	1.8	17.9	11.5	3.3	0.0
Minimum		-	23.3	11.0	13.0	0.0	0.9	15.8	6.1	3.2	0.0

Station	Drainage Area (km^2)	Unit Runoff (l/s/km2)									
		2008					2010				
		June	July	Aug.	Sep.	Oct.	June	July	Aug.	Sep.	Oct.
H1	250	44.3	41.2	29.7	11.3	0.3	50.6	37.8	13.6	12.3	1.3
H2	210	57.6	58.3	31.7	12.0	0.0	39.6	68.3	11.1	12.5	0.0
H3	30.5	71.1	72.1	34.3	15.7	0.0	45.0	92.2	11.5	15.1	0.0
H4	8.3	86.2	45.6	30.5	10.4	0.0	84.0	42.6	13.7	13.3	0.1
H5	5.3	61.6	41.5	42.2	12.9	0.0	72.2	35.6	15.1	14.7	0.9
H6	240	61.7	70.7	34.2	15.8	0.0	38.7	78.1	15.4	14.7	0.8
H7	14.7	62.5	62.5	18.7	9.3	0.0	42.3	81.1	6.5	9.7	0.3
H8	208	57.0	60.4	24.1	9.4	0.0	35.6	70.3	8.0	8.2	0.0

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Table 5.1 Mary River Monthly Unit Runoff Summary

H9	158	27.2	14.9	29.0	11.1	1.0	-	-	-	-	-
H11	3.6	-	-	-	-	-	-	-	-	-	-
BR11	52.7	84.4	83.8	33.3	13.9	0.0	-	-	-	-	-
BR25	113	74.0	70.8	32.9	11.9	0.0	-	-	-	-	-
BR96-2	30.7	50.0	34.4	42.2	13.4	0.0	-	-	-	-	-
BR137	314	30.7	33.2	44.3	27.6	1.1	31.7	45.8	15.6	12.1	2.5
Mary River (06SA001)	690	35.5	59.7	32.2	17.0	0.8	-	-	-	-	-
Ravn River (06SA002)	8219	20.0	60.9	35.9	18.0	2.9	-	-	-	-	-
Isortoq River (06SB001)	7172	51.9	101.7	60.5	10.6	0.6	-	-	-	-	-
Rowley River (06SB002)	3499	34.3	59.7	28.5	13.0	0.9	-	-	-	-	-
Average		53.5	57.1	34.4	13.7	0.5	48.9	61.3	12.3	12.5	0.6
5th Percentile		25.7	29.5	23.0	9.4	0.0	33.3	36.5	7.1	8.8	0.0
Minimum		20.0	14.9	18.7	9.3	0.0	31.7	35.6	6.5	8.2	0.0

Station	Drainage Area (km^2)	Unit Runoff (l/s/km2)				
		2011				
		June	July	Aug.	Sep.	Oct.
H1	250	33.4	12.4	5.0	2.1	0.0
H2	210	52.9	14.2	6.4	1.9	0.0
H3	30.5	73.4	17.3	5.3	1.4	0.0
H4	8.3	35.1	7.8	4.0	1.0	0.0
H5	5.3	32.1	9.5	4.7	1.3	0.0
H6	240	61.3	22.0	9.7	4.2	0.0
H7	14.7	63.6	14.9	5.2	2.2	0.0
H8	208	55.3	15.4	3.5	0.5	0.0
H9	158	-	-	-	-	-
H11	3.6	-	5.3	4.2	4.8	-
BR11	52.7	-	-	-	-	-
BR25	113	-	-	-	-	-
BR96-2	30.7	-	-	-	-	-
BR137	314	-	31.6	14.1	6.9	1.5
Mary River (06SA001)	690	-	-	-	-	-
Ravn River (06SA002)	8219	-	-	-	-	-
Isortoq River (06SB001)	7172	-	-	-	-	-
Rowley River (06SB002)	3499	-	-	-	-	-
Average		50.9	15.1	6.2	2.6	0.2

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Table 5.1 Mary River Monthly Unit Runoff Summary							
5th Percentile		32.6	6.5	3.7	0.7	0.0	
Minimum		32.1	5.3	3.5	0.5	0.0	

5.3.2 Surface Water Runoff Estimation – Milne Port

Streamflow estimates presented in this section are based on site data collected during 2006 to 2008 and 2010 field seasons and regional data collected by Water Survey of Canada (WSC). The locations of the stream gauging stations are shown on Figure 7-1.2 in the appendix. A mean annual unit runoff for the Milne Inlet area of 7.5 L/s/km^2 was selected based on the estimated long-term mean annual runoff at streamflow gauging station H1 (Knight Piésold, 2009). The monthly flow distribution was also based on the long-term average hydrograph shape estimated at streamflow gauging station H1. Given this, surface water runoff rates were estimated for six watersheds in the Milne Port area. These estimates are presented on Table 4.2 and the limits of the catchment areas are presented in Figure 5.3 in the appendix. The runoff values indicate that runoff is negligible from October to May and the majority of runoff occurs in June and July.

Discussion regarding water management is presented by Project areas in later sections. These sections discuss surface water flow direction and estimated quantities (where possible) for each catchment area impacted by the Project.

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Table 5.2 Milne Port Area - Estimated Catchment Runoff Rates								
Catchment No.			MI-01	MI-02	MI-03	MI-04	MI-05	MI-06
Catchment Area (km2)			5.27	3.59	4.11	62.32	5.61	7.96
Mean Annual Unit Runoff (l/s/km2)	7.0							
	Runoff Distribution	Unit Runoff Rate	Runoff Rate					
	(%MAUR)	(l/s/km2)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
January	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
February	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
March	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
April	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
May	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
June	600%	42.0	0.22	0.15	0.17	2.62	0.24	0.33
July	335%	23.5	0.12	0.08	0.10	1.46	0.13	0.19
August	180%	12.6	0.07	0.05	0.05	0.79	0.07	0.10
September	80%	5.6	0.03	0.02	0.02	0.35	0.03	0.04
October	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
November	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00
December	0%	0.0	0.00	0.00	0.00	0.00	0.00	0.00

Note:

1. The above runoff distribution was derived using data collected at hydrometric monitoring station H4. The distribution applies only to watersheds near Milne Inlet with drainage areas less than 100 km2.

2. The above mean annual unit runoff was derived from data collected at hydrometric monitoring station H1, within the Phillips Creek watershed.

5.3.3 Surface Water Runoff Estimation – Steensby Port

Streamflow estimates presented in this section are based on site data collected during 2006 to 2008 and 2010 field seasons and regional data collected by Water Survey of Canada (WSC). A mean annual unit runoff for the Steensby Port area of 7.5 L/s/km2 was estimated based on hydrologic conditions (e.g. elevation, lake area, latitude, aspect etc.) at Steensby Port compared to hydrologic conditions at the monitored sites. The monthly flow distribution was estimated from flow records measured at streamflow gauging station BR137 during 2008 and 2010. Given this, surface water runoff rates were estimated for three watersheds in the Steensby Port area. These estimates are presented on Table 4.3 and the catchment areas are shown on Figure 5.4. The runoff values indicate that runoff is negligible from November to May and runoff volumes are relatively high from June to September due to the high proportion of lakes in the area, which attenuate runoff patterns.

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Table 5.3 Steensby Port Area - Estimated Catchment Runoff Rates					
Catchment No.			SI-01	SI-02	SI-03
Catchment Area (km2)			13.68	21.77	1.99
Mean Annual Unit Runoff (l/s/km2)	7.6				
	Runoff Distribution	Unit Runoff Rate	Runoff Rate		
	(%MAUR)	(l/s/km2)	(m3/s)	(m3/s)	(m3/s)
January	0%	0.0	0.00	0.00	0.00
February	0%	0.0	0.00	0.00	0.00
March	0%	0.0	0.00	0.00	0.00
April	0%	0.0	0.00	0.00	0.00
May	0%	0.0	0.00	0.00	0.00
June	550%	41.8	0.57	0.91	0.08
July	310%	23.6	0.32	0.51	0.05
August	235%	17.9	0.24	0.39	0.04
September	100%	7.6	0.10	0.17	0.02
October	0%	0.0	0.00	0.00	0.00
November	0%	0.0	0.00	0.00	0.00
December	0%	0.0	0.00	0.00	0.00

Note:

1. The above runoff distribution was derived using data collected at hydrometric monitoring station H5. The distribution applies only to watersheds near Steensby Inlet with drainage areas less than 100 km2.

