APPENDIX J19

INTERIM ABONDANMENT AND RECLAMATION PLAN

Baffinland Iron Mines Corporation

INTERIM CLOSURE AND RECLAMATION PLAN

BAF-PH1-830-P16-0012

Rev 4

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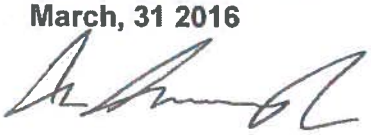

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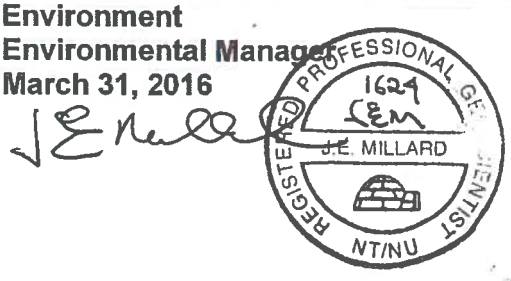

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06/07/2013	0	AG	EM	Approved for Use (H349000-1000-07-126-0012)
03/10/2014	1	JM	EM	Approved for Use (BAF-PH1-830-P16-0012)
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Index of Major Changes/Modifications in Revision 4

Material changes from the previous revision (rev 3) are indicated with revision triangles in the right hand margin of the page.

Item No.	Description of Change	Relevant Section
1	Updated Executive Summary	Section 1
2	Inclusion of reference to the Final Monitoring Agreement as prescribed by CP Section 12.2	Section 2.1.3.1
3	Minor changes to update the document to current project Table 3-1 Major Project Components	Table 3-1
4	Expanded discussion on pre-existing baseline conditions	Section 4
5	Updated Figure 5-1 : Summary of Conceptual Current and Proposed Progressive Rehabilitation Schedule	Section 5
6	Progressive Reclamation of Current Project Components	Section 5.1.1
7	Discussion of the agreed contaminated soil approach and how it related to Nunavut Contaminated Site Guidelines	Section 5.1.1.4
8	Updated Table 6-1	Section 6
9	Updated section on Open Pit Discussion	Section 9.2
10	Discussion on how duration of closure and post closure monitoring phases was determined	Section 10
11	Discussion on how residual effects were developed and significance evaluated	Section 11
12	Updated Closure and Post Closure Monitoring Programs	Section 13
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FOREWORD

This Interim Closure and Reclamation Plan (ICRP) outlines the closure objectives, activities and criteria associated with the closure and reclamation of the Mary River Project (the Project) as approved under Project Certificate No 005 and its Amendment No 1 issued by the Nunavut Impact Review Board (NIRB) on May 28, 2014.

The ICRP builds on the Preliminary Closure and Reclamation Plan (PCRP) which was reviewed and approved by the NIRB under Project Certificate 005 and its amendment, and, by the Nunavut Water Board (NWB) with the issuance of Type 'A' Water Licence 2AM-MRY1325 and Amendment No. 1. The ICRP reflects the requirements of Qikiqtani Inuit Association (QIA) Commercial Lease No. Q13C301 and requirements of Part J, Item 2 of the Type 'A' Water Licence, 2AM-MRY1325 - Amendment No. 1 which requires theMarch 2015 ICRP to be updated 60 days after the issuance of the amended Type A Licence, taking into consideration the items listed in Part J, Item 2. The revised plan is to address the relevant comments and recommendations provided by intervening parties during the review period for the Type A Licence amendment application..

The development of the PCRP and subsequent development of the ICRP is based on AANDC guidelines[1] which envisage three primary stages in the development of a Mine Closure and Reclamation Plan (or A&R Plan):

- A Preliminary Closure and Reclamation Plan.
- An Interim Closure and Reclamation Plan.
- A Final Closure and Reclamation Plan.

The ICRP considers the complete development of the Project and describes expected closure activities at the end of the Project Life (21 year mine life). The ICRP is thus a conceptual benchmark for the intended reclamation and closure activities associated with all components of the Mary River project approved under Project Certificate No. 005 and its Amendment No 1. The ICRP will be updated as required throughout the life of the Project.

As per Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities in such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to require this to change, this timeframe will be adjusted accordingly.

[1] MVLWB/AANDC, Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013

1 EXECUTIVE SUMMARY

The Mary River Project (the Project) is located on north Baffin Island, in the Qikiqtani Region of Nunavut. The Project is wholly owned by Canadian mining company Baffinland Iron Mines Corporation (Baffinland). The scope of the Project is defined by Project Certificate No 005 (and its Amendment No 1) and Type A Water Licence 2AM-MRY1325 - Amendment No. 1.

This Interim Mine Closure and Reclamation Plan (ICRP) was originally updated from the approved Preliminary Mine Closure and Reclamation Plan (H337697-0000-07-126-0014) presented in Volume 3, Appendix 3B, Attachment 10 of the Mary River Project Final Environmental Impact Statement (FEIS) in accordance with applicable requirements of:

- Conditions applying to security and abandonment, closure and reclamation or temporary closure in Type "B" Water Licence 8BC-MRY1416, Type "A" Water Licence 2AM-MRY1325 - Amendment No. 1;
- Conditions applying to closure and reclamation set forth in Commercial Lease No.Q13C301;
- The Project Certificate No. 005 (December 28, 2012) and its associated Amendment (May 28, 2014) terms and conditions;
- The Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands (Version 3.0, 2013);
- Mackenzie Valley Land and Water Board (MVLWB)/Aboriginal Affairs and Northern Development Canada (AANDC) Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the NWT (2013);
- Commitments made by Baffinland during the Mary River Project FEIS and Type 'A' Water Licence review processes.

Project related facilities were designed and constructed to minimize the footprint. These design and construction considerations have facilitated reclamation plans and minimized the engineering required to support the complete decommissioning and reclamation of the site.

Three closure scenarios and their associated closure and reclamation activities are described in this ICRP: Short-Term Temporary Care and Maintenance, Long-Term Temporary Mine Closure and Final Mine Closure. In addition to these scenarios, progressive reclamation measures have been proposed to facilitate temporary and final mine closures measures.

Temporary closure, Short-Term Temporary Care and Maintenance or Long-Term Temporary Mine Closure, occurs when the Project ceases Operation with the intent of resuming activities in the future. During temporary closure, Baffinland will maintain all operating facilities and programs necessary to protect humans, wildlife, and the environment, including necessary environmental monitoring. Short-Term Temporary Care and Maintenance activities will occur if the Project ceases operation for a period of less than one (1) year with the intent of resuming activities in the future. Long-Term Temporary Mine Closure will occur if the Project ceases operation for a period of greater than (1) year with the intent of resuming activities in the future.

In Short-Term Temporary Care and Maintenance, all facilities and equipment would be secured and de-energized. An inventory of all hydrocarbon products, chemicals, hazardous wastes and explosives would be carried out and all effluents would be monitored. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

During Long-term Temporary Mine Closure the Project sites will be maintained in a secure condition, all facilities and equipment would de-energized and winterized. Hazardous waste and explosives would be removed from the site. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

Final Mine Closure and Reclamation will occur when there is no foreseeable intent by Baffinland to return to active mining. Final Mine Closure and Reclamation will include removing all infrastructure, equipment and materials into an on-site landfill, the Mine Pit, quarries and/or other approved disposal location(s) for disposal of inert, non-hazardous, non-combustible materials. All other infrastructure, equipment and materials will be sent off-site to an approved disposal location. Arrangements will be made with a sealift contractor to collect materials and equipment at Milne Port to ship material destined for off-site transport. The airstrips will be closed and reclaimed unless otherwise directed by regulatory agencies or the Land Owner in order to provide emergency/rescue landing spots for regional aircraft and access for post closure monitoring. Permanent dock structures will be left in place at Milne Port and Steensby Port but all surface equipment and materials will be removed. Disturbed areas would undergo contouring of ground or granular surfaces as required to maintain stability and natural drainage patterns will be re-established, if required, as reasonably possible. At Final Mine Closure and Reclamation, project components will be inspected to ensure specific closure objectives of project components are achieved and closure principles of long-term safety of the site, no long term active care requirements, physical stability and chemical stability have been met.

The final closure and reclamation activities are expected to last a period of three (3) years based on estimated duration and level of effort required for identified closure activities[2]. Post closure monitoring will continue until closure principles of long-term safety of the site, no long term active care requirements, physical stability and chemical stability have been shown to be met by monitoring results. These activities may be periodic. It is currently estimated post closure monitoring and follow-up inspections will be conducted for a period of five (5) years based on impacts assessment determinations described in the Mary River Project Final Environmental Impact Statement.

In order to account for interim closure and reclamation security adjustments to reflect project development phases until such a time planned closure commences, an updated determination of Project closure and reclamation security is currently captured on an annual basis in Annual Security Review (ASR) process to account for any planned constriction activities. This is done incrementally in such cases Baffinland would not be able to reach its planned closure phase. The ASR process is

[2] Estimated duration and level of effort required for identified closure activities is described in 'Annual Security Review (ASR)' documentation required under Section 9.2 of the Commercial Lease, No. Q13C301, and under Part C and Schedule C of the NWB Type "A" Water Licence No. 2AMMRY1325.

conducted in accordance with Part C and Schedule C of Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA and includes consultation with Land-owners and other key stakeholders. The results of this ASR process should be considered on the interim basis to assess Project closure and reclamation liability for the end of the upcoming year until such time planned closure commences. In all cases, closure and reclamation liability estimates adhere to required closure and reclamation guidelines including, but not limited to, the QIA Abandonment and Reclamation policy guiding principles and stated assumptions.

2 INTRODUCTION

This Interim Mine Closure and Reclamation Plan (ICRP) outlines the closure goal, principles, objectives, criteria and activities associated with the final closure and reclamation of the Project as approved under Project Certificate No 005 and its Amendment No.1 issued by the Nunavut Impact Review Board (NIRB) on May 28, 2014.

Mine closure and reclamation for the Project will be regulated under Baffinland's Commercial Lease No. Q13C301, Type 'A' Water Licence 2AM-MRY1325 - Amendment No. 1 (Type 'A' Water Licence), Type 'B' Water Licence 8BC-MRY1314 and AANDC Land Lease 47H/16-1-2. In cases, if any, where there was conflict between Type 'B' Water Licence 8BC-MRY1314 and the amended Type 'A' Water Licence, Baffinland will adhere with the terms and conditions of the Type 'A' Water Licence. In cases where the term 'Abandonment and Reclamation (A&R)' is used in authorizations, regulations and other forms of communication, Mine Closure and Reclamation (MCR) is synonymous for the purpose of the Mary River Project.

The ICRP considers the complete development of the Mary River Project (the Project) and describes expected closure activities at the end of the Project Life. Based on current planning, temporal boundaries of the projected Project lifecycle are as follows:

- Pre-development or Definition Phase (nine years - 2004 to 2012);
- 2013 work in support of the Approved Project;
- ERP Construction Phase (two years - 2014 to 2015);
- ERP Operations Phase (10 to 15 years depending on market conditions);
- Railway Construction Phase (up to five years beginning in 2015);
- Railway Project Operations (21 years beginning in 2019; some overlap with ERP Operation);
- Closure (three years - 2040 to 2042);
- Post-Closure Phase (minimum five years - 2043 to 2047).

As planned final closure is decades away, the ICRP is thus a conceptual benchmark for the intended reclamation and closure activities associated with all components of the Mary River project approved under Project Certificate No. 005. The ICRP will be updated as required throughout the life of the Project.

As per Type "A" Water License 2AM-MRY1325 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities such a manner that they

can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly.

2.1 Mine Closure and Reclamation Plans Progression

The Mary River Project ICRP contains and describes the plans related to closure and reclamation of the Project. The ICRP addresses the activities expected to be required to ensure the Project closure goal, principles, objectives and criteria are met. Participation of local communities and other stakeholders in the consideration of alternative reclamation activities to safeguard community values is encouraged as the Project proceeds.

2.1.1 Preliminary Mine Closure and Reclamation Plan

A Preliminary Mine Closure and Reclamation Plan (PCRP) (H337697-0000-07-126-0014) was prepared for Baffinland in support of the regulatory approval process, including the Final Environmental Impact Statement (FEIS) for the Project, and was based on available Project design information which was at a conceptual level. The PCRP assumes that the reader has access to and is familiar with the FEIS content.

The purpose of the PCRP was to provide an initial closure and reclamation plan for the Mary River Project, at a conceptual level, in accordance with the regulatory framework established by the Inuit, Federal and Territorial governments.

2.1.2 Interim Mine Closure and Reclamation Plan

The ICRP builds on the PCRP which was reviewed and approved by the (NIRB) under Project Certificate 005 and its amendment, and, by the Nunavut Water Board (NWB) with the issuance of Type A Water Licence 2AM-MRY1325. The ICRP reflects the requirements of Commercial Lease No. Q13C301, AANDC Land Lease 47H/16-1-2, and Part J, Item 2 of the Type A Water Licence, 2AM-MRY1325 – Amendment No. 1 which required the PCRP to be updated to an ICRP 60 days prior to the commencement of the mining operations.

The Mary River ICRP was developed to increase the detail of the closure criteria and planning presented in the PCRP. It addresses progressive rehabilitation undertaken to date and addresses temporary care and maintenance and long-term closure as well as final cessation of operations. Public health and safety is considered throughout all stages of progressive rehabilitation, closure and post-closure.

The ICRP does not constitute a Final Mine Closure and Reclamation Plan. The ICRP reflects the level of advancement of development on site and what is expect in future development.

2.1.2.1 Updates to the Interim Mine Closure and Reclamation Plan

It is anticipated the ICRP will be reviewed annually and updated regularly throughout the life of the Project, as per the terms and conditions of the Commercial Lease No. Q13C301 and the Type “A” Water License 2AM-MRY1325 - Amendment No. 1, and AANDC Land Lease 47H/16-1-2. Once the Project reaches full planned operation and site activities and infrastructure have stabilized, less frequent

updates may be discussed. Parties reserve the right to request an update if warranted. Updates to the ICRP are primarily expected to focus on the refinement and elaboration of the specific performance indicators and commitments and incorporating any reclamation strategy changes based on reclamation research.

Baffinland expects ICRP updates to mainly coincide with the development of the Annual Work Plans as ICRP updates will primarily be required when an Annual Work Plan calls for the construction and operation, or reclamation, of components of the Project that have not been adequately addressed previously or further information has become available or the Annual Work Plans notes material changes to project activities which would require consideration to closure and reclamation strategies. The update would also include any outcomes of the previous year's reclamation research, if successful or positive[3]. If a previously not considered activity or project component is proposed in an Annual Work Plan, the closure strategy will be detailed in the respective Work Plan and/or its supporting documentation.

When updates to the ICRP are required, Baffinland proposes the following timetable[4]:

- By October 15 of a given year, Baffinland will provide a draft of the upcoming Annual Work Plan to the Landlord for discussion.
- By October 31 of a given year, Baffinland will submit the upcoming Annual Work Plan to all other relevant stakeholders.
- By November 30 of a given year, Baffinland expects review and comments on the upcoming Annual Work Plan from relevant stakeholders including the Landlord.
- By December 31 of a given year, Baffinland will provide an updated ICRP, if required, to the Landlord for review.
- By February 28 of the subsequent year, Baffinland expects discussions with Landlord to be complete regarding the upcoming Annual Work Plan and ICRP revisions and Landlord approval of the ICRP, if required.
- By March 31 of the subsequent year, Baffinland will distribute the current version of the ICRP to all relevant stakeholders.

2.1.3 Final Closure and Reclamation Plan

As per Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities such a manner

[3] The results of any reclamation research that occur during a given year will first be reported to relevant stakeholders in that year's NWB and QIA Annual Report.
[4] Proposed schedule of ICRP updates will be revisited if the frequency of the ASR process changes.

that they can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly. The Final CRP will include a schedule for the implementation of work; any additional appropriate closure criteria based on completed reclamation research and site monitoring; and fully describe the level of detail and certainty surrounding post-closure monitoring and contingency planning.

2.1.3.1 Final Monitoring Agreement

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As per Section 12.3 and 12.4 of the QIA Commercial Lease No. Q13C301, Baffinland will submit a Final Monitoring Agreement within twelve (12) months prior to the completion of Operations. The Final Monitoring Agreement shall include, but not be limited to, provisions detailing the implementation of the contents of the Final CRP in respect of monitoring subsequent to the completion of the Operations and closure activities. The Final Monitoring Agreement will be entered into and determined with Baffinalnd and the Landlord before Baffinland submits the Final CRP or any other Monitoring Plans in respect thereof to other Governmental Authorities.

2.1.4 Exploration Abandonment and Reclamation Plan

The Exploration Abandonment and Reclamation Plan (BAF-PH1-830-P16-0038) is a distinct separate plan from the ICRP that describes the closure and reclamation activities and costs for the Mary River Exploration Project regulated under Baffinland's Type "B" Water Licence No. 2BE-MRY142. In the event Mary River Exploration Project activities occur on Inuit Owned Lands, Baffinland's IOL Commercial Lease (No. Q13C301) conditions will also then apply and the Exploration Abandonment and Reclamation Plan would be required to be reviewed and approved by the QIA. If exploration liability did occur on IOL, it is expected closure goal, principles, objectives, and criteria would apply for similar components.