2. The above mean annual unit runoff was derived from data collected at hydrometric monitoring station BR137, located at the outlet of 10km Lake near Steensby.

5.3.4 Catchment Areas for the Milne Port Tote Road

Figure 5.6 presents the watershed catchment areas along the Milne Port Tote Road.

5.3.5 Catchment Areas for the Proposed Railway Corridor

Figure 5.5 presents the watershed catchment areas for the proposed railway corridor.

5.4 Water Supply

The project fresh water requirements are detailed in the Freshwater Supply, Sewage and Wastewater Management Plan.

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6. Water Management – construction and operation phases

The water management structures will be built at the onset of the construction phase and will remain in operation until the related facility is decommissioned, that is, at the end of useful life of the facility or end of Project life (closure). General drainage arrangement drawings which were considered largely conceptual in nature were first provided for the sites in the FEIS. During 2013, the Work Plan will be focussed on Milne Inlet and the Mine Site infrastructure locations, with minor work being undertaken on the Tote Road based on upgrades that are to be identified. The updated site drainage drawings and water management structures that are applicable for the 2013 Work Program for Milne Port and the Mine Site are provided in Appendix D of this document. Site water balance figures are also provided in Appendix D for Milne Port, Mine Site and Steensby Port. The water balances show the relative flow inputs and outputs during construction and operation for each site. A summary of the balances provided follows:

Figure 1 Mine Site Water Balance - Construction

Figure 2 Mine Site Water Balance - Operation

Figure 3 Mine Site Water Balance - Closure

Figure 4 Milne Port Water Balance - Construction

Figure 5 Milne Port Water Balance - Operation

Figure 6 Steensby Port Water Balance - Construction

Figure 7 Steensby Port Water Balance – Operation

Note that the wastewater flows during 2013 will be smaller than those shown on the site water balances for the future construction and operation phases. This is due to the limited extent of the 2013 Work Plan which is limited to site capture and the construction of limited site infrastructure.

For-construction engineering design and drawings, specifications and engineering analysis to support design shall be provided to the respective regulatory authorities, for review and acceptance, in advance for constructing those facilities. Once project facilities are constructed, copies of the appropriate as-built drawings and design shall be provided to the appropriate regulatory authorities in accordance with future Type A Water Licence terms and conditions.

Baffinland is committed to collecting and treating, if required, contact water generated from mining activities to ensure relevant effluent criteria are met as established in the Water Licence.

6.1 Milne Port

Milne Port and the Milne Port Tote Road will be the main transportation hub for supporting construction at the Mine Site. During 2013, equipment and materials will be delivered to Milne Port by conventional sealift during the open water season and transported overland by

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trucks to the Mine Site over the Milne Port Tote Road. The existing facilities at Milne Port will play a key logistical support role for receiving sealift materials at Milne Port destined for Mary River (Mine Site).

A temporary construction dock will be installed to facilitate the timely offloading of equipment and materials from ships and the existing camp will be expanded to accommodate the peak personnel estimated to be needed during the construction and operation phases.

The Milne Port Site Plan for 2013 along with the locations of potential quarry sites and borrow pits are shown in the Milne Inlet Site Layout drawing in Appendix B of this document. The 2013 Work Plan document together with the site layout presents the facilities that will be constructed during 2013.

Table 6.1 provides an overview of the major facilities required for the construction and operation phases for the project . Detailed list of facilities and activities to be undertaken during 2013 are provided in Appendix B. Although additional facilities may be added or decommissioned throughout the life of the Project, relevant mitigation measures will be incorporated as required in the design, construction and operation of such facilities.

Table 6.1: Overview of Facilities at Milne Port
• Temporary floating dock for sealift unloading • Bulk fuel storage facilities (existing bladder tank farms (to be decommissioned) and new steel tanks, barrels – installed within lined containment) • Camp facilities (existing) for a peak capacity of approximately 150 people • Waste water treatment systems (sewage & oily water treatment) • Communication systems • Domestic water supply from Phillips Creek during the summer months and an unnamed lake along the Milne Inlet Tote Road at km 32 during the winter season • Power generation • Air strip upgrade • Multiple laydown areas • Waste storage areas (hazardous, solid waste and tires) • Contaminated snow treatment pond and contaminated soil/land farm • Truck maintenance facility • Quarries and borrow pits (existing)
List of Facilities for the Milne Inlet Tote Road & Refuge Station
• Milne Inlet Tote Road (existing and upgraded), the historic dirt road constructed in the mid 1960's from Mary River to Milne Port was upgraded to support transport of the bulk sample from Deposit No. 1 • Quarries and borrow sources (existing) • Minor upgrades to the Tote Road in the interest of improving safety and environmental performance • Communication systems • Two temporary refuge stations, one at km 33 and one at km 68 consisting each of a half size trailer and 4 drum fuel storage area (described below in the section Milne Inlet Tote Road Refuge Stations) • Temporary 49 person camp to support construction (water supply, sewage disposal, and waste disposal facilities to be supplied by Milne Port or Mine Site facilities.

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Runoff from areas of intense vehicular activities is susceptible to contamination from small spills/leakage of machinery and equipment. As a general rule, the mitigation measures identified in Section 4.0 will divert non contaminated runoff away from these areas. During the design and site preparation of such areas, efforts will be made to channel runoff from these areas to polishing ponds which will enable monitoring of runoff quality (visual inspection) prior to discharge to the receiving environment. The discharge will be equipped with the appropriate erosion prevention measures and adequate silt control structures as outlined in Section 4.0. Fuel storage, explosives storage, and hazardous substances storage will be confined within impermeable bermed structures (lined with geomembranes). Runoff from these contained areas will be collected and treated if required (refer to specific sections on bulk fuel storage, explosives and laydown/stockpile areas in this section).

6.1.1 Contaminated Snow Pond and Contaminated Soil Landfarm

Lined ponds will be constructed to receive snow contaminated by accidental fuel and oil spills. Water will be collected from this pond during the summer month and treated, as required, to removal contaminants. A contaminated soil landfarm facility will be constructed to receive and treat hydrocarbon contaminated soils. Treated soils that meet appropriate criteria will be used as landfill cover material or other acceptable purposes.

6.1.2 Surface Water Direction and Quantity

The surface water at the site is ultimately directed to Milne Port. Refer to Table 4.2 for the estimated surface water runoff quantities. The direction of surface water flow can be seen in the site drainage plan which has been provided in Appendix D.

6.1.3 Mitigation Measures

Where appropriate, the environmental protection measures implemented during construction will be retained for the useful life of the facilities (until closure). During 20i3 drainage structures will be installed with the direction of runoff to specific points of discharge where it can be monitored as shown on the Milne Port Site Layout Drainage Plan in Appendix B. Based on historical experience during construction activities in 2007, 2008, and 2011, there were very few problems observed related to erosion and sediment control. During the operation period, the Milne Port is not expected to have significant areas of disturbed soils and as such should not have sediment and erosion issues. The site is regularly monitored (Table 10.1). If mitigation measures are required to control sediment and erosion they are selected and installed as previously discussed Section 4.0, Mitigation Measures.

A minimum 100-metre naturally-vegetated buffer shall be maintained between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching except where authorized by the authority having jurisdiction.

6.2 Milne Port Tote Road

The Milne Port Tote Road will be upgraded to support traffic volume during construction. Sediment and erosion control measures are installed and monitored. The road is maintained and regularly monitored (Table 10.1). Creek and stream crossings have been designed and constructed to minimize the potential loss of fish habitat.

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The upgrade will include some realignment:

- to improve gradients (currently as high as 16%),
- to improve visibility,
- to improve drainage,
- to reduce ongoing maintenance requirements, to facilitate snow clearing, and,
- to reduce road washouts during freshet periods.

6.3 Mine Site

The Mine Site Milne Port Site Plan for 2013 along with the locations of potential quarry sites are shown in the Mine Site Layout drawings in Appendix B of this document. The 2013 Work Plan document together with the site layout presents the facilities that will be constructed during 2013. The locations of potential borrow pits near the Mine Site are shown in the Type A Water Licence application (FEIS, Appendix 3B).