2.1.5 Regulatory Context

Baffinland is committed to, and will be responsible for, carrying out the closure and rehabilitation measures in a phased, on-going (progressive) manner as reviewed and agreed with the Landlord, regulatory agencies and impacted communities.

This current revision of the ICRP has been developed as per the Type "A" Water License 2AM-MRY1325 - Amendment No. 1 Part J, Item 2, in accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)*; and the *Abandonment and Reclamation Policy for Inuit Owned Lands* (the Qikiqtani Inuit Association-Version 3.0).

Relevant policies, guidelines and associated regulations that Baffinland will adhere to in the development of this and future revisions to the ICRP are outlined in TABLE 2-1, below.

TABLE 2-1: APPLICABLE MINE CLOSURE PLANNING POLICIES, GUIDELINES, AND LEASE REQUIREMENTS

Title	Source
Project Certificate No.005 (with associated amendment)	(NIRB, 2014)
Type A Water Licence 2AM-MRY1325 and Amendment No. 1	(NWB 2013, 2015)
Commercial Lease No.: Q13C301	(QIA 2013)
AANDC Land Lease 47H/16-1-2	(AANDC, 2014)
Guidelines for the Preparation of an Environmental Impact Statement for Baffinland Iron Mines Corporation's Mary River Project (NIRB File No. 08MN053)	(NIRB 2009)
Abandonment and Reclamation Policy for Inuit Owned Lands, Qikiqtani Inuit Association, Version 3.0	(QIA, 2013)
Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories	(MVWLB/AANDC, 2013)
Mine Site Reclamation Policy for Nunavut	(AANDC 2002)
Mine Site Reclamation Policy for the Northwest Territories	(AANDC 2002a)
Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories	(NWTWB 1990)
NWT/Nunavut Mines Health and Safety Act and Regulations	2005

NIRB - Nunavut Impact Review Board
QIA - Qikiqtani Inuit Association
AANDC - Aboriginal Affairs and Northern Development Canada (formerly INAC - Indian and Northern Affairs Canada)
NWTWB - Northwest Territories Water Board

A Glossary of Terms, Acronyms and Abbreviations used throughout this document and the applicable guidelines and regulations can be found in Section 17. See Section 16 for a concordance review of applicable requirements.

2.1.5.1 Annual Security Review

On an annual basis, in order to account for interim closure and reclamation security adjustments to reflect project development phases until such a time planned closure commences, an updated determination of Project closure and reclamation security is captured through the Annual Security Review (ASR) process should Baffinland not be able to reach its planned closure phase. The ASR process is conducted in accordance with Schedule C of Type "A" Water License 2AM-MRY1325 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the Landlord and includes consultation with landowners and other key stakeholders.

2.2 ICRP Goal and Principles

Over the life of the Project it is expected that closure and reclamation techniques and methodologies for site reclamation will continue to evolve with changes to the understanding of the Project site, stakeholder's views, and technologies for cost effective and practical reclamation in northern conditions. Planning for mine site reclamation will be risk-based and remain dynamic in order to take

into account the results of on-going and future studies, and identified best practices for the Project site specific conditions.

2.2.1 Policies and Guidelines for Final Closure

The Project is being designed with closure and reclamation considerations in mind in compliance with the Baffinland Sustainable Development Policy.[5] General closure and reclamation objectives of this ICRP correspond with the QIA A&R Policy (2013). The main goals of this Policy and the above guidelines and regulations are to:

- Apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation;
- Use energy resources, raw materials and natural resources efficiently and effectively;
- Engage with governments, employees, local communities and the public to create a shared understanding of closure and reclamation issues and take their views into consideration in making decisions;
- Return the Project affected and viable sites (Milne Port, Mine Site, and Quarries) to "wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities"[6] (NRCan, 1994);
- Where practicable, undertake reclamation of affected areas as soon as practical in an on-going and progressive manner to reduce the environmental risk once the mine ceases operation (INAC, 2002. INAC, 2002a. Northwest Territories Water Board, 1990 and QIA, 2009);
- Provide for the reclamation of affected sites and areas to a stable and safe condition and restore altered water courses to near their original alignment and cross-section. Where practical, affected areas will be returned to a state compatible with the original undisturbed area (Territorial Land Use Regulations);
- Restore altered water courses to their original alignment and cross-section (Territorial Land Use Regulations);
- Reduce the need for Long-term monitoring and maintenance by designing for closure and instituting progressive reclamation, when possible;
- Provide for mine closure using the current available proven technologies in a manner consistent with sustainable development;
- Provide sufficient detail such that adequate scopes of work can be developed for the execution of reclamation work. Where insufficient details exist, monetary allowances should be included in the cost estimate to account for additional engineering and planning.

[5] Baffinland Iron Mines Corporation, Sustainable Development Policy (September 2015).
[6] Natural Resources Canada. *The Whitehorse Mining Initiative Leadership Council Accord Final Report* (October 1994).

2.2.2 Site Abandonment Goal

In accordance with the above Policy, regulations, and guidelines, the site abandonment goal of the final closure activities is to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities[7].

2.2.3 Closure Principles to Achieve Site Abandonment Goal

In order to achieve the Site Abandonment Goal, closure objectives and criteria have been selected for Project components (see Section 6) based on the following Closure Principles:

1. Ensure the safety of the abandoned sites for wildlife and human users;
2. Ensure physical stability of abandoned Project sites and remaining physical features (open pit, waste rock stockpile, quarries, road and railway embankments, stream crossings);
3. Ensure chemical stability of the mine open pit, waste rock stockpile, quarries, and, other Project disturbed areas;
4. Incorporate considerations for future land use of Project sites in Final Closure planning;
5. Achieve the "Recognized Closed Mine" status in as minimal duration as reasonably practical, as defined by Section (4) of the Metal Mining Effluent Regulations (MMER) SOR/2002-222 dated 6 June 2002 and ensure no requirements for long-term active care;
6. Implement reclamation in a progressive, on-going manner during the life of the Project and restore sites as soon as an area is no longer required for operations in order to limit the need for long term maintenance and monitoring.

The objectives and criteria proposed for implementing Final Closure and achieving the stated goal and principles are discussed in Section 6 of this ICRP.

2.3 Mine Closure Working Group

Baffinland has committed to the establishment of a "Mine Closure Working Group" (Working Group) in order to best incorporate considerations for post-closure land use of the Project site. The role of this Working Group will be to facilitate the integration of community representation and technical expertise by drawing on Inuit knowledge, arctic experience for similar mining operations, and discussion of alternative uses for decommissioned facilities into the reclamation options for various Project components. A mandate or Terms of Reference for the Working Group will be developed in consultation with the QIA prior to the initial first meeting of the Working Group. It is anticipated that these planning initiatives will commence in approximately two (2) to three (3) years time in order to best utilize the limited human resources of the QIA, stakeholders, and Baffinland to establishing Project Operations.

[7] Based on alignment with Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)

3 PROJECT INFORMATION

3.1 PROPONENT NAME AND ADDRESS

The proponent of this ICRP is:

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON, Canada L6H 0C3
Tel: (416) 364-8820 Fax: (416) 364-0193

3.2 PROJECT DESCRIPTION AND SITE PLANS

A summary Project Description is provided below along with location drawings for each of the major Project sites identifying where components are planned to be reclaimed presented in Appendix A.

3.2.1 PROJECT DESCRIPTION

The basis of the Project (the Project) is production and shipment of high grade iron ore from Deposit No.1 located on North Baffin Island in the Qikiqtani Region of Nunavut. There are three (3) main project locations consisting of the Mine Site, Milne Port located north of the Mine Site, and, Steensby Port located south of the Mine Site. The Mine Site is located approximately 160 km south of Pond Inlet (Mittimatalik) and approximately 1,000 km northwest of Iqaluit. Milne Port is connected to the Mine Site by a 115 km Tote Road. A 149 km railway will eventually be constructed to connect Steensby Port to the Mine Site.

A detailed Project Description for the project has been presented in Volume 3 of the Mary River Project Final Environmental Impact Statement and its associated Addendum (Mary River FEIS, 2013). The Project plan calls for a phased development approach. Initially, Milne Port will be developed and the Tote Road will be upgraded to enable the Company to mine and ship a nominal 3.5 Mtpa of ore via Milne Port. This phase is termed the 'Early Revenue Phase' (ERP). At a later phase, the Railway will be constructed that will connect the Mine Site at Mary River to a newly constructed Port in Steensby Inlet on the southwestern coast of Baffin Island. For the construction period, material, equipment and supplies required for the installation of needed facilities at the Mine Site and the northern portion of the Railway will be received via Milne Port. Goods received at Milne Port will be transported to the work sites via the existing Tote Road. Likewise, construction materials for the new port in Steensby Inlet and the southern portion of the Railway will be received at the Steensby Port location when railway development commences.

It is expected that the Steensby Port facilities and the Railway will take four (4) years to construct. Upon completion of the Railway and Steensby port construction, an additional 18 Mt/a of iron ore will be transported by rail and transferred to ore carrier vessels from Steensby Port for shipment to

international markets. Shipping of ore from Steensby Port will occur year round and will require vessels with icebreaking capabilities.

The ERP includes development of a nominal 3.5 million tonnes per annum (Mt/a) road haulage operation from the Mine Site to Milne Port for shipping of iron ore during the open water season. The ERP introduces the following additional infrastructures that were not part of the original approved Project:

1. Milne Port:
   - Ore stockpiling, reclaiming and loading equipment;
   - Ore dock.
2. Mine Site
   - Truck haulage fleet and associated extended maintenance facilities.

The construction of the ERP facilities is scheduled to be completed by early 2015 except for final commissioning of the ship loader which cannot occur until mid-July when ore shipping begins in the open water season of 2015. For the ERP, iron ore will be transported to Milne Port along the Tote Road by ore truck and shipped out of the Milne Port during the open water season. It is expected approximately 2 Mt iron ore will be shipped in 2015 with 3.5 Mtpa shipped thereafter. During the construction phase of the Project, the majority of the construction material and supplies, fuel and mining equipment will be received at Milne Port during the open-water season August to October.

Once the Railway is operational, the Project will produce and ship 3.5 Mtpa of ore via Milne Port and 18 Mtpa of via the Railway and Steensby Port.

The Project sites are shown on FIGURE 3-1, and The Major Project Components are listed in TABLE 3-1.

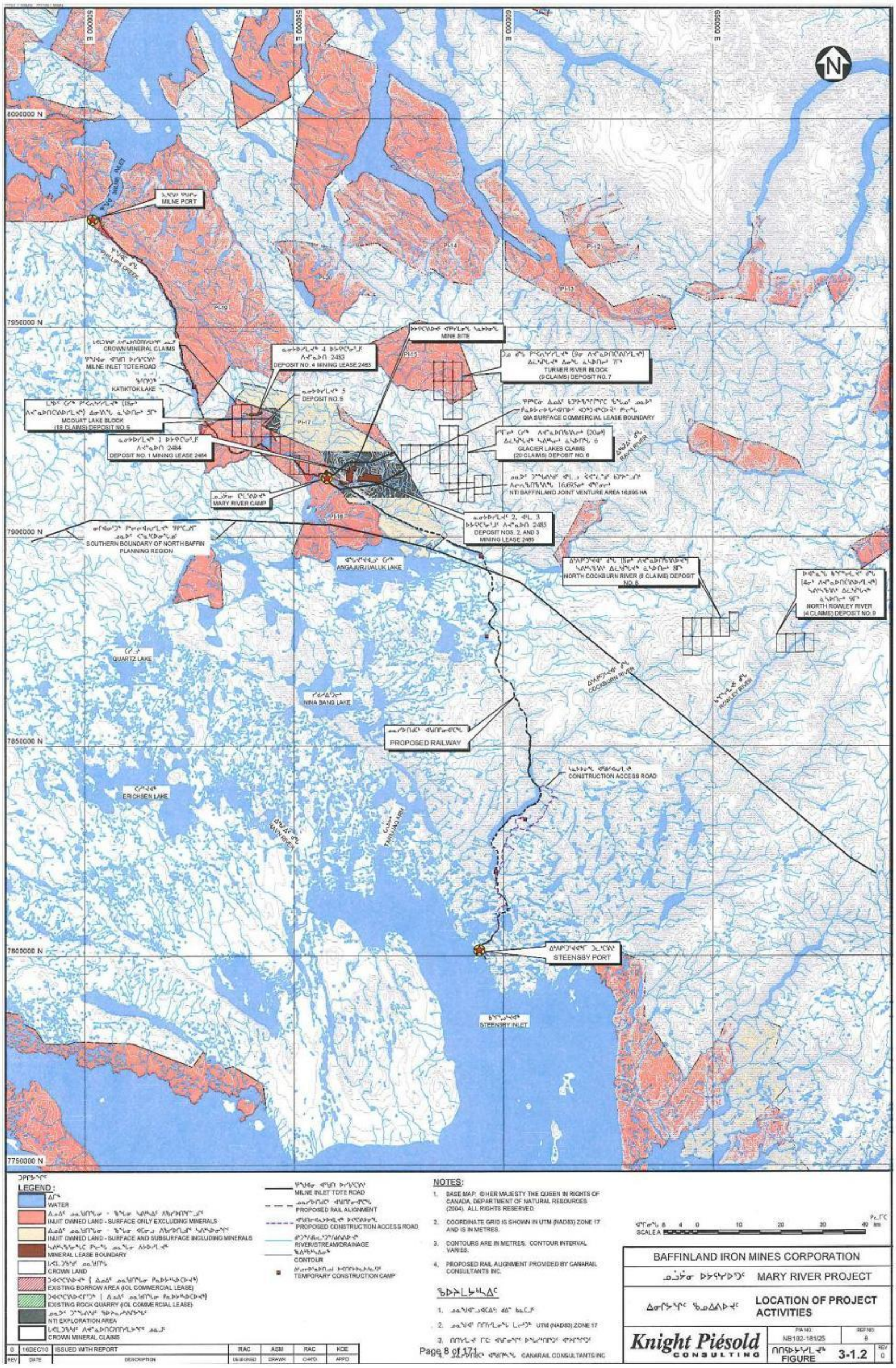

FIGURE 3-1: LOCATION MAP

TABLE 3-1: MAJOR PROJECT COMPONENTS 4

Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2015	Land Ownership
Milne Port Site				
Ultimate development area	x	-	In progress	IOL
Site development, grading, roads, laydown, drainage	x	x	In progress	IOL
Water supply (intake, transport, storage and distribution)	x	-	Completed	IOL
Quarries and borrow pits	x	-	In progress	IOL
Camp	x	-	Completed	IOL
Sewage treatment plant and discharge	x	-	Completed	IOL
Polishing Waste Stabilization Pont (PWSP)	x	-	Completed	IOL
Incinerator	x	-	Completed	IOL
Service buildings (field offices, maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	Completed	IOL
Waste management facilities including temporary storage areas	x	-	In progress	IOL
Landfarm	x	-	Completed	IOL
Power generation and distribution	x	-	Deferred	IOL
Transitional power generation and distribution	x	-	Completed	IOL
Hazardous material storage areas	x	-	Completed	IOL
Fuel tank farm and fuel dispensing facilities (Arctic Diesel, Jet-A Fuel)	x	-	Completed	IOL
Fuel tank farm and fuel dispensing facilities (Marine Diesel)	-	x	Not started	IOL
Ore stockpile	-	x	In progress	IOL
Ore handling facilities (unloading, transfer and stockpiling, reclaiming, ship loading) and associated surface runoff ponds	-	x	In progress	IOL
Ore dock	-	x	Completed	Crown Land
Freight dock	-	x	Not started	Crown land
Explosives storage	x	-	Completed	IOL
Tote Road				
Realignment and grade improvement	x	-	In progress	IOL/Crown
Water crossings improvement/replacement	x	-	Completed	IOL/Crown
Bridge construction	x	-	Completed	IOL
Borrow Pits and Quarries	x	-	In progress	IOL/Crown
Water withdrawal for dust control	x	x	On going	IOL

Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2015	Land Ownership
Mine Site				
Mine Site development, grading, service roads, ore haul roads, laydown, drainage and diversions	x	-	In progress	IOL
Camp Lake water supply (intake, transport, storage and distribution)	x	-	Completed	IOL
Water crossings and surface water diversions	x	-	In progress	IOL
Quarries and borrow pits	x	-	In progress	IOL
Transitional Camps (early development)	x	-	Completed	IOL
Sewage treatment plants, PWSPs and discharge	x	-	Completed	IOL
Incinerator	x	-	Completed	IOL
Permanent camp and construction camp	x	-	Completed	IOL
Service buildings (field offices, temporary or transitional construction facilities, light vehicles maintenance shops, ore trucks maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	In progress	IOL
Mining fleet maintenance facilities	x	-	Completed	IOL
Mining activities	x	-	In progress	IOL
Waste rock storage with associated runoff control structure	x	-	In progress	IOL
Waste management facilities including temporary storage areas	x	-	In progress	IOL
Landfill	x	-	Completed	IOL
Landfarm	x	-	Deferred	IOL
Transitional power generation and distribution	x	-	Completed	IOL
Power generation and distribution	x	-	Deferred	IOL
Hazardous material storage areas	x	-	In progress	IOL
Permanent fuel tank farms and fuel dispensing facilities (arctic diesel, jet A fuel – 15.5 ML)	x		Deferred	IOL
Transitional fuel storage facilities (multiple fuel storage tanks for construction phase)	x	-	Completed	IOL
Temporary crushing facility (crusher trains)	x	-	In progress	IOL
Permanent crushing facilities	x	-	Deferred	IOL
Transitional ore stockpile and runoff control	-	x	In progress	IOL
Ore stockpiling (run of mine, crushed ore) and associated runoff control ponds	x	-	Deferred	IOL
Ore handling facilities (unloading, transfer, tertiary crushing and screening, stockpiling, reclaiming, railway loading) and associated surface runoff ponds	x	-	Deferred	IOL
Air strip extension	x	-	Completed	IOL
Explosives storage	x	-	Completed	IOL
Emulsion plant	x	-	Completed	IOL

Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2015	Land Ownership
Railway				
Service road (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Railway embankment (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Borrow pits and quarries (up to 25 km south of Mine Site)			Deferred	IOL
Water crossings (bridges and culverts)	x	-	Deferred	IOL
Winter road (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Service road	x	-	Deferred	Crown land
Railway embankment	x	-	Deferred	Crown Land
Winter road	x	-	Deferred	Crown Land
Railway construction and operation	x	-	Deferred	Crown Land
Railway construction camps, sewage treatment facilities, emergency ponds and incinerator	x	-	Deferred	Crown Land
Railway camps associated services facilities	x	-	Deferred	Crown Land
Water crossings (bridges and culverts)	x	-	Deferred	Crown Land
Multiple construction fuel storage units	x	-	Deferred	Crown Land
Mobile explosive units	x	-	Deferred	Crown Land
Tunnel construction and disposal of waste rock	x	-	Deferred	Crown Land
Borrow pits and quarries	x	-	Deferred	Crown Land
Steensby Port Site				
Site development, grading, roads, laydown, drainage	x	-	Deferred	Crown Land
Water supply (intake, transport, storage and distribution)	x	-	Deferred	Crown Land
Water crossings and diversions	x	-	Deferred	Crown Land
Quarries and borrow pits	x	-	Deferred	Crown Land
Camp	x	-	Deferred	Crown Land
Sewage treatment plant, PWSPs and discharge	x	-	Deferred	Crown Land
Incinerator	x	-	Deferred	Crown Land
Service buildings (field offices, temporary construction facilities, light vehicles maintenance shops, ore trucks maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	Deferred	Crown Land
Waste management facilities including temporary storage areas	x	-	Deferred	Crown Land
Landfill	x	-	Deferred	Crown Land
Landfarm	x	-	Deferred	Crown Land
Power generation and distribution	x	-	Deferred	Crown Land
Hazardous material storage areas	x	-	Deferred	Crown Land

Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2015	Land Ownership
Fuel tank farms and fuel dispensing facilities (Arctic Diesel, Jet A-Fuel and Marine Diesel)	x	-	Deferred	Crown Land
Railway switch yard	x	-	Deferred	Crown Land
Railway terminal maintenance shop	x	-	Deferred	Crown Land
Ore stockpile	x	-	Deferred	Crown Land
Ore handling facilities (unloading, transfer, tertiary crushing and screening, stockpiling, reclaiming, ship loading) and associated surface runoff ponds	x	-	Deferred	Crown Land
Ore dock	x	-	Deferred	Crown Land
Freight dock	x		Deferred	Crown Land
Air strip	x	-	Deferred	Crown Land
Explosives storage	x	-	Deferred	Crown Land
Emulsion plant	x	-	Deferred	Crown Land
Overwintering of fuel barge	x	-	Deferred	Crown Land
Dredged sediment disposal area	x	-	Deferred	Crown Land

Note 1: Includes additional authorizations under Type A Water Licence 2AM-MRY1325 – Amendment No. 1
Note 2: Includes additional authorizations under Type A Licence 2AM-MRY1325 – Amendment No. 1, and Type B Licence 8BC-MRY1416

3.2.2 SITE PLANS

The Mine Site, Milne Port and Steensby Port, final connecting infrastructure and principal camp locations site plans are shown on the series of drawings in Appendix A and described in TABLE 3-2. These figures represent the intended site layouts upon completion of Project operations including the Railway Execution Phase. Project components that are planned to be progressively rehabilitated following the construction phase are quantified separately, as are components that are located on Inuit Owned Land.

There has been no change to the closure strategy for the Railway Execution Phase of the Project (as approved under the Project Certificate No. 005). For drawings to account for interim closure and reclamation adjustments to reflect project development phases until such a time planned closure commences, see documents/figures associated with the Annual Security Review (ASR) process conducted in accordance with Schedule C of Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA.

Until such time the Railway Execution Phase commences, Steensby Camp and other explorations camps along the proposed railway corridor and exploration areas will be governed by the Exploration Closure and Reclamation Plan (BAF-PH1-830-P16-0038).

TABLE 3-2: DRAWINGS FOR MINE CLOSURE AND RECLAMATION

Drawing Number	Drawing Title
E349000-2000-07-014-00001	Areas of Reclamation – Milne Port Layout
H337697-0000-07-126-0014 (Figure 8.10)	Preliminary Mine Closure and Reclamation Plan – Tote Road
H337697-4210-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Mine Site Construction Phase
H337697-4210-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Mine Site Final Closure Phase
H337697-2000-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Railway Alignment
H337697-7000-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Ravn River Rail Camp
H337697-7000-07-012-0003	Preliminary Mine Closure and Reclamation Plan – North Cockburn Camp – Tunnels
H337697-7000-07-012-0004	Preliminary Mine Closure and Reclamation Plan – South Cockburn Lake Rail Camp
H337697-4510-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Steensby Port Construction Phase
H337697-4510-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Steensby Port Final Closure Phase

3.3 INUIT OWNED LANDS

The Inuit Owned Lands (IOL) surrounding the Project area is shown on FIGURE 3-1. The Commercial Lease, No. Q13C301, to the Project is held by Baffinland and is leased from the Qikiqtani Inuit Association (QIA). In accordance with this and any future surface leases held with the QIA, this ICRP incorporates the guidelines developed for the Qikiqtani lands entitled the Abandonment and Reclamation (A&R) Policy for Inuit Owned Lands (Version 3.0, QIA 2013). The guiding principles of the A&R Policy require that all disturbed IOL be returned to a safe and stable condition capable of supporting human and wildlife needs consistent to social and cultural needs of the Inuit for the undisturbed lands within that area. The QIA guidelines used for this ICRP are summarized in Appendix B. Milne Port and the Mine Site are entirely located on Inuit Owned Land. The first 25 km of the Railway and access roads are located on Inuit Owned Land. All remaining Project areas are located on Crown land.

4

4 PRE-DEVELOPMENT SITE CONDITIONS

A summary description of the atmospheric, bio-physical terrestrial and socio-economic environments at the Project site locations are outlined in the following sections. A comprehensive d description of the baseline social, physical, biological and chemical conditions at the Project Location and impact area, with supporting documentation, are presented in Volumes 4 to 8 of the Mary River Project Final Environmental Impact statement (FEIS), February 2012 and the Early Revenue Phase 2013 , available through the NIRB website (http://www.nirb.ca/), as follows:

- Volume 4: Human Environment;
- Volume 5: Atmospheric Environment;
- Volume 6: Terrestrial Environment;
- Volume 7: Freshwater Environment;
- Volume 8: Marine Environment.

4.1 ATMOSPHERIC ENVIRONMENT

4.1.1 CLIMATE

The Project is situated in the Northern Arctic Ecozone. The climate is semi-arid and permafrost coverage is continuous to a depth of 500 metres, with an active layer of up to two (2) metres. Extremely cold temperatures, combined with the permafrost, result in a short period of runoff that typically occurs from June to September. All rivers and creeks, except for the very largest systems, freeze during winter. Due to the combination of low temperatures and low infiltration, vegetative cover is minimal and surface water is abundant. The region is dotted with thousands of small lakes and streams.

The region experiences near 24-hour darkness with less than two hours of twilight from November to January. During the winter months the treeless topography and fine powdery snow produce blowing snow conditions, resulting in restricted visibility. Frost-free conditions occur from late June to late August. There is continuous daylight from May to August. The months of July and August usually experience the greatest precipitation. From September to November, temperature and the number of daylight hours decrease, and by mid-October the mean daily temperature is generally well below 0° C. The highest snowfall typically occurs during this period.

For additional details on the Project climate conditions refer to Mary River Project FEIS, February 2012, Volume 5, Section 1.

A meteorological baseline report is included in the Mary River FEIS, Appendix 5A, Section 1.1 summarizes the collection of baseline meteorological data at each Project site and incorporates long-term meteorological data from regional Environment Canada (EC) stations. Figure 1 in Appendix 5A Meteorological Report and Meteorological Instrument Report, Volume 5 of the Mary River Project FEIS

shows the regional and project specific meteorological station locations used to complete the climatic assessment to support the development of the Mary River Project.
At present meteorological data at the Project sites is continuously being collected internally. Baffinland are required under their Project Certificate to report on Climate change and provide weather information publicly on Baffinland website.

4.1.1.1 Air Temperature

The baseline meteorological report and meteorological instrument report provided in the Mary River FEIS, Volume 5, Appendix 5A, specifically section 1.3 provides an overview of the mean monthly, annual and expected project air temperature conditions. Figure 4 in Appendix 5A - Meteorological Report and Meteorological Instrument Report, Volume 5 of the Mary River Project FEIS shows the monthly mean average temperatures for the years 2005 to 2008 for both Environment Canada(EC) and Baffinland meteorological stations. EC climate stations range from approximately -34ºC in February at Pond Port to about 7ºC in July at Igloolik. The monthly average temperatures at Nanisivik are 0.7 -7.3ºC colder than at other stations during summer and fall. Temperatures at Pond Port are 1-5.6ºC colder than other stations during winter months.

Data from Pond Port are most representative of temperatures at all three Baffinland stations compared to the other long-term EC stations, although there is a tendency for warmer temperatures at the Baffinland stations during summer. The Pond Port data, corrected upward by 2.4ºC during summer, are assumed to be reasonably representative of baseline conditions at Mary River Project site and to provide the best source of long-term temperature information for the Project sites

4.1.1.2 Precipitation

In the Canadian Arctic, precipitation comes in the form of rain, sleet, snow and ice crystals. The climatic assessment found in Appendix 5A of the Mary River Project FEIS provides a mean monthly and long term annual precipitation data for meteorological stations. Data indicates that precipitation has increased slightly over the entire measurement period (about 0.24 mm/year).

Total rainfall was measured at the Project site meteorological stations for months where the mean temperature was typically above 0ºC which includes May to October. These months were used to compare the Project-measured precipitation data with measurements from the EC meteorological stations. Mary River had more rainfall in summer than all other Project stations, whereas rainfall in Milne Port and Steensby was mid-low range except for autumn months, when they were higher than at all other stations. Based on a comparison of the monthly trends, it appears that the data from Hall Beach are most representative of rainfall in Mary River, and data from Pond Port and Igloolik are most representative of rainfall from Milne Port and Steensby, respectively.

Data from the EC Hall Beach meteorological station was assumed to be reasonably representative of baseline rainfall conditions at the Mary River Project site and to provide the best source of long-term precipitation information. Likewise, an average of precipitation data from Pond Port and Igloolik

meteorological stations were assumed to be reasonably representative of baseline conditions at both Milne Port and Steensby Port. Figure 7 below provides average monthly rainfall for the years 2005 to 2008 from the EC stations and Baffinland project site stations. Additional details are provided in Section 1.4, Appendix 5A, Volume 5 of the Mary River Project FEIS.

4.1.2 Air Quality

The Project is in a remote location with no existing local sources of air pollutants other than exploration facilities at the Mine Site. Construction and operation of the Project may introduce new, local sources of air contaminants such as particulate matter (TSP, PM10, and PM2.5), nitrogen dioxide (NO2), sulphur dioxide (SO2), and carbon monoxide (CO) to the Project area.

In order to identify air quality baseline conditions, Baffinland did some ambient monitoring to assess the background air quality in the areas where project activities would occur. The monitoring results were supplemented with long term ambient air quality data that exists for other monitoring stations in the north. Parameters monitored for include:

- total suspended particulate (TSP);
- inhalable particulate matter (PM10);
- total particulate deposition (dustfall);
- sulphur dioxide (SO2);
- nitrogen dioxide (NO2);
- ozone (O3);
- dust deposition; and
- metals deposition.

Baffinland's 2007 baseline ambient air quality monitoring program had two components: an active and a passive monitoring program:

Active Monitoring Program: measured ambient concentrations of TSP. Samples were collected simultaneously from two locations near the Mine Site over 72 hours using battery-powered Airmetrics "MiniVol" samplers. Sampling time was increased from 24 hours to ensure adequate capture of particulate and to increase the accuracy of the measurements, as low particulate levels were anticipated. A Dust Track monitored particulate matter with aerodynamic diameters less than 10 µm (i.e., PM10).

Passive Sampling Program: collection of SO2, NO2, and O3 samples simultaneously at two different locations near the Mine Site. Passive monitors (duplicate monitors for each contaminant) were installed at each location for 49 days. This program also involved collection of particulate deposition (dustfall), including metals at the same locations also over the same period. Section 2, Volume 5 of the Mary River

Project FEIS, February 2012, identifies existing air quality conditions in the project area and describes potential effects of the Project on air quality.

Summary tables below were extracted from Tables 5-2.1, 5-2.2 and 5-3.3, Section 2.2, Volume 5 of the Mary River Project FEIS provide the baseline air quality conditions for the Project. Additional details on the air quality monitoring program and baseline conditions refer to the Baseline Air Quality Report Appendix 5C-1 of the Mary River Project FEIS.

TABLE 4-1: MEASURED BASELINE CONCNERATIONS

Parameter	Baseline Concentration ($\mu g/m^3$)
24-hour TSP	7.0
24-hour PM_{10}	3.8
30-day SO_2	0.262
30-day NO_2	0.188
30-day O_3	52.8

TABLE 4-2: BASELINE DUSTFALL DEPOSITION RATES

Parameter	Baseline Deposition Rate ($mg/100cm^2$/30-day)
Total Dustfall	0.398

TABLE 4-2: BASELINE METAL DEPOSITON RATES FOR SELECT METALS

Parameter	Baseline Deposition Rate ($\mu g/100cm^2$/30-day)
Al	26.9
Co	0.5
Cr	0.3
Fe	30.6
Mg	23.9
Mn	1.7

Source: Tables 5-2.1, 5-2.2 and 5-2.3, Section 2.2, Mary River FEIS Volume 5

4.1.3 Noise and Vibration

A detailed noise baseline assessment was conducted in 2007 and provided as Appendix 5D-1 of the Mary River Project FEIS, February 2012. The basic procedure to establish baseline noise levels consisted of:

- Conducting measurements and recording sound levels at Milne Port, the Mine Site, and Steensby Port;
- Validating the data based on the recordings and weather information; and
- Calculating the resulting validated sound level data.

Background atmospheric noise levels in remote areas are typically low, ranging from about 25 to 40 dBA, similar to those measured for the Mine Site, Steensby Inlet and Milne Inlet. Table 4-3 below which is a replica of Table 5-3.1 from Volume 5 of the Mary River Project FEIS shows the measured ambient noise values for each site. At these levels, noise would be described as faint.

TABLE 4-3: BASELINE NOSIE MONITORING RESULTS

Site	L_{eq} (24 h) (dBA)	L_{eq} (Day, 15h) (dBA)	L_{eq} (Night, 9h) (dBA)	Minimum L_{eq} (1 h) (dBA)	Maximum L_{eq} (1 h) (dBA)
Mary River	25	25	26	20	34
Steensby Inlet	29	31	26	23	35
Milne Inlet	30	31	29	21	35

Source: Mary River FEIS, Appendix 5, Table 5-3.1

4.2 Physical (Terrestrial) Environment

4.2.1 Landforms

Superficial landforms and deposits in the Mary River Project area are associated with widespread glaciation on Baffin Island. Surface geology consists of locally abundant sediment deposits from glaciers and rivers. Occasional outcrops of granitic and sedimentary rock formations occur. The North Baffin region containing the Mary River area lies within the Committee Belt, a granite-greenstone terrain mixed with sedimentary and volcanic rock. The mountains to the east are older than 540 million years old, and the lowland plateaus to the west are about 250 to 540 million years old.

4.2.2 Topography

Topography varies considerably across the Project area. The shoreline of Milne Inlet in the northern part of the Project area is situated on a relatively broad, deep and flat sand beach. Milne Inlet itself is enclosed by steep fiord walls measuring 60–600 m above sea level (asl). Moving inland, the Milne Inlet Tote Road follows the Phillip's Creek valley that starts near sea level at Milne Inlet and rises to 188 m asl at the Mine Site. The Phillip's Creek valley is confined by hills or mountains on both sides. West of the Phillip's Creek Valley is mountainous terrain with some occurrence of glaciers.