Table 6.2 provides an overview of the major facilities required for the construction and operation phases for the project . Detailed list of facilities and activities to be undertaken during 2013 are provided in Appendix B. Although additional facilities may be added or decommissioned throughout the life of the Project, relevant mitigation measures will be incorporated as required in the design, construction and operation of such facilities.

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Table 6.2: Overview of Facilities at Mine Site
• Construction camp and associated support facilities and Contractor offices • Quarry and borrow sites for rock, sand and gravel and related access roads • Temporary and permanent fuel storage (iso-containers and manufactured tanks) • Aggregate crusher and stockpiles • Concrete batching plants (post 2013) • Multiple mobile power generators and temporary fuel storage (double wall iso-containers) • Heavy equipment parking and maintenance facilities • Ore crushing facilities and conveyor systems (post 2013) • Ore stockpiles with associated runoff water polishing ponds (post 2013) • Contaminated snow holding pond (post 2013) • Landfarm for treatment of contaminated soil (post 2013) • Non-hazardous Landfill • Hazardous waste, recyclable waste, used tires and other miscellaneous waste storage area • Waste management building • Ore crushing and screening facilities for railway transportation (post 2013) • Ore stockpiling facilities and runoff water ponds (post 2013) • Railway loading and unloading facilities (post 2013) • Operation worker accommodations • Communication systems • Site roads • Heavy equipment fleet parking and heavy equipment maintenance facilities • Multiple laydown areas • Airstrip existing and upgraded to accommodate Boeing 737s and similar sized aircraft • Helicopter landing pad and hangar • Bulk fuel storage and distribution facilities • Bulk AN storage building and explosive manufacturing and storage • Domestic water supply from adjacent Camp Lake • Power generation for the camps • Main waste water treatment facilities discharging to either storage ponds or Mary River • Waste water treatment facilities for old exploration/bulk sample camp facilities discharging to storage ponds / Sheardown Lake.

Runoff from areas of intense vehicular activities is susceptible to contamination from small spills/leakage from machinery and equipment. As a general rule, the mitigations measures identified in Section 4.0 will divert non contaminated runoff away from these areas. During the design and site preparation, efforts will be made to channel runoff from these areas to polishing/sedimentation structures which will enable monitoring of runoff quality prior to discharge to the receiving environment. The discharge will be equipped with the appropriate erosion prevention measures and adequate silt containment structures as outlined in Section 4.0. Fuel storage, explosives storage, and hazardous substances storage will be confined within impermeable bermed structures (geomembrane). Runoff from these contained areas will be collected in a sump and treated if required (refer to specific sections on bulk fuel storage, explosives and laydown/stockpile areas in this chapter).

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6.3.1 *Ore Stockpile, Crushing Plant and Maintenance Facilities*

These facilities will cover a significant area of a small watershed north of Sheardown Lake. The water management structures constructed to capture runoff from disturbed areas and from the ore stockpile will divert this runoff to Mary River. As a result, potential impacts (reduction in flows) have been identified for the small streams that are presently draining this sector and flowing to Sheardown Lake. As discussed in Volume 7, some of these streams may have good fish habitat. Additional data will be collected during the construction phase to assess more accurately whether or not this is a potential impact (i.e., follow-up). Once this information is available, the Project will adopt a tiered mitigation strategy as follows:

a) Monitoring/Fish Salvage: Monitor the streams during late summer and fall to determine if Arctic char are becoming stranded and, if so, conduct a salvage fishery to move the fish downstream to Camp / Sheardown lakes;

b) Potential Channel Enhancement: If the potential for stranding is identified in a particular stream, assess the potential for improving connectivity between upstream habitat and Camp / Sheardown Lake and, if feasible improve connectivity;

c) Install Fish Barriers: If stranding is identified as a serious and chronic issue in a particular stream, and restoration of connectivity is not considered possible/feasible, as a last resort, consider the installation of a fish exclusion barrier at the mouth of the stream.

6.3.2 *Contaminated Snow Pond and Contaminated Soil Landfarm*

Lined ponds will be constructed to receive snow contaminated by accidental fuel and oil spills. Water will be collected from this pond during the summer month and treated, as required, to removal contaminants (refer to Fresh Water, Sewage and Wastewater Management Plan, Oily water treatment, Attachment 5, Appendix 10D-3).

A contaminated soil landfarm facility will be constructed to receive and treat hydrocarbon contaminated soils. Treated soils that meet appropriate criteria will be used as landfill cover material or other acceptable purposes.

6.3.3 *Surface Water Direction and Quantity*

Ultimately the surface water at the site is directed towards Camp, Sheardown and Mary River. The estimated surface water runoff quantities for each catchment area are shown on Table 4.1. The direction of surface water flow can be seen in the site drainage plan which has been provided in Appendix A.

6.3.4 *Mitigation Measures*

Sediment and erosion control measures may be required and will be installed as per Section 4.0, Mitigation Measures. The site will be regularly monitored (Table 10.1). The stockpiles will be located a minimum of 30 m from the normal high water mark of water bodies.

A minimum 100-metre naturally-vegetated buffer shall be maintained between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching except where authorized by the authority having jurisdiction.

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6.4 Railway construction

Figure 1.1 of the "Quarry Management Plan" presents the alignment of the railway along with locations of potential borrow sites and quarries, and, the location of the railway construction camps. The creek and river crossings subject to an authorization under the Fisheries Act, or, an approval under the Navigable Waters Protection Act have been identified. The associated potential loss of fish habitat is the subject of Baffinland's Fish Habitat Compensation Plan (Appendix 10D-7). No construction is planned along the rail alignment during 2013.

6.4.1 Railway Construction Camps

Construction camps will be established along the railway alignment, one near the major crossing of Cockburn Lake and the other north of Cockburn Lake mid-way to Ravn River. These camps will have an occupancy ranging in the order of 100 to 200 people. Consideration is being given to locating two smaller construction camps at key bridge locations. A partial list of the facilities required for the construction and operation phases is presented in Table 6.3.

Table 6.3: List of Facilities for Railway

Temporary (Construction Phase)	Permanent (Operation Phase)
• Construction access roads	• Railway embankment
• Quarries and borrow sources	• Train loading and unloading facilities
• Construction camps	• Communication systems
• Refuelling depots at camps and quarries	• Tunnels, bridges
• Explosives magazines	• Rail sidings

6.4.2 Mitigation Measures

The Railway Camp Sites are not expected to have significant areas of disturbed soils and as such should not have sediment and erosion issues. The sites will be regularly monitored (Table 10.1). Where mitigation measures are required to control sediment and erosion they are selected and installed as previously discussed in Section 4.0, Mitigation Measures.

A minimum 100-metre naturally-vegetated buffer shall be maintained between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching except where authorized by the authority having jurisdiction.

6.4.3 Railway Route and Tunnel

The railway will be constructed from Steensby Port by first building the construction access road, then establishing construction camps to facilitate construction of the railway from multiple faces. The location of proposed quarries, construction camps and the construction access road is shown on Figure 1.1 of the "Borrow Pit and Quarry Management Plan" (Appendix 10D-6). A list of the facilities required for the construction and operation phases is presented in Table 6.3.

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6.4.4 *Water Crossings*

A number of crossing structures are required along the route, including large bridges, smaller single-span bridges and culverts.

A hydraulic design study was carried out to assess suitable hydraulic design criteria for culverts and bridges in order to avoid flooding of the railway infrastructure or any unexpected damage to the adjacent ground (Dillon, 2008b). Culvert capacities and bridge locations were assessed using a river hydraulics analysis software package assuming an appropriate return period (as determined in the associated Hydrology Design Brief (Dillon, 2008c)) with an allowance made for ice accumulation.

The identification of appropriate engineering options for each crossing was carried out using a systematic decision making process to evaluate each of the 214 crossings presented in the Mary River Development Proposal (Baffinland, 2008). This process took into account engineering and environmental factors at each crossing location. Screening and detailed evaluations were performed to aid in determining the optimum site-specific crossing at each location (i.e. culvert or bridge). Decision-making criteria which were used included: potential impacts to freshwater aquatics, hydraulic conditions, ease of construction and cost.

A preliminary assignment of crossing structures for each drainage crossing along the railway has been completed. At the majority of locations corrugated steel pipe (CSP) culverts will be used. Alternatively, corrugated structural plate pipe (CSPP) culverts will be used, as required. Corrosion protection will be provided using rip rap.

In addition to major bridges, several shorter bridges will be required over smaller watercourses. These short bridges will likely be simple single-span structures. Standard arctic foundation construction techniques similar to those used in northern Canadian mining and infrastructure projects, such as embedding piles in bedrock or the use of ad-freeze piles, have been assumed. Additional geotechnical investigation is planned to facilitate the final foundation designs to be developed in the detailed design phase. Special consideration, especially for foundations, will also be given to the potential effects of climate change, which could increase the depth of the permafrost active layer.

Culverts have been designed in accordance with AREMA. Corrugated steel pipe is recommended for ease of construction and to avoid any major maintenance needs. In general, a minimum of 1-m cover shall be provided above all culverts.

Conceptual drawings of 24 bridges for the Mine Site, Cockburn Lake, Ravn River and BR-137 (un-named) watercourses are included in the EIS Volume 3, Project Description (Appendix C5). Several shorter bridges will be required over smaller watercourses and the majority of drainages to be crossed using culverts. Typical open deck single span bridges and culvert designs in thaw-stable and thaw-sensitive ground are also included.

6.4.5 *Spoil Deposits for Railway*

Spoil material excavated during the construction of the railway will be placed in deposits. This spoil material will consist of materials unsuitable for construction (i.e., silty and ice rich soils. The Spoil Deposits will be located and constructed with the following considerations:

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- Located in natural depressions or in spent quarries or borrow areas.
- Located a minimum of 31m from all water bodies.
- Constructed sufficiently far from the railway and road alignments to avoid changing the thermal regime of these structures.

6.4.6 *Surface Water Direction and Quantity*

The catchment areas for the Railway Route are shown on Figure 5.5 of the Appendix. The surface water along the corridor is ultimately directed to Cockburn River, Cockburn Lake, Ravn River and Angajurjualuk Lake. Specific surface water runoff quantities were not calculated for the transportation corridor due to the large catchment area and the minimal quantity of water required.

6.4.7 *Mitigation Measures*

Sediment and erosion control measures may be required and will be installed as per Section 4.0, Mitigation Measures. The site will be regularly monitored (Table 10.1). The stockpiles of spoil material will be located a minimum of 30 m from the normal high water mark of water bodies.

Fuel required will be transported in fuel drums or double walled day tanks. Drip pans are used under the tanks to prevent spills.

All bridges and culverts crossings have been designed for an appropriate hydraulic event return period with allowance made for ice accumulation.

For all construction works requiring the use of explosives in or near water, Baffinland and its EPCM contractor will adhere to the Guidelines for Use of Explosives In or Near Canadian Fisheries Waters.

For each stream/river crossing an assessment is made regarding the potential loss of fish habitat. Some of these crossings will result in the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat under Section 35(2) of the Fisheries Act, and an authorization will be sought from the Department of Fisheries and Oceans. HADDs are expected at a portion of the watercourse crossings, for water intake and sewage outfalls. The compensation plan for the HADD is the subject of the Fish Habitat Compensation Plan.

A minimum 100-metre naturally-vegetated buffer shall be maintained between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching except where authorized by the authority having jurisdiction.

6.4.8 *Borrow Pits and Quarries required for the Railway Construction*

Locations of the potential borrow sites and rock quarries are shown in the “Quarry Management Plan” for the railway (Appendix 3B, Attachment 6). As stated in the EPP and the Borrow Pit and Quarry Management Plan, the following guidelines will be applied for sourcing borrow material and quarries:

- Surficial borrow materials will be obtained by stripping and excavation of the active layer;

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- Processing of borrow materials will be limited to screening using a grizzly and segregation of material into temporary stockpiles;
- Excavation will not occur within 31 m of a watercourse, and seasonal drainage ways will be re-established during pit development;
- Rock quarries may be developed for various construction purposes;
- Rock will be obtained through drilling and blasting, and crushing if necessary;
- Quarrying will not occur within 31 m of a watercourse, and drainage will be re-established during quarry development;
- Acid rock drainage (ARD) and metal leaching (ML) tests have been conducted on rock samples, with results indicating that, due to the physical environment and the geochemistry of the rock, ARD and ML are very unlikely to occur from quarry materials. If samples from any quarry indicate a potential to generate ARD then that quarry will not be developed.

6.5 Steensby Port

The Steensby Port and the locations of potential borrow pits and quarry sites are shown in the Type 'A' Water License application , Attachment 9 (FEIS, Appendix 3B) in the drawing titled 'Steensby Inlet Temporary Works Site Layout', Doc. No. H337697-4690-10-014-0001. An overview of the facilities required for the construction and operation phases is presented in Table 6.4. Although additional facilities may be added or decommissioned throughout the life of the Project, relevant mitigation measures will be incorporated as required in the design, construction and operation of such facilities. No construction work is planned during 2013.

Table 6.4: Overview of Facilities at Steensby Port

• Construction docks	• Ore stockpiling facilities
• Quarry and borrow sites, and related access roads	• Ore, freight and tug docks
• Concrete batch plant(s)	• Ship loading and unloading facilities
• Bulk fuel storage and distribution facilities	• Cargo (container) handling facilities
• Power plan	• Permanent worker accommodations
• Construction workshops and maintenance shops	• Rail shops and maintenance infrastructure
• Warehouses/stores	• Buildings and offices
• Temporary power generators	• Communication systems
• Laydown areas/freight storage	• Site roads
• Parking areas for construction fleet	• Causeway
• Temporary fuel storage (iso-containers)	• Laydown areas/freight storage
• Explosives plant and magazines	• Water supply facilities
• Airstrip	• Waste management facilities
• Construction worker accommodation and related facilities	• Navigational aids (shipping lane and port)

Runoff from areas of intense vehicular activities is susceptible to contamination from small spills/leakage from machinery and equipment. As a general rule, the mitigations measures

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identified in Section 4.0 will divert non contaminated runoff away from these areas. During the design and site preparation, efforts will be made to channel runoff from these areas to polishing ponds which will enable monitoring of runoff quality prior to discharge to the receiving environment. The discharge will be equipped with the appropriate erosion prevention measures and adequate silt containment structures as outlined in Section 4.0. Fuel storage, explosives storage, and hazardous substances storage will be confined within impermeable bermed structures (lined with geomembrane). Runoff from these contained areas will be collected in a sump and treated if required prior to release to the receiving environment.

6.5.1 Steensby Port Docks Construction

Construction Docks

To provide rapid and efficient unloading of a large volume of equipment and materials at Steensby Port early in the construction phase, two construction docks will be installed during the open water season in Year 1 of construction. One dock will be situated on the island to facilitate construction of the ore dock and ore handling systems, and the other on the mainland to support all other construction activities at Steensby Port.

The docks will be constructed by placing a concrete caisson out into the water, and backfilling a ramp or causeway to the caisson. Concrete caissons will have been mobilized to Steensby Port during the previous open water season. A level pad will be prepared for the caissons by placing aggregate, the caissons will be moved into place and ballasted (backfilled) with local aggregate. The ramp to the caissons will be constructed by placing and compacting local aggregate (refer to FEIS Volume 3, Project Description for construction dock details).

The docks will allow barges and shallow draft ships to go dockside and mobile handling equipment and cranes to operate from the dock. At the end of construction, the ballast will be removed from the caissons and the caissons removed for re-use at another location or disposal. The ramp will be left in place permanently, adding structure to the seabed and improving fish habitat.

Ore Dock

The ore dock will consist of a dock structure on discrete caissons. The dock will be constructed by blasting and dredging level pads for each of the caissons, placing and backfilling the caissons, and completing the dock superstructure. The levelling of the seabed at the -25 m contour will be carried out through blasting and dredging. Dredged materials are likely to be contained on barges until used as backfill. Concrete caissons will be floated into place and then backfilled with dredged and excavated materials as well as local aggregate.

In-water blasting will be carried out by an experienced contractor following a blasting plan to be developed and filed with the Department of Fisheries and Oceans, meeting their published overpressure guideline of 100 kPa.

Freight Dock

A freight dock to support the Project during the operation phase will be constructed. The freight dock will allow for the safe and efficient unloading of the large volumes of fuel,

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ammonium nitrate to manufacture explosives, and other consumables and replacement equipment to be delivered each year of operations.