At the Mine Site, Nulujaak (Deposit No. 1) rises quickly to 679 m asl from the fairly flat and sandy outwash plain where the exploration camp is currently located. Nulujaak is a landmark for Inuit travelling on the land and is part of a ridge trending approximately north–south. The land to the west is equally mountainous with some minor coverage of glaciers. East of Deposit No. 1 the land is somewhat rolling with several elevated plateaus formed by horizontal sedimentary deposits. South of Mary River the undulating outwash plains end near the Ravn River. South of the Ravn River the land is quite flat and poorly drained and begins to drop steeply toward the Cockburn Lake valley, which is bounded by steep cliffs that range from 360–380 m asl. The land south of Cockburn Lake to Steensby Inlet becomes flatter with mainly undulating bedrock and boulder landforms. Figure 6-2.1 - Relief Map of the Northern Baffin Region, found in Section 2.1.1.1. Volume 6 of the Mary River Project FEIS shows the relief across North Baffin Island, and the topography as it relates to Project features starting in the north at Milne Inlet and extending towards Steensby Port in the south.

Additional details on topography can be found in Section 2.1.1.1, Volume 6 of the Mary River FEIS, February 2012.

4.2.3 SURFICAL AND BEDROCK GEOLOGY

The surficial geology of the area generally consists of locally abundant Holocene glacio-lacustrine sediments, alluvial sediments (alluvial deposits), marine and glacio-marine deltaic sediments and end moraine till, with occasional outcrops of pre-Quaternary bedrock and sedimentary rock formations. Figure 6-2-2 - Surfical Geology in the RSA in Volume 6 of the Mary River FEIS shows the surfical geology of the Project area.

The following sections provide some more specific observations associated with the surficial geology at some of the proposed and existing project infrastructure locations/sites.

Mine Site — The Project is located in a glaciofluvial outwash deposit in what appears to be a classic U-shaped valley. There are some direct glacial deposits consisting of kames, moraines and eskers in and around the southeastern portion of Sheardown Lake. The outwash valley is essentially a relatively flat plane with very little local relief, the primary exceptions being along water bodies, esker deposits and adjacent to valley edges. Valley walls are generally steep and abrupt, often with distinct terraces.

Milne Inlet Tote Road — The Tote Road alignment generally follows a glacial valley oriented northwest-southeast to the Mine Site. The surficial deposits along this alignment include till veneer or blankets on the higher elevations with some drumlins and moraines. Glaciofluvial outwash sediments (gravel and sand) forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand) are typically found in the valley floors. Limited bedrock exposure is present along the Tote Road. Milne Port — The dominant landforms in the Milne Inlet area are typically a result of glacial activity, marine and mechanical forms in various degrees. Glacial activity is not overly apparent on the immediate Port site but is more pronounced in the higher elevations south of the site. Marine and mechanical features are most predominant with terraces and strand (beach) lines formed by marine

action which have been cut by mechanical features, some of which may be attributed to permafrost. Wind appears to have been responsible for some drifting on the finer grained soils on the lower part of the site. Recently deposited colluvium is present on many of the slopes and side hills in the area. The action of surface water has produced numerous sharp gullies along water-ways. Marine clays were also noted at some locations at the site.

Railway — The topography of the RSA is generally quite hilly, with the exception of the Ravn River area which is relatively flat. Glaciated valleys are evident along a significant portion of the alignment. The surficial geology of the RSA is also characterized by the relatively recent glacial activity of Baffin Island. Surficial geology consists of several types of deposits including glacio-lacustrine sediments, alluvial sediments (alluvial deposits), end moraine till, and till veneers and blankets. Occasional outcrops of pre-Quaternary bedrock and sedimentary rock formations are also common along the southern section of the RSA.

Steensby Port — Near surface bedrock is dominant in the Steensby Port area. Limited overburden is in the form of marine sediments and localized deposits of till. The majority of the overburden is located in depressions bet

For additional details on site specific baseline conditions refer to Section 2.1.1.2 Surfical Geology, Volume 6 of the Mary River Project FEIS.

4.2.3.1 Surficial Soils Composition

A soils evaluation was carried out in 2007 and 2008 by an Arctic soils specialist (Veldhuis, 2010). Regionally, soil formation is controlled and limited by year-round low soil temperatures, low precipitation rates and near-surface permafrost. Soil formation occurs in the thin layer overlying the permafrost that is subject to seasonal thawing, known as the active layer. The thickness of the active layer varies substantially across the region with topography, depth to bedrock, and vegetative or water cover but is typically between 1 to 2 m thick in the Project area depending on the local soil cover. In locations where well drained, dry sand and gravels are present, thaw depth can extend to 2 to 4 m depth.

Project area soils were classified based on the Canadian System of Soil Classification (Soil Classification Working Group, 1998), and included primarily Cryosols (permanently frozen soils or soils with permafrost within 100–200 cm of soil surface) and Brunisols (soils with weak B horizon development). In general, Project-area soils all showed weakly developed horizons, with a general lack of organic material accumulation. Fine- to medium-textured soil materials were generally cryoturbated, and patterned ground phenomena related to permafrost and freeze-thaw cycling were also commonly observed throughout the RSA. Soils throughout the RSA were generally poor in nutrients (Table 4-4) extracted from Volume 6 of the Mary River FEIS. This factor, in combination with the depressed level of pedogenic development in the area and thinness of soils where present, generally make local soils unsuitable for

stockpiling for revegetation purposes (Veldhuis, 2010). For further information regarding surficial soils composition, see Section 2.1.1.3, Volume 6, of the Mary River Project FEIS.

TABLE 4-4: TOTAL AMOUNTS OF ORGANIC MATTER AND PRIMARY NUTRIENTS IN SOILS IN THE PROJECT AREA

Parameter	Concentration Range per Horizon, %			
	B Horizon (sandy)	C Horizon (sandy)	B and C Horizons (loamy)	A Horizon
Organic Matter	0.83 (0.17 - 2.21)	0.34 (0.17 - 0.51)	2.81 (0.17 - 5.44)	13.72 (2.38 - 26.00)
Nitrogen	0.04 (0.02 - 0.08)	0.03 (0.02 - 0.04)	0.15 (0.012 - 0.36)	0.93 (0.09 - 1.14)
Phosphorous	0.03 (0.01 - 0.09)	0.07 (0.04 - 0.11)	0.04 (0.02 - 0.10)	0.06 (0.06 - 0.11)
Potassium	0.13 (0.05 - 0.36)	0.15 (0.09 - 0.25)	0.47 (0.16 - 0.69)	0.08 (0.06 - 0.11)
Sulphur	< 0.01	< 0.01	0.02 (0.01 - 0.05)	0.06 (0.01 - 0.10)

NOTE(S):
1. FROM VELDHUIS, 2010.

4.2.3.2 BEDROCK GEOLOGY

The the baseline information available on bedrock geology in the Project area is based on field geological exploration programs conducted by Baffinland geologists from 2004 to 2008 and summarized by Aker Kvaerner (2008).

The North Baffin Island region and Mary River area lie within the Committee Belt, a granite-greenstone terrane mixed with rift basin sediments and volcanic rocks. The belt lies within the Churchill Province, extending from Baker Lake to Greenland, and is divided into five main assemblages: the Archean, the Mary River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation.

The Mary River iron deposits are located within the Mary River Group, an assemblage of Late-Archean (2.76 to 2.72 Ga) metasedimentary to metavolcanic rocks that have been folded and preserved in greenstone belts. The Mary River Group greenstone belts are present as fragmented remnants stretching from Bylot Island south to Eqe Bay. Refer to Figure 6-2.5 – Bedrock Geology in the RSA shown in Volume 6 of the Mary River Project FEIS, Primary sequences within the Group consist of a lower series of metavolcanic rocks and an upper series of turbidite pelitic-greywacke; the stratigraphic position of iron formation, quartzite, conglomerate, minor marble, and volcanic breccia units within the belts, which varies across the region. The Mary River Group is part of the regional Committee Belt, an Archean-aged (2.9 to 2.5 Ga) assemblage of granite-greenstone terranes, granitic migmatites gneissic granitic intrusions, and clastic and carbonate sedimentary units reworked during the Paleo-Proterozoic (2.5 to 1.6 Ga). For additional details on site specific baseline conditions refer to Section 2.1.2, Volume 6 of the Mary River Project FEIS.

4.2.4 PERMAFROST

The Project is located in a zone of continuous permafrost which can extend to depths of several hundred metres. Cryosolic soils (i.e., those affected by permafrost-related processes) predominate.The active layer through the Project area typically ranges from approximately 1 to 2 m but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds and less in areas with a substantial surface layer of wet organics. Unfrozen taliks can exist within areas of continuous permafrost below lakes, under large rivers or near the coast.

Permafrost thickness in and around the RSA is considered to be deep, typically in the 400–700 m depth range. In 2007, a 400 m thermistor installed into Deposit No. 1 showed that the depth to permafrost is predicted to extend to 610 m at this location which is well below the planned depth of mining.

Between 2006 and 2008 more than fifty ground temperature monitoring instruments (thermistor cables) were installed and sporadically monitored to determine typical ground temperatures in the overburden soils and bedrock across the RSA. Many were installed to depths sufficient to define the typical stable temperatures in the permafrost soils below the depth of zero annual amplitude. The depth of zero annual amplitude in temperature fluctuation appears to exist at depths of between 10 and 15 m in the valleys. At that depth, the “typical” permafrost temperature is roughly -10°. Details on permafrost are described in Section 2.1.1.4, Volume 6, of the Mary River Project FEIS.

4.2.5 GEOCHEMICAL AND GEOTECHNICAL OVERVIEW

Geotechnical (soil mechanics) and geomechanical (rock mechanics) investigations were conducted from 2006 to 2008 to evaluate the soil, bedrock and permafrost conditions at locations where project infrastructure will be situated at the Mine Site, Railway and port facilities. Additional field investigations were carried out in 2011 to complement subsurface data from the previous investigation programs.

Geochemical assessments of the potential for metal leaching and acid rock drainage (ML/ARD) have been completed for the Mine Site and for prospective quarry and borrow sites along the Railway alignment and existing Milne Inlet tote road. Third party consultants, AMEC, evaluated existing geochemical studies and completed additional sampling of rock materials from drill core that are expected to be representative of the waste rock produced during mining. Geochemical characterization of rock materials from this and previous studies has been completed using industry-standard ML/ARD assessment techniques. In addition, AMEC has evaluated drainage and runoff data from existing stock piles to assess the potential mine drainage quality at the site during mine operations and closure.

A total of 277 drill core waste rock samples (including an additional 180 samples from current studies) were submitted for Acid-base Accounting (ABA) testing. Results of this testing has determined that approximately 86 % of the waste rock samples are unlikely to generate acidic drainage in the future. The remainder of the samples were classified as potentially acid generating (PAG) materials. Drainage quality expected at the site, based on monitoring of existing ore stock piles, is expected to be circum-neutral to

mildly acidic (pH 5.5 to 6) with generally low metal concentrations. A full report on these studies is provided as Appendix 6B-1, Volume 6 of the Mary River Project FEIS.

4.2.6 FRESHWATER

Volume 7 of the Mary River FEIS, February 2012 discusses impacts to the Freshwater Environment, including impacts on water quantity, quality and fish habitat. Sections 1 and 2 of Volume 7 describe the baseline hydrologic conditions, potential impacts and mitigation measures and residual effects of activities on the hydrologic system in the Project area. Sections 3 and 4 of Volume 7 include similar content related to water quality and aquatic biota and habitat, respectively.

4.2.6.1 HYDROLOGY

Groundwater flow in the Local Study Area (LSA) consists of seepage through unconsolidated materials within the active layer, which typically ranges from 1 to 2 m (up to 3 m) below surface. This groundwater reports to local surface drainages and lakes. The long period of sub-zero temperatures results in a very short runoff season, typically occurring from June through September. Runoff may extend to late October in systems with large lake components. A Baseline Hydrology Report for the Project is found in Appendix 7A, Volume 7 of the Mary River FEIS.

The key findings within the Baseline Hydrology Report pertain to four main hydrometric parameters: timing of runoff, magnitude of runoff, spatial variability of timing and magnitude of runoff, and long-term runoff estimates. Runoff in the vicinity of the Mary River Project are characterised as follows:

- Streamflow typically commences in early to mid-June as temperatures climb above 0 oC, and ends in late September to late October, depending upon watershed characteristics.
- The annual hydrograph is dominated by a nival (snowmelt) freshet, which occurs between late June and the end of July, followed by a period of low baseflows driven by permafrost melt and shallow subsurface flow. Baseflows are punctuated by precipitation events through July to early September.
- Precipitation runoff events are usually quite large and flows increase rapidly as interception, infiltration, and evapotranspiration are minimal due to shallow permafrost, cool temperatures and lack of vegetative cover.

4.2.6.2 DRAINAGE PATHWAYS

The drainage pathways for the Mary River Project are defined by catchments as shown in the following figures in from Volume 7 of the Mary River Project FEIS. Additional details on drainage can be found in Section 2.0 of Volume 7 of the Mary River Project FEIS.

- Figure 7-1.1 – Freshwater Regional Study Area
- Figure 7-1.2 – Milne Port Local Study Area and Milne Tote Road Local Study Area
- Figure 7-1.3 – Mine Site Local Study Area

- Figure 7-1.4 – Railway Corridor Local Study Area and Steensby Port Local Study Area

4.2.6.3 SURFACE WATER AND SEDIMENT QUALITY

Freshwater quality measurements in the Mary River area indicate naturally elevated concentrations of dissolved oxygen, turbidity, aluminium and iron. Some average values for pH, as well as cadmium and mercury in fresh water are greater than levels recommended by the guidelines of Canadian Council of Ministers of the Environment.

A baseline water quality program was carried out over the period of 2005 through 2008 which included up to 74 surface water sampling sites distributed throughout the study area. Three lakes in the vicinity of the Mine Site with the potential to be affected by Project-related components and activities were sampled in 2006 through 2007: Camp Lake, Sheardown Lake and Mary Lake. In 2008, lake water sampling extended to the Steensby Inlet area, the Rail Camp area, and the current railway alignment. A follow-up water and sediment quality monitoring program was carried out in summer 2011 to update the dataset and to obtain water and sediment quality data from candidate long-term water monitoring locations. Sediment samples were collected from various lake, stream, and river locations.

The complete water and sediment quality baseline data are provided in the Surface Water and Sediment Baseline Report found in Appendix 7B-1, Volume 7 of the Mary River FEIS.

4.3 BIOLOGICAL ENVIRONMENT

4.3.1 VEGETATION

Existing knowledge of the North Baffin region with respect to vegetation describes the area as having a harsh climate, high winds and shallow soils result in sparse and dwarfed plant life. Herb- and lichen-dominated communities constitute the main vegetative cover. The latter is closely associated with the rock fields and hilly upland areas. Common herbs are purple saxifrage, mountain avens, and arctic poppy, often mixed with shrubs such as arctic willow. The size of shrubs decreases rapidly as one moves north. Vegetative cover tends to be greater on wetter sites confined to coastal lowlands, sheltered valleys and moist nutrient-rich corridors along streams and rivers. Baseline studies of the Mary River Project area were conducted during each of the summers of 2005 through 2008. A total of 833 plots were surveyed across the terrestrial RSA, focusing mainly on the Potential Development Areas (PDA). A total of 155 vascular plant species were recorded, a vegetation classification system was developed and a species list was compiled. In addition to vegetation surveys, there was particular emphasis on establishing baseline levels of different metals and elements of the area prior to project development. Results for of the Vegetation Baseline Report for the project, including selected metals in plant species foliage are summarized and detailed in the Vegetation Baseline Report, Appendix 6C, Volume 6 of the Mary River Project FEIS, February 2012. Figure 2 –Terrestrial Regional Study Area showing Vegetation plot locations found in Appendix 6C of the Mary River FEIS shows the Vegetation plot locations in the regional study area.

4.3.2 AQUATIC WILDLIFE

A freshwater aquatic baseline study was completed for the Project from 2005 and 2011. The results of this report are presented in Appendix 7C, Volume 7 of the Mary River FEIS, February 2012 and summarized at a high level in the sections below.

There are two key fish species in the freshwater environment: Arctic char and a minnow species named nine-spine stickleback (*Pungitius pungitius*). While both are generally abundant and widespread in distribution, ninespine stickleback are absent from the freshwater lakes and streams that were surveyed near the Milne Inlet coast. As all streams with the possible exception of large rivers freeze solid in winter, lakes provide the only overwintering habitat for both species and spawning habitat for Arctic char across the study areas. Many streams provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char. Most of the drainage basins that support Arctic char either contain barriers preventing anadromous migrations and/or are distant from the coast and most populations in the five study areas are land-locked. Nearshore zones of larger lakes also provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char, foraging and, in some cases, spawning habitat for adult Arctic char, and overwintering habitat for all life stages. Arctic char feed primarily on benthic invertebrates, although cannibalism occurs in a small proportion of at least some populations.

Mercury concentrations in Arctic char muscle exceeded guidelines for human consumption in some fish captured in the Mine Area, although concentrations were similar to those reported for other landlocked Arctic char populations. In general, the lower trophic level communities are similar to other areas of the Canadian Arctic. As is typical of Arctic ecosystems, the freshwater environment is relatively nutrient-poor and primary productivity is relatively low. In general, Arctic freshwater ecosystems are characterized by relatively low diversity of zooplankton communities due to low temperatures and nutrients; results of the baseline studies for Mine Area lakes are consistent with this generalization. The benthic invertebrate communities in the Mine Area are generally moderately diverse, although higher diversity is found in some small tributaries, and are dominated by chironomids.