The freight dock will be constructed by installing a row of four caissons for the dock face and backfilling behind the caissons to provide a large dock for turnaround of equipment. The dock will be constructed by placing fill to form level pads for each of the caissons, placing and backfilling the caissons with locally quarried aggregate, and completing the dock superstructure and backfilling the land side. Unlike the ore dock, construction of the freight dock will not involve underwater blasting.

The dock will have a minimum draft of -13 m below the low water level. In addition to a large working area for vehicles and cranes for off-loading, a fuel off-loading manifold will be located on the dock to allow for dock to shore fuel transfers.

Mitigation measures for dock construction

Construction of the docks will necessitate piling, installation of casing and backfilling. Detailed construction methods will be established by the EPCM contractor and the contractor undertaking the construction of the docks.

During construction of the docks, for all works requiring the use of explosives (blasting) in or near water bodies, the “Guidelines for Use of Explosives In or Near Canadian Fisheries Water, 1998” will be followed. For any locations where the guidelines cannot be conformed with, the DFO will be consulted prior to commencing blasting.

Bubble curtains may also be used to attenuate the noise generated during blasting and piling.

During dock construction (piling, backfilling), silt curtain may be used to prevent the dispersion of sediments in marine waters.

6.5.2 *Crossing to Island*

A causeway structure will be constructed to provide the necessary link between the ore dock, stockpiles and ship loading facilities on Steensby Island, and all other infrastructure on the mainland. The crossing structure will support conveyors that will move ore from the railway car dumper to the ore stockpiles on the island. The structure will also allow for the movement of vehicles between the island and the mainland.

The causeway will be built from both directions by placing blasted rock that is appropriately sized to withstand ice loading. Construction of the causeway will take place during the open water season, and no blasting will be required during its construction.

6.5.3 *Contaminated Snow Pond and Contaminated Soil Landfarm*

Lined ponds will be constructed to receive snow contaminated by accidental fuel and oil spills. Water will be collected from this pond during the summer month and treated, as required, to removal contaminants (refer to Appendix 10D-3, Fresh Water Supply, Sewage and Wastewater Management Plan, Oily water treatment).

A contaminated soil landfarm facility will be constructed to receive and treat hydrocarbon contaminated soils. Treated soils that meet appropriate criteria will be used as landfill cover material or other acceptable purposes.

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6.5.4 *Surface Water Direction and Quantity*

The catchment areas for the Steensby Port are shown on Figure 5.4 in the appendix. The surface water at the site ultimately reports to Steensby Port. The estimated surface water runoff quantities are shown on Table 4.3.

6.5.5 *Mitigation Measures*

Where appropriate, the environmental protection measures implemented during construction will be retained for the useful life of the facilities (until closure). Several sedimentation pond and drainage structures will be installed at the on-set of construction. During the operation period, the Steensby Port is not expected to have significant areas of disturbed soils and as such should not have sediment and erosion issues. The site is regularly monitored (Table 10.1). If mitigation measures are required to control sediment and erosion they are selected and installed as previously discussed Section 4.0, Mitigation Measures.

Shallow groundwater monitoring stations will be established downstream of major infrastructure (i.e. landfill, landfarm, etc.) to draw samples from the subsurface ~ 2 meter deep active zone to ensure that groundwater has not been impacted. Samples will be taken from the monitoring stations once a year during the period of greatest active zone thickness (late August). Standard well installation monitoring and sampling methods will be followed.

6.6 Bulk Fuel Storage Areas

During construction and operation, the handling and storage of fuel is one of the highest risks of potential impact to the receiving environment. The following section provides a brief overview of the bulk fuel facilities. Detailed requirements for management of the bulk fuel depots are presented in the Emergency Response Plan, the Milne Port OPEP and the Steensby Port OPEP.

6.6.1 *Description*

Milne Port Fuel Delivery during Construction

Tankers of 10 to 20 ML capacity will enter Milne Inlet during the open water shipping season and fill the tank farm by the floating hose method. The ship to shore fuel transfer operation is subject of the Milne Port OPEP (Appendix 10C-2).

Milne Port Fuel Storage and Distribution

The existing 8 ML bladder fuel storage facility will be decommissioned and replaced with a new tank farm.

Local fuel use will be dispensed at the tank farm, and remote work sites along the road such as borrow areas will likely be serviced by positioning 20,000 L double-walled iso-containers with contained dispensing areas. Fuel will be transported to the Mine Site by 30,000 L capacity truck tankers over the Milne Inlet Tote Road.

Additional lined storage capacity will be added, if required, to contain additional bulk lubricating oils and antifreeze delivered by sealift.

Mine Site Fuel Storage and Distribution

The existing bladder farm will be decommissioned. A new tank farm will be constructed. The tank farms will be equipped with an engineered containment system lined with

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geosynthetic liners. Day-to-day refuelling of vehicles will be carried out at a fuel filling depot. Aircraft and the equipment in the pit will be refuelled using a fuel truck.

A separate diesel storage tank and dispensing facility will be provided for the mining equipment located at the mining area. Fuel trucks will be used to transport diesel fuel from the main tank farm to the mine storage tank.

Various diesel fuel day tanks ranging in size from 1,000 L to 40,000 L will be located across the mine site as required, such as the power plant, boilers, mine dry, water intake pump house, incinerator, and explosives emulsion plant. With the exception of remote locations such as the water pump house and explosives plant, the diesel day tanks will be supplied by the fuel distribution pipeline from the tank farm.

Jet fuel required for turbine engine aircraft and helicopters will be stored in a storage tank, located within a lined containment area.

Bulk antifreeze and heating glycol fluids will be stored in the power plant and maintenance complex. The storage capacities will be based on the anticipated consumption required for a minimum operating period of 12 months. The annual antifreeze quota will be stored in the same area as the lubricant storage tanks, based upon the following estimated requirements:

1. Antifreeze (coolant) tank
2. Power plant glycol initial fill of heat recovery and distribution systems.
3. Building heating circuit.

The premixed glycol solution will be transported to the port by sea and then by rail to the mine where the system will be filled directly.

Lubricating oils for the power plant and maintenance shop will be stored in bulk tanks ranging in size from 12,000 L to 200,000 L. Waste oil will be collected in a common sump linked to a receiving tank from which it will be pumped to the above waste oil storage tanks. Every year, the waste oil will be sent back to the supplier for recycling. Approximately 1 ML of used lubricating oil will be produced annually, with approximately 440,000 L used for fuelling the secondary chamber of the incinerators and the remainder being shipped back south to a refinery for recycling.

A dedicated bulk fuel storage facility will store and dispense Aircraft fuel to fixed wing aircraft and helicopters. De-icing facilities, provided at the airstrip, will consist of a portable discharge pump for the application of de-icing fluid from 200 L drums. De-icing will be carried out to the side of the runway, with propylene glycol, a biodegradable fluid which requires no treatment. Alternately, aircraft may be refuelled directly from a mobile fuelling truck.

Fuel Transport to Mine Site for Operation Phase

Fuel will be re-supplied to the Mine Site using a fleet of tanker trucks capable of self loading and discharging. The Mine Site tank farm will be re-supplied from the tank farm at Steensby Port; railway fuel cars will transport fuel to the mine on a weekly basis. A fuel unloading facility will be provided to facilitate quick unloading of diesel rail tankers, five at a time. This

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unloading facility will be mounted on a concrete spill containment pad equipped with a collection sump to contain fuel spills.

Fuel tanker cars will be used to transport fuel, and most freight will be transported in containers to facilitate handling from ship to shore to rail.

Railway Construction Phase - Fuel Storage and Distribution

The primary fuel storage supporting railway construction will be the large tank farms at the Mine Site and Steensby Port. Smaller temporary tank farms, consisting of multiple 20,000 L capacity double-walled iso-containers, will be established at construction camps, quarries and major bridge sites. These smaller tank farms will be re-supplied using tanker trucks. Equipment at the railway construction camps will be refueled using smaller fuel trucks.

Steensby Port Fuel Storage and Distribution

A large volume of fuel will be required at Steensby Port early in the construction phase. The development of fuel storage capacity at the port site will occur in stages.

Fuel will be brought in double-walled skid mounted 100,000 L capacity ISO tanks until the permanent tank farm is constructed and operational. Temporary storage for fuel will consist 2 ML in double-walled 100,000 L capacity ISO tanks. Secondary storage during this period, at quarries and other work areas, will consist of 20,000 L double-walled storage tanks.

The permanent tank farm will consist of four 40 ML capacity steel tanks. A pipeline will be installed from the tank farm to the permanent freight dock to allow for dockside fuel deliveries. Before the freight dock is constructed, the tank farm will be re-supplied from tankers using the floating hose fuel transfer method.

Ore carriers will not be re-fuelled at Steensby Port, and fuel will be delivered to the freight dock as part of normal operations. One 7.5 ML storage tank will nevertheless be located on Steensby Island to supply the tugs and ice management vessels. Fuel will be delivered to this table by truck from the main tank farm.

The main tank farm fuel system will distribute fuel to the following locations:

- Power plant
- Heavy and light equipment fuel pumps
- Heating boiler building
- Railcar fuel loading station.

In addition to the main tank farm, a number of day tanks will be required within the port site, ranging in size from 2,000 to 50,000 L in capacity and located in- and outside of the power plant, boiler building, at fuel dispensing stations for light vehicles, and the incinerator.

6.6.2 Mitigation Measures

Temporary and permanent storage facilities will be erected within a bermed and impermeable lined containment area in compliance with applicable regulations and best management practices. These containment areas will have a capacity of 110% of the largest tank. The

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design of tank farms is consistent with the document entitled “Design Rationale for Fuel Storage and Distribution Facilities” published by the Department of Public Works of the North West Territories. The lining within the bermed area is an impervious HDPE liner membrane.

Refuelling stations are equipped with a lined and bermed area to contain minor spills or leaks during refuelling. The liner (e.g., 40 mm hypolon liner or equivalent) is protected by sand bedding. Vehicles and mobile equipment drive onto this bedding for refuelling. All fuel transfer is done by pumps.

Smaller temporary tank farms and secondary storage consisting of multiple 20,000 L capacity double-walled iso-containers will be established at construction camps, quarries and major bridge sites. These smaller tank farms will be re-supplied using tanker trucks. Equipment at the railway construction fronts will be refuelled using smaller fuel trucks.

For each method of fuel storage and transfer, specific procedures related to fuel storage and transfer will be developed, and proper containment and emergency response equipment will be provided to meet or exceed regulatory requirements (Refer to EPP procedures, Appendix 10B). The Emergency and Spill Response Plan will govern land-based operations, and a Transport Canada approved Oil Handling Facility (OHF) Plan (Milne Port OPEP and Steensby Port OPEP) will govern ship to shore fuel transfers.

6.7 Explosives Storage

The Explosives Management Plan (Appendix 10C-4) outlines the requirements for the management of explosives for the Mary River Project.

6.7.1 Mitigation Measures

All permanent and temporary explosive storage facilities will be designed and constructed in compliance with regulations (refer to Explosive Management Plan). As per regulatory requirements, the storage sites will be fenced, and erected within secondary containment structures (berms). The EPP (Appendix 10B) will outline handling procedures for handling, storage and use of explosives.

6.8 Laydown

6.8.1 Description

For the construction phase, several laydown areas will be constructed at Milne Port, Mine Site, along the railway temporary construction road and Steensby Port, to enable storage of equipment and material required for the construction of the facilities. The EPP (Appendix 10B) provides procedures and guidance for the preparation of laydown areas.

6.8.2 Mitigation Measures

Contouring, berms and silt fences will be applied as necessary for sediment and erosion control. Sediment and erosion control measures will be required and will be installed as per Section 4.0, Mitigation Measures. The site will be regularly monitored (Table 8.3).

6.9 Ore Stockpile at Steensby Port

Ore will be transported to Steensby Port for shipment. The Mine Site and Steensby Port will have significant ore stockpiles (refer to EIS volume 3, Project Description). The locations of

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these stockpiles along with the water management structures associated with them are presented in the Type 'A' Water License application, Attachment 9 in the drawings numbers H337697-4210-10-014-0009 (Mine Site Proposed Drainage Works), and H337697-4610-07-042-0003 (Steensby Inlet Environmental Monitoring Plan Site Layout – Appendix 3B, FEIS).

At each location, the runoff from the ore stockpile will be routed to sedimentation pond prior to discharge to the receiving environment. The discharge will be subject to water quality as established in later sections of this management plan.

7. Water Management – mining operation

In the Type 'A' Water License Application, Attachment 9 (FEIS, Attachment 3B) in the drawing titled 'Mine Site Permanent Works Water Supply and Wastewater Disposal GA Plan', Doc. No. H337697-4310-10-042-0001 presents the site plan of Mine Site for the Operation phase. For the mine infrastructure, the runoff management structures will have been established during the Construction phase. Where required, these structures will be maintained for the life of the project. However, the open pit mine and the waste rock stockpile will progress over time and the water management strategies and structures will have to be adapted to the terrain as these facilities expand. For a description of run-off management refer to "Stormwater Management and Drainage System Design" (H337697-0000-10-122-0001) included as Annex 1 of the Waste Rock Management Plan (FEIS, Appendix 10D-5).

7.1.1 Mitigation Measures

Sediment and erosion control measures may be required and will be installed as per Section 4.0, Mitigation Measures. Berms and other drainage control measures will be established as needed to limit erosion and maintain positive drainage to minimize water ponding. Contouring, berming and silt fences will be applied as necessary for sediment and erosion control. The site will be regularly monitored (Table 10.1).

7.2 Open Pit and Related FACILITIES

During operations the open pit and mine site will consist of:

- Mine haulage roads
- Run of mine (ROM) ore stockpile
- Ore stockpiles (lump and fines) including stacker/reclaimer system
- Primary crusher
- Secondary crushing
- Explosives magazines and emulsion plant
- Waste rock dump

The open pit will be excavated using a conventional bench configuration with access via ramps. Movement of vehicles within the pit will be monitored by a central dispatching system

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in order to ensure worker health and safety and operational efficiency. The general dimensions of the final open pit based on the preliminary design presented in the FEIS will be:

- Maximum length: 2.0 km
- Maximum width: 1.2 km
- Depth ranging from 465 m (northern side) to 195 m (southern side)

7.2.1 *Groundwater inflows into the pit*

The general consensus is that groundwater inflows are likely to be minimal below the active zone. Comparison have been made with operations at three mine sites at northern latitudes including the Polaris, Ekati, and Diavik mines, of which the Ekati mine is most similar to the Mary River. The Ekati pits were developed in competent granite that was cut by moderate faults. The base of permafrost at the Ekati mine was encountered at approximately 350 to 400 meters. Other than near the surface, groundwater was not encountered in the pits until mining was below permafrost. Based on this data, the Mary River pit is not likely to have much groundwater inflow below the active layer because it also will be developed in competent bedrock, has generally colder mean temperatures, is topographically higher, has minimal faulting, and has a deeper permafrost zone.

The Polaris underground mine, also located in Nunavut, had problems with groundwater coming into the mine which caused temporary closure of the mine. However, the water inflows were due to thawing of permafrost in ice-rich rock (shale) due to the ventilation system, rather than natural groundwater inflow. The ventilation system was subsequently renovated and there were no additional problems with underground water accumulations in the mine as it was extended to a total depth of approximately 450 meters. The mine was not extended deeper due to incompetence of the shale, rather than groundwater inflow problems.

For the Mary River mine pit, geotechnical investigations have included the drilling of a 400 m deep drillhole that was instrumented with thermistors along its length. The thermistors report ground temperatures at various depths within the hole. Extrapolation of temperature gradients with depth suggests that permafrost conditions (i.e., below zero degrees Celsius for two consecutive years) extend to approximately 700 m, well below the planned mine depths. As such, water inflows into the pit are expected to be minor, consisting of shallow seasonal groundwater flows and direct contribution from precipitation events.

Drifting snow is not expected to contribute significantly to in-pit water volume. A snow fence will be erected around the perimeter of the pit to minimize intake of drifting snow.

Pit water quality will be monitored and transported to a sedimentation pond prior to discharge to the receiving environment.

7.2.2 *Surface Water Direction and Quantity*

The catchment areas for the Mine Site are shown on Figure 5.1 of the appendix. Ultimately the surface water at the site is directed towards Camp, Sheardown and Mary Lakes. The estimated surface water runoff quantities for each catchment area are shown on Table 4.1.