The following three figures found in Section 4.5, Volume 7 of the Mary River Project FEIS show the Arctic Char distribution in fresh water at the Project Sites:

- Figure 7-4.2 – Arctic Char Distribution in Milne Port
- Figure 7-4.4 – Arctic Char Distribution at Mine Site
- Figure 7-4.8 – Arctic Char Distribution at Steensby Port

4.3.3 TERRESTRIAL WILDLIFE

Terrestrial wildlife on north Baffin Island (described in the Mary River Project FEIS, Volume 6, Appendix 6F - Terrestrial Wildlife Baseline Report) includes caribou, wolves, foxes, Arctic hares, ermine, and small mammals. Terrestrial wildlife, caribou in particular, are an important part of the Inuit culture and are an

important component of a subsistence lifestyle. Occurrence of most wildlife species on north Baffin Island is relatively sparse.

4.3.3.1 CARIBOU

A key terrestrial wildlife species (to both humans and within the broader ecology) is the North Baffin Island caribou. They currently occur in low densities and their abundance seems to be cyclical – harvest data and Inuit Qaujimajatuqangit (IQ – Inuit Knowledge) suggests a roughly 60- to 70-year cycle of abundance. The cyclical pattern of caribou abundance is similar to patterns described on Greenland and south Baffin Island. The cause of these changes in abundance is currently unknown. The last period of caribou abundance in the regional study area (RSA) was 1980 to 2000. According to IQ, and trail orientation and abundance, movement will predominantly be east-west and will occur within the southern half of the RSA Caribou numbers are expected to gradually increase in the Mary River Region, but might not recover to historical — highs until the 2050s. There is evidence that caribou occur, and have historically occurred, throughout the entire region and, therefore, use most of the RSA as some form of habitat. The most-used habitat is in the southern and central portion of the RSA, as indicated by caribou sign (bones, antlers, tracks, and trails) and IQ. Trails observed along the proposed railway alignment suggest that some areas are better for movement. Analyses of habitat use show a greater probability of caribou occurrence for some habitats during the calving, growing, and winter seasons, but the probability of occurrence of caribou is relatively equal in many locations throughout the Project area. The caribou that currently occupy the RSA are not migratory. The local caribou on average move less than 4 km per day during all seasons with very few focused directional movements and all movements were at the scale of tens of kilometres — most caribou remained within the areas they were collared. Additional details on Caribou populations are summarized in Section 5 and Appendix 6F-Terrestrial Baseline Report of the Mary River FEIS.

The Terrestrial baseline report found in Appendix 6F of the Mary River FEIS is the most extensive and thorough summary of north Baffin Island caribou currently in existence. It summarizes and synthesizes the history of government surveys, local harvest, IQ, habitat use, and terrestrial wildlife surveys funded by Baffinland, and is one of the most in-depth analyses of caribou habitat selection completed in Nunavut

4.3.3.2 MARINE AND TERRESTIAL BIRD COMMUNITES

The marine and terrestrial bird communities of north Baffin Island are described in the Bird Baseline Report found in Appendix 6E, Volume 6 of the Mary River FEIS.

Field surveys in the Project Area documented 54 bird species within the marine and terrestrial RSAs, five of them Species at Risk listed by COSEWIC (2010) or SARA (Environment Canada, SARA 2010), including Peregrine Falcon, Short-eared Owl (documented within the terrestrial RSA but showing no signs of nesting there), and Ivory Gull, Ross's Gull and Harlequin Duck (all detected within the marine RSA, but

no nesting sites were located). One additional Species at Risk, the Red Knot, has the potential to be found within the Project Area, but was not detected during baseline surveys.

Staging and breeding areas are found in the Project Area for numerous species of birds including Snow Geese, Common and King Eiders, Brant, and Long-tailed Ducks, and include a known moulting area for Snow Geese prior to fall migration. Twenty-five species were confirmed to breed throughout the marine and terrestrial study area. No large, conspicuous seabird nesting colonies were recorded during Project surveys; however, several are known to exist within and adjacent to the marine RSA, particularly on Bylot Island, in Foxe Basin, and along Hudson Strait. Marine surveys did locate a large breeding colony of Snow Geese (>5,000 individuals) on the southwestern shores of Steensby Inlet**.**

IQ surveys conducted in the surrounding communities indicated that the marine and terrestrial contain several areas that are used seasonally by large numbers of various bird species. Community Elders indicated that most bird species in the area are migratory and typically arrive in late-April, May, and June, and start leaving in August. Breeding occurs throughout the area: most of the islands within the RSA are used as nesting grounds by various species of seabirds, gulls, terns and waterfowl, and some large colonies of seabirds and gulls are known along cliff habitats. Species such as geese, eiders, loons and ducks can be found nesting along coastlines or inland along freshwater lakes. Fall migration occurs between early August to late October depending on the species and the sex. Some birds, such as Common Raven, ptarmigan, and sometimes Snowy Owl, winter in the area, and some seabirds, such as Black Guillemot, also remain in the area year-round using the open shore leads in the winter.

4.3.3.3 Wolves and Foxes

Wolves and foxes are the dominant carnivores in the RSA and exist at low densities throughout the RSA. Very little information was collected on these mid size carnivores because they were so rarely observed. Fewer than 100 wolf and fox observations were recorded during extensive baseline surveys from 2006–2010. Information in published journal articles was supplemented with anecdotal and IQ information specific to the Project area for this baseline. Carnivore populations are tied to fluctuating prey densities (e.g., caribou and lemmings). Occurrence of carnivores might increase in the area if caribou populations return in large numbers. Additional details on mid size carnivores in the Project area can be found in Section 2.3, Appendix 6F-Terrestial Wildlife Baseline Report of the Mary River Project FEIS.

Lemming and Arctic Hare, Lemmings are a key prey species in Arctic ecosystems. Their abundance affects the behaviour, habitat use, and population dynamics of carnivores such as Arctic fox, red fox, wolf, Snowy Owls, and falcons. Lemming populations are considered Secure in Nunavut. Populations typically undergo large regular fluctuations in population size (every three to four years). Refer to Section 2.3, Appendix 6 F of the Mary River Project FEIS, February 2012 Arctic hare are a lagomorph found in treeless regions across North America and Greenland. They are restricted to mountains, tundra, and coastal barrens due to their apparent inability to use food resources in forested areas). They may occur in groups of 10–60, or up to thousands on Arctic islands the current population status of Arctic hare in Nunavut is classified as Secure by CESCC. In northern Baffin Island Arctic hare are locally

abundant. Additional details on small prey mammals in Baffin Island can be found in Section 2.3, Appendix 6F-Terrestial Wildlife Baseline Report of the Mary River Project FEIS.

4.3.4 Marine Wildlife

The Mary River FEIS, Volume 8, Section 5.0 and Appendix 8A presents the marine baseline information for the Project area. In total twenty-two marine mammal species are known or expected to occur in the identified Regional Study Area (RSA) including the proposed shipping routes in Baffin Bay and Davis Strait. Species accounts are provided for all species; however, emphasis is placed on species which regularly occur within the Regional Study A. Only one mysticete or baleen whale species, the bowhead whale (Balaena mysticetus), occurs regularly in the RSA. Narwhal (Monodon monoceros) and beluga (Delphinapterus leucas) are abundant in the RSA; other Odontocetes that occur (albeit in low numbers) in the RSA include killer whales (Orcinus orca) and northern bottlenose whales (Hyperoodon ampullatus). Pinniped species which occur regularly in the RSA include ringed seal (Pusa hispida), bearded seal (Erignathus barbatus), harp seal (Pagophilus groenlandicus), and walrus (Odobenus rosmarus). Polar bears (Ursus maritimus) also occur throughout the RSA. For graphical representation in the RSA of which communities hunt which species of marine animals where, see Figure 3.8 – Land Use Information from DIAND (1982B) and Figure 3.9 – Wildlife Distribution found in Volume 4 of the Mary River Project FEIS.

Marine wildlife in the north Baffin Island (described in the Mary River Project FEIS, Volume 8, Marine Section 5) includes bowhead whale, beluga whale, narwhal, walrus, ringed seals, bearded seals, harp seals, and polar bears.

4.3.4.1 Bowhead Whale

Bowhead whales occur seasonally in the RSA and are typically found alone or in small groups. Bowheads are adapted to living in areas of heavy unconsolidated ice and can navigate extensive distances under ice although they are capable of breaking up to 20 cm of ice in order to breathe. Feeding and calving usually takes place in nearshore, sheltered, shallow waters in summer. During open-water periods bowhead distribution is likely driven by the distribution of the various prey species. Bowheads are baleen whales (filter feeders), eating pelagic crustaceans as well as epibenthic invertebrates. Traditionally, bowheads have been observed feeding along the floe edge and their presence is often dependent on the tides. There are four recognized bowhead stocks, one of which (the Eastern Canada-West Greenland stock) occurs within the RSA. This stock ranges throughout the eastern and central northern Arctic and from northern Baffin Bay to Hudson Strait. Bowhead whales within Davis Strait and Baffin Bay were commercially overexploited in the early 1900's, reduced from an estimated 11,800 whales to perhaps as low as 1,000. The stock has shown a significant recovery in recent decades and may now number greater than 14,000.

Along the proposed northern shipping route, bowhead whales occur during summer and fall. They may summer along the east coast of Baffin Island, or move westward through Lancaster Sound during June and July to feed and nurse calves in inlets and sounds within the Canadian arctic archipelago. The IQ

suggests that the number of bowheads using Eclipse Sound appears to be increasing in recent years. It is thought that fall migrants wintering in Davis Strait follow the east coast of Baffin Island south to wintering areas, whereas whales that winter along the west coast of Greenland may cross north Baffin Bay and then move south.

The number of bowheads within the Foxe Basin-Hudson Bay region is estimated to be over 2,000. Bowheads congregate to feed and nurse calves in spring and summer around Southampton Island, along the western Hudson Bay coast, and in a relatively small area in northern Foxe Basin between Igloolik and Fury and Hecla Strait. The IQ indicates that bowheads observed near Hall Beach in spring migrate from southern Foxe Basin. Migrations are not well documented, though most movement is thought to take place through the western and central portion of Foxe Basin and may be influenced by ice cover. During summer, this species tends to select areas of high ice cover, presumably to reduce the risk of predation by killer whales. Northern Hudson Bay, Foxe Basin, and Admiralty Inlet have been identified as summering areas, with whales moving farther into inlets and bays as the ice breaks up. In summer months, bowhead whales north of Igloolik consist primarily of juveniles and females with calves, suggesting that this location is a nursing area. Aerial surveys of the Foxe Basin area identified small numbers of bowheads in northwest Foxe Basin but not Steensby Inlet.

Hudson Strait has been identified as a primary wintering area for bowhead whales. Bowheads begin winter migrations in October as the sea ice begins to form, heading south towards northeastern Hudson Bay and Hudson Strait. In 1981, over 1,300 bowheads were estimated in Hudson Strait and were observed during aerial surveys. Additional details on Bowhead Whales can be found in Section 5.1.5 Volume 8 of the Mary River FEIS.

4.3.4.2 Beluga Whale

Beluga whales have a circumpolar distribution and occur seasonally within the RSA. They are opportunistic feeders, consuming a wide array of fish and invertebrates. Mating is thought to peak prior to mid-April with calving likely occurring in offshore areas during late spring migration. A limited amount of calving may also occur near estuaries and bays that is supported by IQ indicating that Koluktoo Bay and the southern portion of Milne and Navy Board inlets may be calving areas.

Four of the seven recognized populations in Canada occur in the RSA, including the Eastern High Arctic-Baffin Bay, Western Hudson Bay, Eastern Hudson Bay population, and Ungava Bay populations. The Eastern High Arctic Baffin Bay population (estimated at >20,000) summers in the Canadian Arctic archipelago and winters in the loose pack ice of two distinct areas; along the west coast of Greenland and in the North Water Polynya in northern Baffin Bay. Beluga from the smaller population wintering in the North Water begin entering Lancaster Sound in late April or early May with peak movements occurring in late June to July depending on ice conditions. Belugas wintering off the west coast of Greenland generally occupy similar geographic areas between years. Large numbers from the Eastern High Arctic Baffin Bay population migrate past Bylot Island during spring on their way to summering areas concentrated near Somerset Island. Only a small number of animals move into areas inland of

Bylot Island, ostensibly for calving and feeding. Eastward fall migrations begin in September, and are concentrated almost exclusively along the southern coast of Devon Island. Belugas were observed in Eclipse Sound, Eskimo Inlet, Koluktoo Bay, Milne Inlet, and White Bay during aerial surveys.

All four populations of beluga in the RSA are known or expected to occur along or in the vicinity of the southern shipping route. Beluga from the Eastern High Arctic Baffin Bay population enter into northern Foxe Basin during spring and remain in the general area of eastern Fury and Hecla Strait throughout the summer. These beluga typically remain in shallower waters where feeding is thought to occur.

The Western Hudson Bay and Eastern Hudson Bay populations occur in the southern shipping route waters from late October through April when the whales are in their wintering grounds, and during fall migrations from summering areas in late September and October. Beluga whales from both populations occur in the vicinity of Igloolik, Hall Beach, and likely Steensby Inlet during July to early September. The very small (possibly extirpated) Ungava Bay beluga population possibly occur year-round within the RSA. The most recent population estimate for the Western Hudson Bay population is about 57,000. The Eastern Hudson Bay population has been in decline.

The wintering location of the Western Hudson Bay beluga population has not been confirmed but it is thought to be primarily in Hudson Strait. Spring migration to summering areas occurs during late April to May. The majority of animals likely follow the eastern coast of Hudson Bay south to the Belcher Islands, and then across through the pack ice to the Manitoba coast in late May and early June. A small number move westwards towards Southampton Island. Belugas generally remain within estuaries along the coast and in September begin a northward migration towards Southampton Island.

Based on aerial survey results, beluga whales were widespread in Steensby Inlet, Foxe Basin and Hudson Strait but abundance varied with location and month. Additional details on Beluga Whales can be found in Section 5.1.3. Volume 8 of the Mary River FEIS.

4.3.4.3 NARWHAL

Narwhals generally inhabit deep arctic waters of Baffin Bay, the eastern Canadian Arctic, and the Greenland Sea but are seldom found south of 61°. Their diet is thought to be similar to that of beluga, consisting primarily of small cod, flatfish such as Greenland halibut, squid, and other small fish and invertebrates.

Narwhals prefer coastal areas that provide deep water and protection from the wind during summer. They appear to favour deep fjords and the continental slope during winter, in areas where water depths are 1,000 to 1,500 m and marine water upwelling increases biological productivity. Narwhals are highly social animals and can be found in small numbers groups of hundreds or thousands during migration. Based largely on summer distributions, two tentative populations of narwhal occur in Canadian waters; the Hudson Bay population and the Baffin Bay population. However, narwhals are currently assessed as a single population in the eastern Arctic. Narwhals occur throughout the northern shipping route year-

round but are found in the RSA primarily during the open-water period. Those that winter in Baffin Bay typically summer in the eastern Canadian Arctic, moving to summering areas in Melville Bay, Eclipse Sound, Smith Sound, and beyond Lancaster Sound. Important summering areas identified within Baffin Bay include Eclipse Sound, Inglefield Bredning, and Smith Sound-Kane Basin.

Recent estimates indicate that approximately 45,000 narwhal summer around Somerset Island, while over 27,000 inhabit waters in the Prince Regent and Gulf of Boothia area, with approximately 20,000 in the Eclipse Sound area, 10,000 in the East Baffin Island fjord areas, and 5,000 in Admiralty Inlet. Survey results from the late 1980's and early 1990's indicated that summer distribution of narwhal within Eclipse Sound, Milne Inlet, Koluktoo Bay, and Tremblay Sound is influenced by presence and distribution of ice and killer whales.

Narwhals begin to migrate out of their summering areas in groups of a few hundred to several thousand just before freeze-up begins in late September. Those summering near Somerset Island enter Baffin Bay north of Bylot Island in mid to late October. Populations summering in Pond Inlet begin migrating down the east coast of Baffin Island in late September. Narwhals generally arrive in their wintering areas in November. The Baffin Bay narwhal population winters at two discrete areas in the pack ice in central Baffin Bay, and in polynyas at the north end of Baffin Bay.

Narwhals were identified in aerial surveys throughout in Eclipse Sound, Milne Inlet, and Koluktoo Bay. Narwhale observed during a typical survey often numbered in the thousands. Narwhals were also frequently seen in Tremblay Sound and White Bay. Aerial surveys documented fine scale movements of large groups of narwhal between various areas of Eclipse Sound and surrounding fjords.

A much smaller number of narwhal inhabit waters along the southern shipping route. The Hudson Bay population was estimated to be almost 2,000 in the year 2000, though it may be as many as 3,500 during summer months. The timing and routes of migration used by the Hudson Bay narwhal population are less understood than those of the Baffin Bay population. This population is thought to winter in eastern Hudson Strait and move towards summering areas located primarily in the Repulse Bay area north of Southampton Island during late June while some may move north towards Fury and Hecla Strait, in the vicinity of Igloolik.

Fall migrations to Hudson Strait begin in late August or early September, depending on ice conditions. A small number of narwhals that winter in Baffin Bay are thought to move through Fury and Hecla Strait into northern Foxe Basin during spring migrations in April and May.

Aerial surveys confirmed that narwhal occur in relatively low numbers in Foxe Basin; there were no sightings in Steensby Inlet. Narwhal were most abundant in Hudson Strait during April and June surveys when a small number of individuals were recorded. Additional details on Narwhal can be found in Section 5.1.4, Volume 8 of the Mary River FEIS.

4.3.4.4 WALRUS

Walrus have a discontinuous circumpolar distribution and are migratory, moving with the ice. They winter in the offshore pack ice of Davis Strait and along the west coast of Greenland, the North Water Polynya off eastern Devon Island and northern Labrador, as well as in Foxe Basin ranging from the floe edge along the north side of Rowley Island and south to the Melville Peninsula. Walruses are primarily benthic feeders on bivalve molluscs and other invertebrates, and are generally confined to shallow coastal waters up to 100 m.

Four extant stocks occur within Canadian waters however these may be further subdivided. Three of the four identified stocks occur within the confines of the RSA; the Baffin Bay (High Arctic) population, the Foxe Basin population, and the North Hudson Bay-Davis Strait population.

The Baffin Bay walrus population is estimated between 1,700 and 3,000 individuals with summering populations in Kane Basin, Buchanan and Princess Marie bays, Jones Sound, eastern Ellesmere Island, and the Lancaster Sound-Barrow Strait area. Walrus along the northern shipping route winter in the North Water and other polynyas among the Canadian Arctic islands, inhabiting northwest Baffin Bay north from Pond Inlet to Kane Basin, Lancaster Sound, Barrow Strait, and Jones Sound. They are also distributed along the west coast of Greenland. Walrus move westward along the southern coast of Devon Island during spring to summering areas in the Canadian Arctic islands. Only a few individuals are now observed among the inlets and fjords south of Bylot Island. Aerial surveys within the vicinity of Eclipse Sound recorded two walrus; one in Eclipse Sound and one in Milne Inlet.

Walrus are considerably more abundant along the southern shipping route. They are year-round residents in northern Foxe Basin, overwintering in small polynyas and shore lead systems near the outlet of Fury and Hecla Strait, to the east of Hall Beach, and among the islands (Rowley, Koch, and the Spicer Islands) located farther to the east of Hall Beach and south of Steensby Inlet. Their distribution appears to be driven by ice and open-water conditions during winter. During the open water period, they move onto beaches and coasts among the islands south of Steensby Inlet and onto drifting pans of ice. Walrus have been observed within Steensby Inlet during late summer, but the degree to which they use other locations within Steensby Inlet is uncertain. The Foxe Basin walrus population is estimated to be approximately 5,500.

Walrus were abundant within northern Foxe Basin portion of the aerial survey route in 2006. They were observed in pack ice or open water with walrus densities in northwest Foxe Basin estimated at about seven times higher than those observed in northeast Foxe Basin or southern Foxe Basin. During the aerial surveys, two terrestrial walrus haulout sites were observed, one at Manning Islands (mid-way between Hall Beach and Spicer Islands) and the other at Bushnan Rock (a small sandy islet west of the gap between Rowley and Koch Islands). Walrus densities in Hudson Strait were lower than any observed in Foxe Basin. Additional details on Walrus can be found in Section 5.1.2, Volume 8 of the Mary River FEIS.

4.3.4.5 RINGED SEAL

The ringed seal is an important element of the Arctic marine system, both as main prey of polar bears, and as a major consumer of marine fish and invertebrates. Ringed seals occur year-round along both proposed shipping routes and in the vicinity of both proposed port sites and are a major traditional food source for the Inuit.

Ringed seals establish a series of breathing holes and subnivean lairs, with many of these structures created shortly after fall freeze up. Birth lairs are constructed on the landfast ice in mid-March and pups are born in April. Landfast ice is preferred for breeding rather than pack ice. The population of ringed seals in the Canadian Arctic is estimated to be at least a few million.

Ringed seals are common throughout Baffin Bay as well as along the length of West Greenland. During winter and spring, ringed seals concentrate on stable shorefast ice, though in areas where fast ice is limited, as in Baffin Bay, increased numbers may occupy offshore pack ice. As ice breaks up during summer, they disperse as solitary animals or small groups throughout open-water areas or to coastal. Though ringed seals were originally thought to remain in the same general region throughout the year recent evidence suggests that some members of the population, particularly juveniles, may undertake extensive seasonal movements.

Ringed seals are abundant and have been observed throughout along the proposed northern shipping route, occurring throughout Baffin Bay and Davis Strait, Eclipse Sound, Koluktoo Bay, Navy Board and Pond Inlet.

Ringed seals are abundant along the proposed southern shipping route, occurring throughout Foxe Basin, including the landfast ice of Steensby Inlet and Hudson Strait. Southern Steensby Inlet, Igloolik, Hall Beach, Murray Maxwell Bay, and Rowley Island into Fury and Hecla Strait have been described as important hunting and/or pupping areas for ringed seal. Additional details on Ringed Seal can be found in Section 5.1.1, Volume 8 of the Mary River FEIS.

4.3.4.6 BEARDED SEALS

The bearded seal has a patchy circumpolar distribution as far north as 85ºN. There is no reliable abundance estimate for bearded seals in Canadian waters; however, some have suggested an estimate of >190,000.

Bearded seals typically occur alone or in small groups. Whelping occurs between late April and early May, and pups are typically born on unstable pack ice where they are weaned after 12-18 days. Bearded seals eat a wide variety of foods and are generally considered to be benthic feeders that prey on an array of benthic invertebrates and fish, although pelagic fish are also a food source.

Bearded seal distribution is largely determined by the presence of shallow water but they usually move into areas of open water <200 m deep when the pack ice retreats, while some individuals associate with

ice year-round. They are seldom found in fast ice areas, but are widely dispersed in open water areas of pack ice where leads and cracks are frequent, and where ice pans are sufficient for haul out sites.

Bearded seals are considered common in the RSA. Large numbers of bearded seals occur around north eastern Baffin Island and in Lancaster Sound. The many polynyas of northern Foxe Basin support several colonies of bearded seals and is thought to be an area of high density for bearded seals.

During aerial surveys in support of the Project, bearded seals were present in all areas of Foxe Basin and Hudson Strait, and most sightings occurred from April to August 2008 when they are easily observed basking on sea ice. During aerial surveys in June 2008, most bearded seals were sighted near the mouth of Steensby Inlet; densities were lower in northwest Foxe Basin, northeast Foxe Basin, southern Foxe Basin, and Hudson Strait. Bearded seals were observed in small numbers during springtime seal surveys in Eclipse Sound and Milne Inlet in 2007 and 2008. Additional details on Bearded Seal can be found in Section 5.1.7, Volume 8 of the Mary River FEIS.

4.3.4.7 HARP SEALS

Harp seals occur in the northern Atlantic and Arctic oceans below 84ºN. Three geographically distinct populations occur in the North Atlantic Basin but only one of which occurs in the RSA, the Northwest Atlantic population. This is the largest population, including a total of ~5.9 million animals. This population spends the summer off west Greenland and in the Canadian Arctic. Harp seal whelping occurs from late February to mid March on first year ice or landfast ice offshore Newfoundland and Labrador and in the Gulf of St. Lawrence. Harp seals enter Lancaster Sound in July and August via migration routes along the fast ice edge off east Baffin or across Baffin Bay from Greenland.

Generally harp seals enter Pond Inlet and Navy board Inlet at the end of July. They concentrate at the mouth of Navy Board Inlet and occasionally within Eclipse Sound throughout August and September. Harp seals were sighted in relatively high numbers during aerial surveys in Eclipse Sound and Milne Inlet. Harp seals were seen frequently in large groups of 10-50, and in one case 400. Most sightings were in Eclipse Sound. The September exodus from Lancaster Sound proceeds along the north coasts of Devon and Ellesmere islands, and then either across Smith Sound to Greenland, or along the east coast of Baffin. By October, most seals have left the Canadian High Arctic and Greenland.

Smaller numbers of harp seals also move westward into Hudson Bay and Foxe Basin during spring. Some animals move south along the east coast of Hudson Bay, reaching Southampton Island and occasionally as far south as the Belcher Islands near James Bay. Others head west across northern Hudson Bay and disperse along the west coast of the bay and Foxe Basin. There were relatively few sightings of harp seals in Hudson Strait during aerial surveys in 2008. Additional details on Bowhead Whales can be found in Section 5, Volume 8 of the Mary River FEIS.

4.3.4.8 POLAR BEAR

Polar bears have a circumpolar distribution and occur in relatively low densities throughout most of the ice-covered areas in the RSA. Polar bears tend to be more abundant along shore lead systems and polynyas during winter, where less consolidated ice cover provides habitat for prey species. Non-pregnant females, juveniles, and adult males remain active on the pack ice throughout the year, often moving considerable distances with the ice. The distribution and population size of polar bears is likely regulated by the extent of sea ice and the distribution and numbers of their primary prey, the ringed seal.

Female polar bears give birth to 1-3 cubs every 3 to 4 years. Mating occurs from April to June, and females give birth the following December or January in maternity dens, which are excavated in accumulations of snow on stable parts of landfast ice, offshore pack ice, and most often on land within approximately 50 km of the coast. Dens are created in the fall and bears leave their dens in April.

The global polar bear population is estimated at 22,000 to 25,000, of which at least 15,500 occur in Canada or in subpopulations shared with Canada. Three subpopulations of polar bears occur within the RSA: Foxe Basin, Baffin Bay, and Davis Strait with each subpopulation numbering around 2,000.

Along the northern shipping route, polar bears are distributed throughout Baffin Bay, Lancaster Sound, and along coastal areas. Polar bears from the Baffin Bay subpopulation occupy drifting pack ice and landfast ice between Baffin Island and west Greenland during winter, but can concentrate along the Lancaster Sound fast ice edge. Bears are also concentrated along landfast ice edges across Pond and Navy Board inlets during spring. Bylot Island and coastal Baffin Island are used as summer retreats when sea ice melts and also provide denning habitat for pregnant females. The Davis Strait subpopulation occurs in the Labrador Sea, eastern Hudson Strait, Davis Strait south of Cape Dyer, and an undetermined portion of southwest Greenland. Polar bears are harvested domestically as well as during commercial spring sport hunt based out of Pond Inlet. Small numbers of polar bears were observed during aerial surveys during the open-water season in Milne Inlet, Eclipse Sound, and Eskimo Inlet and on landfast ice in Milne Inlet, Koluktoo Bay, and Navy Board Inlet.

Polar bears from the Foxe Basin subpopulation range over Foxe Basin, northern Hudson Bay and western Hudson Strait during winter and move ashore during the open-water period, concentrating on Southampton Island and along the Wager Bay and other coasts within Foxe Basin. During aerial surveys polar bears were observed on landfast ice, pack ice, terrestrial areas, and in open-water areas primarily in northern Foxe Basin but also in Hudson Strait. Additional details on Polar Bear baseline studies can be found in Section 5.1.6, Volume 8 of Mary River FEIS.

4.4 SOCIO-ECONOMIC ENVIRONMENT

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. Recent changes, particularly residential schools, have affected family integrity

and by implication, social cohesion. Elders are becoming more engaged in community life and in the education of youth in traditional skills. At the same time, a shift toward Western middle-class expectations appears to be taking place among Inuit youth.

The land-based economy is a major part of the livelihoods of many residents of the North Baffin. Harvesting from the land and sea is estimated to produce food worth between $12 million and $20 million per year in this region. The amount of work to harvest this food is estimated to be similar to 350 full-time jobs.

In addition, residents of the region earn money through sales of arts and crafts, through employment, and from various government social programs such as Income Support. The personal income reported by residents of the five North Baffin communities amounted to $83 million per year.

Residents' demand for wage employment is very high. People want to work, even when this work requires flying to remote locations. However, job opportunities in the North Baffin are limited. Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-time work would pay, and a small number earning full-time, year-round incomes. Most residents working in full-time jobs in Iqaluit do so year-round. In North Baffin, many more full-time workers are engaged in these jobs for only short periods. Women who work full-time jobs in North Baffin are more likely to work year-round than are men.

Nunavut relies on federal transfer payments for at least 90 % of its revenue. Government employment is a mainstay of the wage economy, with many of Nunavut's small businesses and retail outlets established to support government needs or those of public servants. The public sector accounts for a large portion of Nunavut's economic activity. Government jobs in administration, education and health account for about half of all employment earnings in the territory. Construction has been growing as government infrastructure has been established.

These communities have a subsistence economy and have experienced dramatic population growth over the last 20 years. Over 70 % of the population is under 25. Underemployment and lack of opportunities is causing social stress. Community Elders recognize that the communities must position themselves to enter the wage economy.

For many North Baffin households, harvest of country food provides an important contribution to overall well-being. In all five communities, caribou, ringed seal, and Arctic char are of major importance. In addition, walrus is a major species of importance in Hall Beach and Igloolik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet and, to a lesser degree, Clyde River.

4.4.1 Nearby Communities

There are five communities of north Baffin Island in the immediate vicinity of the Project, which have existing and historical socio-economic and/or ecosystemic ties to the Project area, and for which the

Project has a direct effect on the traditional land use of their residents. Listed in alphabetical order, these communities (known as Category 1 communities in literature as they are closest to the Project) include Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet. The ties of these individual communities to the Project are described in more detail:

Arctic Bay is located on northern Baffin Island, 280 km northwest of the Mary River site. Harvest and land use patterns indicate that the effect of Project activities on these current patterns of Arctic Bay residents is less than what it would have been historically. Arctic Bay residents might use the Milne Inlet, Eclipse Sound, and Mary River areas for hunting on a sporadic or occasional basis but other geographic areas are more important to this community's land use.

Clyde River is located in northeastern Baffin Island, 415 km from the Project area. Historical land use information and discussions with Elders from various communities suggest that the people of the Clyde River area used to travel inland from Cambridge Fiord facing Baffin Bay, into the Raven River area east of Angajurjualuk Lake and southeast of Mary River. Harvest patterns suggest that contemporary land use activities are now concentrated closer to the community, however, historical ties to the Mary River area resulted in the inclusion of this community in the study area.

Hall Beach is located on the mainland just south of Igloolik, 192 km from the Steensby Port site and 288 km southwest of the Mary River site. Hall Beach harvest patterns are distinct from Igloolik despite their proximity, with a concentration of marine harvesting centred on the Hall Beach area. Some hunting occurs on Baffin Island intermixed with Igloolingmiut hunting, including in and around Rowley and Koch islands and Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Igloolik is located on the mainland but is the closest community to the Steensby Port site (155 km) and second-closest geographically to the Mary River Project site (230 km). Historically, Igloolingmiut spent the summer hunting caribou along the western side of North and Central Baffin Island. Current harvest patterns show that while Igloolingmiut use the Baffin coast and marine areas at the mouth of Steensby Inlet, their activities are heavily concentrated around the community on Melville Peninsula and the closest Baffin Island shoreline to the north. Igloolingmiut still hunt around Rowley and Koch islands and even in Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Pond Inlet is geographically the closest community to the Mary River mine site, located approximately 160 km northeast of Mary River. Pond Inlet relies on hunting in the marine environment of Eclipse Sound and Milne Inlet as well as caribou hunting through the Mary River area. As such, Pond Inlet has the closest land use, historical, and ecosystemic ties to the Mary River area. Details on the socio economic environment surrounding the Project area are described in detail in Volume 4 of the Mary River Project FEIS, February 2012.

4.4.2 Traditional Land Use

Human habitation of the region extends back at least 4,000 years. The historic period of a region is defined as that point where human activities are documented in written record.