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7.3 Waste Rock Pile

The waste rock stockpile is located directly north of the mine pit as shown in the mine site layouts provided in the Type “A” Water License Application, Attachment 9. The Waste Rock Management Plan (Appendix 10D-5) addresses the specific requirements for management of the waste rock and includes the document “Stormwater Management and Drainage System Design”.

The total capacity of the waste rock stockpiles is expected to be on the order of 640 Mt. Any waste rock classified as potentially acid-generating will be stored in designated areas within the waste rock stockpile to limit its potential for contact with meteoric water and also its exposure to oxidizing conditions.

7.4 Mine Site Crushing Operations

Crusher locations are provided in the Type ‘A’ Water License application, Attachment 9 (FEIS, Appendix 3B) in the drawing titled ‘Mine Site Permanent Works Water Supply and Wastewater Disposal GA Plan’, Doc. No. H337697-4310-10-042-0001. Ore from the open pit or the ROM stockpile will be processed by crushing to a suitable size for rail transport. The primary objective of the crushing systems is to maximize the production of lump product (-30 mm/+6 mm), while at the same time, keeping ore fines (-6 mm) at a minimum, since lump product has a greater value for sale.

The crushers are installed inside buildings. Material handling equipment, including reclaimers, stackers and conveyors are installed outdoors. Conveyors will be enclosed to reduce wind exposure and potential for ore fines to be blown off the conveyors. Dust collectors will be installed at transfer points and other required areas to limit fugitive dust emissions.

Runoff from the area will be directed to surface drainage and appropriate sediment control structures will be installed as required.

7.4.1 Surface Water Direction and Quantity

The catchment areas for the stockpiles and crusher operations in the vicinity of the Mine Site are shown in the Type ‘A’ Water License application, Attachment 9 (FEIS, Appendix 3B) in the drawing titled ‘Mine Site Permanent Works Water Supply and Wastewater Disposal GA Plan’, Doc. No. H337697-4310-10-042-0001. Surface water in this area is first directed to a sedimentation pond and then release to the receiving environment if it meets discharge water quality guidelines.

7.4.2 Mitigation Measures

Sediment and erosion control measures may be required and will be installed as per Section 4.0, Mitigation Measures. The site will be regularly monitored (able 8.1).

7.5 Railway Route

The railway will be used to transport iron ore from the mine site to the port located at Steensby Port, it will be approximately 150 km long. The basic design is for a heavy haul mineral railway, although the line will also carry some mixed general freight traffic to supply the mining operation. The proposed railway system will consist of:

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- Rail line and embankment - including tunnels, bridges and sidings
- Crossings - across watercourses and drainages
- Yards and terminals - including rail loop, coupling and turn-around
- Supporting facilities - including maintenance and emergency facilities
- Train - including locomotives (engines) and cars
- Cargo
- Signalling and telecommunications

7.5.1 Mitigation Measures

The railway corridor will be inspected weekly. Necessary repair to the railway bed, bridges, stream and creek crossings will be scheduled as required.

8. Roles and Responsibilities

8.1 Organisation 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 1 below. Communication channels are described as liaisons in the tables outlining the responsibilities and accountabilities in the following sections.

8.1.1 Environmental Project Team

8.1.1.1 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 8-1.

Table 8-1: 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

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Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
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

The Baffinland Environmental Team will oversee all environmental activities on site. These responsibilities on site are outlined in Table 8-2.

Table 8-2: 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

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Baffinland Iron Mines Corporation On-Site Management Team	
	- 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

8.1.1.2 *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 8-3 below.

Table 8-3: 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

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Construction Contractor(s)	
	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.

8.2 Monitoring and Inspection

The monitoring and inspection requirements are described in Section 10 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.

8.3 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

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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

8.4 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.

8.5 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.

8.6 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.

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8.7 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.

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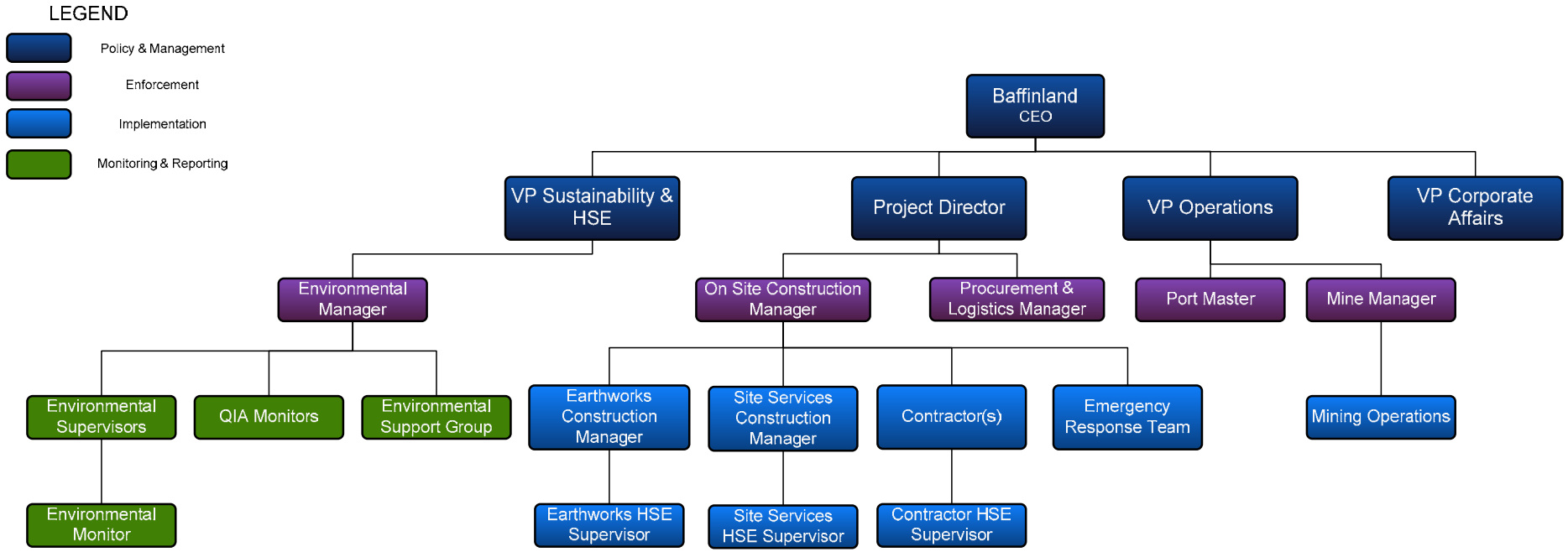

Figure 1

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9. Performance Indicators and Thresholds

In terms of water quantity, the performance indicator is the on-going compliance with the terms and conditions of the Water Licence.

Table 9.1: Water Quantity Performance Indicator (to be updated on the basis of Type A Water License, when issued by NWB)		
Construction Phase		
Source	Permitted Quantity	Expected Consumption
Milne Inlet - Philips Creek		
Tote Road - Km 26 Lake		
Milne Inlet - Km 32 Lake		
Tote Road - Katiktok Lake		
Tote Road - BG28		
Mary River - Unnamed lake north of camp		
Mary River		
Mary River – Camp Lake		
Railway – Unnamed Lake (summer)		
Railway - Unnamed lake supplying Ravn camp (winter)		
Railway - Cockburn Lake		
Railway - Various lakes and ponds along railway alignment		
Steensby - 3km Lake		
Steensby - Lake ST27		
Steensby - 10km lake		
Steensby - Local ponds		
Steensby – Ocean (hydrotest)		
Operation Phase		
Source	Permitted Quantity	Actual Consumption
Milne Inlet - Philips Creek		
Milne Inlet - Km 32 Lake		
Mary River		
Mary River – Camp Lake		
Steensby - 10km lake		

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In terms of surface water quality, both visual inspection and sampling/analytical results are used as indicators. During routine inspections, any indication of elevated TSS level or visible oil sheen will result in immediate corrective action. For the sampling and analytical results, the indicators of water quality will be developed and presented in a format similar to Table 9.2. The table will be updated once the Type A licence is issued and the Water Licence parameters and criteria are known. The current surface water quality performance indictors under the existing Type B licence are presented in Table 3.2 of the Comprehensive Environmental Monitoring Plan.