The historic period of the North Baffin region begins in the late 16th century with the first European whaling and exploration in areas adjacent to Baffin Bay. Two ships that over-wintered in the Igloolik in 1822 and 1823 provide the first record of Euro-Canadian exploration in the Foxe Basin area.The Hudson Bay Company, the Royal Canadian Mounted Police (RCMP), and the church established themselves at different times in the vicinity of each of the existing communities, as early as 1921). The establishment of these institutions, as with the whalers before, influenced land use and settlement patterns through the mid-twentieth century. The establishment of DEW-line sites in Foxe Basin also influenced land use patterns, with Inuit settling near the DEW-line sites seeking part time employment and for trade. Traditional land use patterns changed substantially with the movement of the Inuit into permanent settlements as a result of federal policy and housing initiatives in the 1950s Contemporary Inuit land use was determined through consideration of the Nunavut Wildlife Harvest Study interviews and discussions with local communities, and the results of the MRIKS. Connection with the land continues to be an important aspect of Inuit life and is evident in current land use patterns. Although Inuit now live in permanent settlements, travel and camping continue to be important aspects of Inuit life. Travel routes have been identified linking all the communities of north Baffin Island (Clyde River, Pond Inlet, Arctic Bay, Igloolik, and Hall Beach). Travel is an important land use practice of the Inuit as it enables the development of connections to the land, enables individuals to meet with family and friends from other communities, and enables hunting and gathering. For additional and a through breakdown of land use areas surrounding the project information refer to Figures 3.13 – Travel Routes – North Baffin Region (workshop results) and Figure 3.14 – Travel Route – North Baffin Region (interview results) from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Contemporary harvesting activities on North Baffin include wildlife hunting, marine mammal hunting, freshwater and marine fishing, berry picking, egg gathering, sea resource harvesting, and land resource harvesting such as soapstone. See the following figures from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for geographical representation of identified areas where harvesting activities occur:

- Figure 3.4 – Hall Beach/Igloolik Harvest Locations (Pre-1965)
- Figure 3.5 – Hall Beach/Igloolik Harvest Locations (1965-1974)
- Figure 3.6 – Arctic Bay/Pond Inlet Harvest Patterns (pre-1959)
- Figure 3.7 – Arctic Bay/Pond Inlet Harvest Locations (1959-1964)
- Figure 3.8 – Land Use information from DIAND (1982B) (showing inuit land use by marine and terrestrial animal activity)

- Figure 3.9 – Wildlife distribution
- Figure 3.10 – Approximate Camp Areas (1930-1966) (not sure this is needed)
- Figure 3.19 – Berry Picking Locations – North Baffin Region (workshop results)
- Figure 3.22 – Ocean Resource Collection Areas – North Baffin Region (workshop results)
- Figure 3.31 – Reported Caribou harvest locations in North Baffin (1996 – 2001)
- Figure 3.33 – Reported marine mammal harvest locations on North Baffin (1996 – 2001)
- Figure 3.35 – Reported waterfowl and egg harvest locations in North Baffin (1996 – 2001)
- Figure 3.37 – Reported Fish Harvest Locations in North Baffin (1996 – 2001
- Figure 4.2 – DFO Arctic Char Commercial Fishing Quotas for North Baffin Rivers

4.4.2.1 Land Fast Ice

Ice is an important component of land use activities, as much of the travel engaged in by residents is on land fast ice. Land fast ice is often used to reduce travel time and to access the floe edge for hunting purposes. For more information refer to Figures 3.13 – Travel Routes – North Baffin Region (Workshop Results); Figure 3.14 Travel Routes – North Baffin Region (interview results); and Figure 3.24 – Sea Ice Conditions – North Baffin from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Recreational Land use several parks exist in the vicinity of the Project. Sirmilik National Park of Canada, established in 2001, is one of Canada's newest national parks and covers a considerable landmass with four separate land parcels. The Bylot Island Bird Sanctuary is located within Sirmilik National Park, affording it overlapping legal protection and restrictions on land use. Tamaarvik Territorial Park, located adjacent to the community of Pond Inlet and Little Salmon River, is a relatively small park used mainly for camping. See Figure 7.1 – Parks and Conservation Areas from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for location of the parks relative to the Project.

Local outfitting resources are available in local communities for tourism activities such as kayaking, nature viewing and polar bear hunting. Cruise ships visit the North Baffin region each summer, specifically the region around Bylot Island and Sirmilik National Park.

4.4.3 Protected Areas

The Project does not overlap with any terrestrial protected areas and/or known critical habitats such as national or critical wildlife areas. Access to Milne Port would be through Baffin Bay into Eclipse Sound or around Bylot Island through Navy Board Inlet. Both paths are adjacent to Sirmilik National Park and Bylot Island Bird Sanctuary, and in proximity to key marine bird habitat sites near Cape Graham Moore or Cape Hay on Bylot Island. No interactions are expected along the southern shipping route through Hudson Straight and Foxe Basin.

For further information, see Appendix 4C (Land Use in the Vicinity of the Mary River Project Report), Volume 4 of the Mary River Project FEIS.

4.5 Project Updates & Reporting

Since 2007, Baffinland has provided annual reports to the Nunavut Impact Review Board (NIRB) summarizing the site work completed, and the work planned for the following year for the activities previously screened and approved by NIRB. These reports also provide a synopsis of compliance performance with explorations licences, permits, approvals and commitments, and include the results of monitoring activities. An update on the existing environmental conditions and progressive reclamation activities are also contained in these reports. The reports are publicly available through NIRB (http://www.nirb.ca/) and results of the monitoring activities described in these annual reports which have an impact or influence on the goals, objectives, criteria, or strategy of the ICRP will be considered in future revisions of the ICRP. Please see Appendix C provides site photographs of current conditions onsite.

5 PROGRESSIVE REHABILITATION

Most of the Project areas will be actively used during the Construction and Operation phases of the Project, although where practical, areas which are no longer needed to carry out Project activities will be progressively reclaimed.

This section describes the proposed progressive rehabilitation measures that will be completed during the construction and/or operation phases of the Project. In accordance with the objectives and guidelines presented in Section 2.1.5, progressive rehabilitation will be implemented to achieve the Projects site abandonment goal and closure principles.

Phase:	**Construction (ERP)**				**Operation (ERP)**				**Operation (ERP & Rail Phase)**			
Year:	1	2	3	4	1*	2*	3*	4*	1	2	3	4
Milne Port												
PWSP (exploration)	■	■										
Bladder Farm	■	■										
Quarry (Q1)												■
Mary River Mine Site												
Bladder Farm		■	■	■								
Quarry (QMR2)												■
Laydown Areas									■			
Borrow Pits				■	■				■			
Rail Route												
Rail Access Road									■	■		

*Rail phase construction begins

FIGURE 5-1: SUMMARY OF CONCEPTUAL CURRENT AND PROPOSED PROGRESSIVE REHABILITATION SCHEDULE 4

5.1 Proposed Progressive Rehabilitation Measures

The overall intent of the proposed progressive rehabilitation measures is to assist in achieving Baffinland's site abandonment goal to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities in as minimal duration as reasonably practical. The progressive rehabilitation measures proposed as part of the ICRP are expected to be technically and economically feasible and reflect Project closure principles. Closure criteria, to determine if the closure objectives outlined in subsections below have been achieved by closure activities, are consistent with the closure criteria described in TABLE 6-1. It should be noted participation of the local communities, through their QIA representatives, and other applicable government stakeholders, in the consideration of alternative progressive reclamation activities is encouraged via the Working Group (see Section 2.3 for more information). The experience gained and lessons learned from the closure of the Nanisivik and Polaris mine sites, which are located in a similar climate zone, will be used, where applicable, as a benchmark for the progressive rehabilitation of disturbed Project areas.

The general progressive rehabilitation measures for each Project component is provided in the subsections below.

5.1.1 Progressive Reclamation of Current Project Components

The following areas will be progressively reclaimed during the Construction and/or Operation phase at Milne Port, the Tote Road, the Mine Site, and Steensby Port.

5.1.1.1 Laydown Areas

Progressive reclamation of laydown areas will occur when laydown areas are no longer needed for construction and/or operations. Laydown areas will be re-graded and scarified to ensure to the extent possible:

- Pre-disturbance surface conditions including drainage patterns have been re-established
- Disturbed areas are scarified to promote natural re-vegetation
- Remaining area is physically and geotechnically stable
- Surface runoff and seepage water quality is safe for humans and wildlife
- The area encourages the desired wildlife movement.

Any contaminated portions of any laydown will be remediated to ensure they do not pose an unacceptable environmental risk.

5.1.1.2 Quarries and Borrow Pits

Progressive reclamation of quarries and borrow pits will occur when quarries and borrow pits are no longer needed for construction and/or operations for the Project. At that time, quarries and borrow pits will be cut or filled, as required, to ensure to the extent possible:

- Pre-disturbance surface conditions including drainage patterns have been re-established
- Disturbed areas are scarified to promote natural re-vegetation
- Remaining area is physically and geotechnically stable
- Surface runoff and seepage water quality is safe for humans and wildlife.

Any contaminated portions of any quarries and borrow pits will be remediated to ensure they do not pose an unacceptable environmental risk. Closure and reclamation of these sites will be carried out in accordance the site specific requirements as outlined in the individual Borrow Pit or Quarry Operating Plan.

5.1.1.3 Landfill

Project landfills will be progressively covered with overburden, as cells are completed, to allow the contents of the landfill to remain permanently frozen to ensure the area is physically and geotechnically stable in the long term, any surface runoff and seepage water quality is safe for humans and wildlife, and the area encourages the desired wildlife movement upon site abandonment. It shall be ensured that post-closure water quality run-off objectives in receiving water bodies are met and no long-term active care is required.

5.1.1.4 Landfarms

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Hydrocarbon-contaminated soils will be excavated and treated in the Project landfarm(s) throughout the life of the Project to maintain the chemical stability of the site and any discharges. During Operations, soils treated in Project landfarm(s) that meet Nunavut Contaminated Site Remediation Tier-1 Guidelines[8] for industrial/commercial land uses will be used in select locations. The use of treated soils meeting these criteria is restricted to areas deemed as a low risk of exposure to transportation pathways and a defined in prescribed operational control procedures. During Operations, soils treated in Project landfarm(s) that meets Nunavut Contaminated Site Remediation Guidelines[8] for agricultural or residential land uses will be spread over land as or used of as cover material. Soils treated in Project landfarm(s) that do not meet Nunavut Contaminated Site Remediation Guidelines[8] for industrial/commercial land uses will be kept in containment for further treatment. Another approach that may be utilized is a risk based methodology for the establishment of hydrocarbon criteria that are protective of human and ecological health. The methods to be followed are outlined Canadian Council

[8] Environmental Guideline for Contaminated Site Remediation, Department of the Environment, Government of Nunavut, March 2009

of Ministers of the Environment (CCME) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil (2008).

Once no longer required, landfarms will be closed to ensure the area is physically and geotechnically stable long term, any surface runoff and seepage water quality is safe for humans and wildlife, and the area encourages the desired wildlife movement. It shall be ensured post-closure water quality run-off objectives in receiving water bodies from landfarms are met and no long-term active care is required.

5.1.1.5 Camps and Associated Infrastructure

Construction camps and associated infrastructure will be demolished, removed, and/or disposed of in approved site landfills, the Mine pit, quarries, other approved disposal locations or off-site disposal facilities following the Construction Phase to accommodate the reduced number of personnel required on site during operations. Closure activities will ensure camp components will not be a source of contamination to the environment or a safety hazard to humans and wildlife. Surface areas occupied by construction camps and associated infrastructure will be restored to pre-disturbance conditions or to a condition compatible with future land use targets, to the extent possible.

5.1.1.6 Waste Rock Stockpile

The waste rock stockpile will be monitored during operations. It is anticipated, based on current investigations, that most of the waste rock will not be prone to metal leaching or acid drainage. However, if ongoing ore characterization studies show that the minor portion of waste rock that is potentially acid generating (PAG) could cause unacceptable impact to runoff and seepage, the waste rock stockpile construction strategy will be modified accordingly. Baffinland will implement, on an as needed basis, any measures required to ensure:

- Generation of poor water quality from waste rock piles has been minimized, including that from Acid Rock Drainage/Metal Leaching (ARD/ML)
- Surface runoff and seepage water quality is safe for humans and wildlife
- The pile is physically and geotechnically stable for human and wildlife safety in the long-term
- The risks of erosion, thaw settlement, slope failure, collapse, and the release of contaminants or sediments have been minimized
- Dust levels are safe for people, vegetation, aquatic life, and wildlife in the long-term.

5.1.1.7 Roads

Roads no longer required during operations will be decommissioned, to the extent possible, to ensure pre-disturbance surface conditions including drainage patterns have been re-established, disturbed areas are scarified to promote natural re-vegetation and remaining disturbed area is physically and geotechnically stable. Decommissioning activities will ensure adverse impacts to permafrost along the route have been limited and impacts to the environment, fish, and wildlife, from localized areas of

contamination that may be present along a route have been minimized. Any contaminated portion of a road will be remediated to ensure they do not pose an unacceptable environmental risk and post-closure public and wildlife access has been deterred or enabled as necessary to meet designated future land use of the area and encouragement of desired wildlife movement. Water crossings will be removed in a manner necessary to maintain the physical and chemical stability of the area in the long-term.

5.1.1.8 Fuel Bladders Farms

Progressive reclamation of the fuel bladders at Milne Port and Mary River Mine Site will occur during the Construction Phase and ERP of the Project. Once the fuel bladders are removed, any contaminated soil will be treated in the landfarms to ensure contaminated soils do not pose an unacceptable environmental risk. Area no longer required will be re-graded and scarified to ensure to the extent possible:

- Pre-disturbance surface conditions including drainage patterns have been re-established
- Disturbed areas are scarified to promote natural re-vegetation
- Remaining area is physically and geotechnically stable
- Surface runoff and seepage water quality is safe for humans and wildlife
- The area encourages the desired wildlife movement.

5.1.2 Progressive Reclamation Associated with the Railway

Following completion of the Railway, progressive reclamation activities will be undertaken by Baffinland to ensure the site abandonment goal and principles in accordance with Project requirements are met consistent with activities outlined in Section 5.1.1. Progressive reclamation strategies associated with the railroad may be revised at a later stage in the Project with a focus on measures related to the assessing and remediating, if warranted, the following:

- Railroad maintenance facilities that have generated wastes and the potential for spillage of solvents and heavy metals
- Railroad fuelling facilities: diesel spillage, diesel recovery, water treatment, soil remediation. Storage of gasoline at fuelling facilities
- Ballast geochemistry, potential ML/ARD
- Consideration of materials to be hauled on the line such as diesel which have the potential to contaminate ballast and soils
- Ore dust from moving trains
- Ore spillage into the ballast from movement of trains
- Ballast cleaning and disposal of recovered fines

- Tie replacement and disposal of used ties.

5.2 Uncertainties, Risks and Research Plans

Baffinland will conduct monitoring and research as necessary to resolve uncertainties pertaining to residual effect assessments and environmental risks that may have closure implications. When required, reclamation research, including engineering studies and/or focussed research, will be undertaken with the intention of reducing uncertainties to an acceptable level and provide information that can lead to the development of additional appropriate closure criteria (see Section 5.2.1).

Baffinland's current monitoring and research is focused on confirming or resolving uncertainties related to the Project's potential effects on Valued Ecosystem Components (VECs) and key indicators to assess the Project`s environmental performance relative to the residual effects predictions in the FEIS (See Section 11) . Based on the most recent monitoring results from 2014 (reported March 2015), Baffinland suggests the Project has provided net positive effects to the region and no significant adverse effects have been identified. The results of ongoing monitoring and research from 2014 are summarized in Table 5-1.

TABLE 5-1: ASSESEMENT EFFECT PREDICTIONS BASED ON ONGOING MONITORING AND RESEARCH

Component	Effects	Monitoring Program	Summary Conclusions
Atmospheric Environment			
Air quality	Greenhouse gas (GHG) emissions; Project releases of dustfall and various air quality contaminants.	Emissions of GHGs, Sulphur dioxide (SO_2) and nitrogen oxides (NO_x) based on fuel consumption Dustfall monitoring Continuous monitoring of SO_2 and NO_x	GHGs, SO_2 and NO_x estimated below FEIS predictions. Dustfall monitoring at Milne Port higher than predicted. SO_2 and NO_x below applicable 1-h and 24-h limits, but NO_x at the mine trending towards exceeding annual limit.
Noise and vibration	Noise disturbing sleeping workers and/or presenting health and safety concern.	Noise monitoring within worker accommodation	Most individual noise measurements within night-time noise threshold; individual short-term noise above time-weighted average.
Vibration	Underwater noise due to use of explosives or in-water construction.	No project interactions to monitor in 2014	Explosives were not used near watercourses. Vibrations levels around Milne ore dock construction will be undertaken in 2015.
Terrestrial Environment			
Landforms, soils and permafrost	Ground disturbance resulting in ground thaw, erosion, etc.	Inspection of road and quarries	A number of roadside borrow areas developed in 2007 and 2008 require remedial works.
Vegetation	Changes in abundance or health, introduction of invasive species.	Exotic vegetation sampling Dustfall monitoring Soil and vegetation sampling Long-term vegetation abundance plots	No exotic vegetation species identified Supplemental baseline data collected in 2014 for other vegetation monitoring programs, which are long-term in nature and only show effects over time.
Birds	Destruction of nests; Habitat loss; Influences on health, mortality, sensory disturbance.	Pre-clearing next surveys Coastal nesting and foraging habitat survey Incidental observations	Two bird mortalities (long-tailed ducks) occurred due to collision with an operating crane. Effect occurred, which the FEIS had considered unlikely. Operation of the crane