Table 9.2: Surface Water Quality Performance Indicators – For All Location

Parameter	Average Concentration mg/L	Maximum Concentration of any Grab Sample mg/L	Actual mg/L (to be determine)

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10. Monitoring and Reporting Requirements

In addition to specific monitoring and reporting requirements under the regulatory approvals such as the water license, QIA land lease, land use permits and fisheries authorization, routine inspections of various aspects of the operations will be undertaken. Routine water management related inspections will be conducted at drill sites, camp sites and related infrastructure, roadways, and landforms generated in association with the Project development.

10.1 Routine Inspections

Routine inspections and water license monitoring is outlined below in Table 10.1.

Table 10.1: Routine Inspection and Monitoring

Site	Routine Inspection		
Milne Port Mine Site Steensby Port facilities Rail camp locations Milne Port Tote Road and Refuge stations	- Water management systems - Sediment and erosion control structures - Evidence of hydrocarbon staining or leaks from containment devices - Full-time supervision of fuel transfer operations - Water intakes - Flow meter readings - Rutting by vehicles		
Milne Port Tote Road Railway Construction Road Railway	- Sediment and erosion control structures - Fuel leaks - Drip Pans and Equipment condition - Any rutting by vehicles		
Spoil Deposit locations Tunnelling locations	- Sediment and erosion control structures - Evidence of hydrocarbon staining or leaks from containment devices - Fuel leaks - Drip Pans and Equipment condition - Rutting by vehicles		
Borrow sites and rock quarries	- Evidence of hydrocarbon staining or leaks from containment devices - Full-time supervision of fuel transfer operations - Sediment and erosion control structures - Drip Pans and Equipment condition		
Drill sites	Pre-drilling	Drilling period	Post drilling
	- Drillhole coordinates - Water source coordinates - Site photo - Water source photo - Distance to nearest water source - Archaeological approval	- Fuel leaks - Sediment and erosion control structures - Drip Pans - Equipment condition - Any rutting by vehicles - Water intake - Water management - Flow meter reading	- All materials and debris removed from site - Quantity of equipment, rods or casing left in the hole - Site photo - Water source photo - Water use assessment

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	- Completed wildlife survey		- Environmental concerns - Wildlife concerns
Waste Rock Stockpile	- Sediment and erosion control structures - Evidence of hydrocarbon staining or leaks from containment devices - Evidence of ARD and ML - Drip Pans - Equipment condition		
Bulk Fuel Storage Facilities Milne Port Mary River Steensby Port	- Primary containment structure - Evidence of hydrocarbon staining or leaks from containment devices - Equipment condition - Spill kit		
Explosives Storage Mary River Steensby Port	- Primary containment structure - Access and security - Equipment condition - Rutting by vehicles		
Laydown and storage areas	- Sediment and erosion control structures - Evidence of hydrocarbon staining or leaks from containment devices - Fuel leaks - Drip Pans - Equipment condition - Rutting by vehicles		
Routine inspection and site monitoring will be undertaken by the Construction Contractor's EHS Supervisor under the direction of the Baffinland Environmental Supervisor.			
The effects of the project on the permafrost along the railway and other project affected areas shall be monitored the integrity of the permafrost. Preventative measures will be undertaken to ensure that the integrity of the permafrost is maintained.			

10.2 Water Quality and Quantity Monitoring

The water quality/quantity program under the existing Type B Water Licence consists of several elements as follows:

a) Measurement, recording and reporting of water volumes extracted, as prescribed by the water license

b) Sampling, analysis and reporting of water quality, as prescribed by the water license

c) Weekly to monthly monitoring downstream of exploration drilling activities during periods of open water

Existing monitoring station locations, parameters, and water licence criteria for the existing Type B Water Licence are presented in Table 4.2 of the Comprehensive Environmental Monitoring Program. Water quality and quantity monitoring stations will be established under

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the future Type A Water Licence and once received, the Environmental Monitoring Program will be updated.

An exploration drill water quality monitoring program has been undertaken since 2005 at selected locations upstream (reference), downstream along the Mary River (potentially affected), and along steep seasonal flow channels that drain the rugged topographic terrain that characterizes the land surface in the vicinity of Deposits 1,2 and 3. The main objective of the monitoring program is to identify and measure *Contaminants of Potential Concern* in Mary River, both upstream at locations unaffected by drilling activities, and downstream at locations that may be potentially affected by drilling activities. Each year, the water quality monitoring program is dependent and specific to the planned scope of the drill program. The Environmental Superintendent will, in consultation with Operations personnel the annual exploration drill water quality monitoring program and ensure that it is implemented. The results of the monitoring program will be used to guide adaptive management measures, as appropriate.

10.2.1 Monitoring Stations

Signs will be posted in appropriate areas at Surveillance Network Program (SNP) Monitoring Stations, and will be located and maintained to the satisfaction of the Inspector. Monitoring Stations will be maintained at the locations identified. Existing monitoring station locations, parameters, and water licence criteria for the existing Type B Water Licence are presented in Table 4.2 of the Comprehensive Environmental Monitoring Program. New stations will be established under the future Type A Water Licence. During the site preparation activities that are planned during the May to July period under a new Type B licence, new monitoring stations have been established and are presented in the 2013 Site Drainage Plans for Milne Port and for the Mine Site and in Table 4.2 of the Comprehensive Environmental Monitoring Plan (CEMP). New SNP Monitoring Stations will be established under a future Type A licence and plans will be updated to reflect the monitoring stations and sampling/monitoring regime under a new Type A Licence.

10.2.2 Groundwater Monitoring

Shallow groundwater monitoring stations will be established downstream of major infrastructure (i.e. landfill, landfarm, etc.) where there are identified unacceptable risks to the receiving environment. Samples will be retrieved from the subsurface active zone which is typically less than two metres below grade at most locations. Field parameters will be measured and samples retrieved and sent for select analyses, depending on location and potential contaminants of concern. Typically samples would be collected once per year during the period of greatest active zone thickness (late August). Standard well installation monitoring and sampling methods will be followed. The groundwater monitoring network will be established and monitors installed in 2014. A terms of reference for a shallow groundwater study will be submitted to the NWB for review and comment prior to implementation.

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10.3 Construction and Operation Phases

The Nunavut Water Board (NWB) water license is the main regulatory instrument specifying the scope and details of the water quality monitoring program. The water quality monitoring will be conducted in accordance with a QA/QC Plan filed with the NWB. Baffinland's current QA/QC Plan is presented as an attachment to Comprehensive Environmental Monitoring Program.

This plan is currently sufficient for the existing Type B and new proposed Type B Water Licence activities and will be updated as required to satisfy the requirements under a future Type A Water Licence.

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11. Data Management and Reporting

11.1 Data Management

The Environmental Manager is responsible for data management and reporting related to waste management. The data management system includes conducting routine inspections and monitoring, and providing these results to appropriate parties as required.

11.2 Water Licence Reporting

- Monthly water license reporting requirements
- Project annual report that addresses Water Licence, NIRB and other's annual reporting requirements
- Review results in comparison to predictions
- Opportunity for continuous improvement

Since water is regulated by the Nunavut Water Board (NWB) through the water licensing process, there will be monthly water license reporting requirements. An annual Project report will be prepared that addresses requirements specified by the Water Licence, the Nunavut Impact Review Board (NIRB), and the landowners.

11.3 Stakeholder Reporting

Future arrangements regarding reporting could be made through the Inuit Impact Benefits Agreement (IIBA) or other mechanisms; this will be incorporated in future Plan updates.

12. Adaptive Strategies

Baffinland is committed to continual improvement in its work activities in the aim of reducing risks to the environment and improving operational effectiveness. The strategy employed at Baffinland is regular monitoring supported by operational change and adoption of other mitigating measures as warranted.

As per the requirements of Baffinland's HSE Management Framework, the company will conduct and document management reviews of its "Surface Water and Aquatic Ecosystem Management Plan" on a regular basis. Such reviews will ensure the integration of monitoring results for the waste management plan are integrated with other aspects of the Project and that necessary adjustments are implemented as required. These reviews also provide a formal mechanism to assess the effectiveness of the management in achieving the company's objectives and maintaining on-going compliance with Project permits and authorizations.

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