Component	Effects	Monitoring Program	Summary Conclusions
		Raptor nest occupancy and productivity survey Roadside waterfowl surveys	is short-term during dock construction. All other effects to birds either did not occur in 2014, or occurred consistent with FEIS predictions.
Caribou	Habitat loss; Restriction of movement; Mortality.	Height of land (HoL) monitoring of caribou Incidental observations	No caribou were observed at 24 stations along the Tote Road during the observations.
Freshwater Environment			
Water Quantity	Reduction or increase in lake levels or stream flows due to water usage, diversion of discharge.	Monitoring and reporting of water usage Stream flow monitoring and inspection of streams affected by diversions	All water usage in 2014 was within limits of Type A Water Licence that were assessed as acceptable in the FEIS/FEIS Addendum. Diversions of flow to mine site streams due to the pit and waste rock stockpile have not yet occurred.
Water and sediment quality	Sedimentation (increased TSS) in site runoff; release of ammonia and metals in runoff from quarries; Discharge of treated sewage effluent causing eutrophication or other water quality changes; Discharge of mine effluent from ore and waste rock stockpiles; Water and sediment quality changes due to airborne emissions (i.e., ore dust).	Monitoring of effluent discharges and runoff against discharge criteria in water licence Aquatic effects monitoring program (water and sediment quality)	Discharge criteria have been met with the exception of occasional short-term exceedances of total suspended solids. One-time benchmark exceedances of nitrite, ammonia and iron in Camp Lake tributary 1.
Freshwater biota	Habitat loss; Impairment to fish passage; Water quality effects to fish health and productive capacity; Physical habitat alteration and egg mortality; Fish mortality.	Aquatic effects monitoring program (phytoplankton, benthic invertebrates, fish) Lake sedimentation study	Chlorophyll *a* concentrations are not elevated; eutrophication is not occurring. Benthic invertebrate results not yet available; fish monitoring is for supplemental baseline collection. Lake sedimentation results for 2014 are consistent with 2013 results.
Marine Environment			
Sea ice	Disruption of land fast ice or changes in break-up and formation – effect did not occur in 2014.	No ice breaking; therefore, no monitoring being conducted.	Effects did not occur.
Marine water and sediment quality	Changes in water and sediment quality due to ore dock construction, effluent discharges, prop wash, ballast water discharge, ore dust deposition, accidental fuel spills.	Marine environmental effects monitoring program in 2014 focused on the collection of supplemental baseline data for comparison of future data.	A construction summary report will be provided on ore dock construction in 2015. Prop wash scour effects did not occur with 2014, nor was ballast water discharged from sealift vessels. There was no ore deposition or accidental fuel spills.
Marine habitat and biota	Disruption and loss of marine coastal habitat due to ore dock, effects on arctic char health or mortality due to dock construction and effects to	Same as above	A loss of habitat occurred due to the dock as predicted in the FEIS Addendum. This habitat loss will be offset as per the Fisheries Authorization. Ballast water was not discharged from

Component	Effects	Monitoring Program	Summary Conclusions
	marine water and sediment quality.		sealift vessels; ore deposition or accidental fuel spills.
Marine mammals	Habitat change from ice breaking/ice management; Hearing impairment/damage, or masking of underwater environmental noise from construction noise; Collisions of whales with vessels; Polar bear mortality from human-bear interactions.	Bruce Head shore-based monitoring program Shipboard observer pilot monitoring program Preliminary underwater noise monitoring program	Ice-breaking effects did not occur. Monitoring programs for whales are long-term, but preliminary results suggest that changes in narwhal abundance and distribution due to shipping are not significant. Underwater noise monitoring of ships conducted, and underwater noise monitoring of dock construction to be conducted in 2015. No polar bear mortality in 2015.
Socio-economic Environment			
Population demographics	Project induced demographic instability.	Population statistics	No measurable effect.
Education and training	Training programs improving life skills among local study area residents; in- and out-migration within North Baffin communities.	Training program participation numbers	Training has delivered positive effects to Inuit workers and families.
	Incentives related to school attendance and career opportunities.	Training program participation numbers The number of students receiving Mining Matters programming	Training has delivered positive effects to Inuit workers and families. The outcome of this training on school attendance, employment uptake, etc. occur longer term.
Livelihood and employment	Job creation in local study area communities.	Employment records	As predicted, a proportionally high number of employees come from LSA communities.
Economic development and self-reliance	Increased industrial utilization of the land; effects on harvesting and travel; Changes to human engagement in land-based economy.	No specific monitoring program; changes will only become apparent with time.	Effects difficult to monitor; expected to have occurred as predicted in the FEIS.
	Increased human capacity, opportunities for youth, improved education, training; Increased wealth and well-being; improved ability to meet community development objectives, ,etc.	Inuit Human Resources Strategy is under development. The Socio-economic monitoring program has recently been developed.	Effects are measurable in the long-term only.
Human health and well-being	Potential for increased substance abuse; Attitudes towards substances and addictions.	Security searches of employees arriving to and departing from site.	No drugs or alcohol identified during security searches of workers arriving to or departing from site in 2014.
	Well-being of children, community social stability.	Inuit Human Resources Strategy is under development. The Socio-economic monitoring program has recently been developed.	Effects are measurable in the long-term only.
Community infrastructure and public services	Short-term competition for skilled workers leading to temporary staffing gaps in communities;	Inuit Human Resources Strategy is under development. The Socio-economic monitoring program	Effects are measurable in the long-term only.

Component	Effects	Monitoring Program	Summary Conclusions
	Long-term improvement in labour force capacity.	has recently been developed.	
Contracting and business opportunities	Increased business opportunities for existing and new Inuit firms and joint ventures (JVs).	Contract awards to Inuit businesses	Approximately $178 million in contracts awarded to Inuit businesses and JVs in 2014; a positive effect as predicted in the FEIS.
Cultural resources	Destruction of archaeological sites without proper mitigation, due to construction or deliberate raiding/destruction.	Known archaeological sites were inspected in 2014 and several were mitigated by a qualified archaeologist	No residual effects to cultural resources, as predicted in the FEIS.
Land and resources use	Effects to Inuit harvesting of wildlife, or use of travel routes and camps.	Site observations; recorded visits to project sites; consultation	The HTO cabin at Mary River was relocated in 2014 as per an agreement with the HTO; informal feedback received from hunters that they enjoy being able to stop at the project sites.
Cultural well-being	Support for Inuit values and cultural development.	Training hours Cultural Awareness, Inuit Human Resources Strategy implementation; use of Inuit elders on-site	All employees have received cultural awareness training.
Benefits, royalty and taxation	Increased revenue and taxes; Payroll and corporate taxes; Payments and other benefits under the Inuit Impact and Benefit Agreement (IIBA).	N/A	The positive effects are within FEIS predictions.
Governance and leadership	IIBA Agreement, development of leadership skills.	IIBA Forum, and 2014 IIBA Forum Report	A public forum for reporting on IIBA performance should foster transparency and awareness and support the development of leadership skills. Fulfillment of the IIBA implementation will also support leadership development.

5.2.1 Reclamation Research

Identified reclamation research is focused on ensuring the selected closure activities for the future open pit, waste rock stockpile, and the site as a whole related to natural re-vegetation will meet closure criteria. The results of reclamation research, where required, are reported on an annual basis, in the NIRB Annual Report (see Section 4.5). As further research is conducted, select mine components that may warrant additional study and research may be identified. Baffinland expects a function of the Closure Working Group will be to identify these opportunities as well as reviewing reclamation research results and determining applicability. As required, relevant closure and reclamation study and research findings will be incorporated into future versions of the ICRP. See Appendix D and the following subsections for details on current Reclamation Research Plans associated with: open pit runoff water quality, waste rock stockpile runoff water quality natural re-vegetation.

5.2.1.1 Open Pit Runoff Water Quality

Conceptual modelling of the pit water quality is presented in the Mary River Project FEIS in Volume 7. Open pit monitoring will be done throughout of the life of the Project as per Type A Water Licence Amendment No.1 requirements and in accordance with MMER requirements. Predictions of pit water quality will be periodically updated throughout the life of the Project as more information becomes available on the geochemistry of the waste rock and the pit wall. Although indications to-date demonstrate a low probability of ARD/ML, if monitoring results during Operations suggest a potential ARD/ML it shall be dealt with at that time and any associated impacts that ARD and/or ML would have on closure and reclamation planning, monitoring, long-term maintenance and bonding will be addressed. If there are no indications from test programs or ongoing monitoring of ARD/ML throughout the Operation Phase, at final closure, the open pit will be inspected by a qualified engineering professional to assess the physical stability of the pit walls and pit lake and to reconfirm no indicators of ARD/ML.

ARD and ML will be periodically reassessed as a potential issue in the future ICRP revisions and in the Final CRP. The Final CRP will present a time frame for the potential development of ARD/ML conditions, if any, and discuss the impact of ARD/ML release on final closure identifying the need for ongoing monitoring, treatment, and potential mitigations.

See Section 9.2 for more information about regarding the closure and reclamation activities associated with the Open Pit and Section 11.2.3.2 for further discussion of predicted residual effects related to open pit runoff water quality.

It should be noted that the current mine workings are free draining and that there currently is not an open pit, rather there are the development of benches on the hillside that are largely free draining. The runoff water from the mine workings area is monitored and sampled in accordance with the Water Licence and MMER requirements.

5.2.1.2 Waste Rock Stockpile Runoff Water Quality

At the onset, the waste rock pile design will consider final closure considerations. A detailed sampling and testing program for the characterization of the waste rock for the period of 2012-2014 was conducted and involved:

- Devising a representative sampling program for the waste rock based on the configuration of the ore body and the mining plan;
- Analysis of the lithology, morphology and mineralogy of the waste rock;
- Additional testing (both static and humidity cell).

This program has been reviewed with guidance by independent experts. The objective of this program is to inform prediction of expected runoff quality over time. Contingencies will be put into place if there are acid rock drainage issues and treatment is necessary. The characterization program will be ongoing for the life of the Project and will guide the development of adaptive management strategies for waste

rock management. Regular updates on waste rock characterization and prediction of runoff water quality will be provided in future updates of the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) as they are developed and will be incorporated into future versions of the ICRP as appropriate.

See Section 9.11 for more information about regarding the closure and reclamation activities associated with the Waste Rock Stockpile and Section 11.2.3.2 for predicted residual effects related to waste rock stockpile runoff water quality.

5.2.2 Natural Re-Vegetation

The observations made during Operations to identify best practices for promoting natural re-vegetation of disturbed areas will inform future updates of the ICRP. The objective of reclamation research is to identify methods to successfully achieve a sustainable vegetation cover, and the ability of a vegetation cover to enhance physical stability and/or achieve the desired aesthetic conditions for the project site at closure.

It should be noted that vegetation is naturally sparse or nonexistent (e.g., waste rock stockpile footprint) over much of the Project Area, and therefore the potential for natural re-vegetation of disturbed Project areas is anticipated to be minimal. Re-vegetation by reseeding or replanting is not currently being considered by the Project based on the current site conditions and the potential for success in areas not historically vegetated. However, studies and/or observations of natural re-vegetation, such as colonization potential of vegetation species to disturbed areas, will be undertaken, as needed, to identify alternative methodologies for promoting natural re-vegetation of disturbed Project areas.

6 SUMMARY OF CLOSURE MEASURES

Baffinland acknowledges that due to various economic drivers (commodity prices, escalation of construction and production costs, extended maintenance shutdown, others), Baffinland may be forced into a temporary or permanent closure scenario. For planning purposes, Baffinland defines closure periods as follows:

- Temporary Care and Maintenance – cease commercial operation for a period of up to one (1) year;
- Long-term Closure – cease commercial operation for over (1) year for an indefinite period;
- Final Closure – cease commercial operation permanently.

Sections 7, 8, and 9 describe the measures that would be undertaken to secure, close and/or reclaim Project sites in the event or temporary care and maintenance, long-term temporary closure, and final closure scenario, respectively. A description of the closure objectives, criteria, activities and applicable monitoring program that is proposed to be implemented to confirm objectives and criteria were met for each component of the Project for is summarized in TABLE 6-1.

TABLE 6-1: CLOSURE OBJECTIVES, CRITERIA AND ACTIVITES BY MAJOR PROJECT COMPONENTS (BASED ON ULTIMATE PROJECT DEVELOPMENT – 21.5 MTPA NOMINAL) 4

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Milne Port Site (including ERP components)							
Site Wide for Milne Port	a) Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation. b) Remaining area will not be a safety hazard to humans and wildlife. c) Remaining disturbed area is physically and geotechnically stable. d) Area facilitates the desired wildlife movement. e) Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk. f) No long-term active care is required. g) Dust levels safe for people, vegetation, aquatic life and wildlife. h) Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.	**Geotechnical/Engineering Investigation** • Satisfactory final inspection by professional NU engineer • Closure design and drainage construction inspected and signed-off by a Professional engineer, as-built drawings produced **Environmental Site Assessment** • CCME contaminated sites guidelines or site-specific risk-based criteria met **Flora and Fauna** • Post-closure monitoring demonstrates flora and fauna use in the area **Air Quality** • Mean Total Suspended Particulate concentrations less than 60 $\mu g/m^3$ annual and 120 $\mu g/m^3$ 24 hr average (NU Ambient Air Quality Standard) or site-specific risk-based criteria met. **Land Use** • No visible buildings, equipment or non-local materials. Re-vegetation activities (scarification) applied to disturbed areas.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required.	**Year 0** – Site audit **Year 1** – Rehabilitation of civil works and laydown areas **Year 2** – Decommission roads and water crossings **Year 3** – Rehabilitation (re-grading and scarification) of all surfaces	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring 4. Air Quality Monitoring	Crown/IOL
Ore Dock	a) Any surface runoff and seepage water quality is safe for humans and wildlife.	**Aquatic Monitoring** • Discharge quality meets Contact Water effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/degradation of the civil works.	**Year 0** – Site audit **Year 1** – Decommissioning/ dismantling of all equipment **Year 2** – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown
Civil works, including: • Camp Pads • Laydowns • Freight Dock • Site Roads • Water crossings • Conduit berms	a) Any surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Contact Water effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/degradation of the civil works.	**Year 0** – Site audit **Year 1** – Rehabilitation of laydown areas **Year 2** – Decommission roads and water crossings **Year 3** – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL

[9] *From Milne Port up to 25 km south of Mine Site (excluding small section around P1 Borrow Area) is Inuit Owned Land (IOL). Remainder of Project Facilities on Crown Land*

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Non-Hazardous Waste Disposal Locations	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Landfill effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 21, Table 7 or site-specific risk-based criteria	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year 1** – Routine inspection of facilities. **Year 2** – Application of cover material and rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL
Landfarm	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Landfarm facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 23, Table 9 or site-specific risk-based criteria	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/degradation of the civil works.	**Year 0** – Site audit **Year 1** – Routine inspection of facilities. **Year 2** – Routine inspection of facilities. **Year 3** – Application of cover material(if required) and rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL
Ore Stockpile and Sedimentation Ponds	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Open Pit, Stockpile and Sedimentation Ponds effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria • Discharge quality meets acute toxicity tests under the Fisheries Act	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation	**Year 0** – Site audit **Year 1** – Rehabilitation of ore stockpiles **Year 2** – Decommission sedimentation ponds **Year 3** – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL
Polishing Waste Stabilization Ponds (PWSP)	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Sewage Treatment Facilities to the ocean effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 18, Table 5 or site-specific risk-based criteria	• Maintain/monitor water quality	• Maintain/monitor water quality	**Year 0** – Site audit **Year 1** – Decommission sedimentation ponds **Year 2** –Breach and re–profile all pond sites	1. Aquatic Monitoring	IOL

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Fuel and Hazardous Materials, including: • Fuel Tank Farm and Fuel Dispensing Facilities (Arctic Diesel, Jet–A Fuel) • Hazardous Material Storage Areas • Waste Management Facilities Including Temporary Storage Areas • Hazardous Waste and Hazardous Chemicals • Fuel • Explosives • Explosives Storage	a) All fuel and hazardous materials removed from site. b) Surface runoff and seepage water quality is safe for humans and wildlife c) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Bulk Fuel Storage Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria and/or discharge quality meets Oily Water Treatment Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria (as appropriate).	• Maintain/secure	• Maintain/secure fuel • De-mobilize all hazardous materials	**Year 0** – Site audit **Year 1** – Decontamination and disposal of all non–essential fuel and hazardous materials **Year 3** – Off-site disposal of all remaining material – Rehabilitation of all surfaces	1. Aquatic Monitoring	IOL
Tote Road (including ERP components)							
Site Wide, including: • Road Alignment • Water withdrawal access areas • Water crossings (bridges and culverts)	a) Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible. b) Remaining area will not be a safety hazard to humans and wildlife. c) Remaining disturbed area is physically and geotechnically stable. d) Area facilitates the desired wildlife movement. e) Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk. f) No long-term active care is required. g) Dust levels safe for people, vegetation, aquatic life and wildlife. h) Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.	**Geotechnical/Engineering Investigation** • Satisfactory final inspection by professional NU engineer • Closure design and drainage construction inspected and signed-off by a Professional engineer, as-built drawings produced **Environmental Site Assessment** • CCME contaminated sites guidelines or site-specific risk-based criteria met **Flora and Fauna** • Post-closure monitoring demonstrates flora and fauna use in the area **Air Quality** • Mean Total Suspended Particulate concentrations less than 60 $\mu g/m^3$ annual and 120 $\mu g/m^3$ 24 hr average (NU Ambient Air Quality Standard) or site-specific risk-based criteria met. **Land Use** • No visible buildings, equipment or non-local materials. Re-vegetation activities (scarification) applied to disturbed areas excluding road surface.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year 1** – Rehabilitation of laydown areas **Year 2** – Decommission roads and water crossings **Year 3** – Rehabilitation (re-grading and scarification) of all surfaces – Secure stream banks to prevent erosion – Secure access as required.	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring 4. Air Quality Monitoring	Crown/IOL
Borrow Pits and Quarries	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Borrow Pits and Quarries effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria	• Remove quarry equipment • Secure access	• Remove quarry equipment • Secure access	**Year 0** – Site audit **Year 2** – Rehabilitation for borrow pits and quarries – Secure access as required.	1. Aquatic Monitoring	Crown/IOL

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Mine Site (Site Fully Developed for Mining of 21.5 Mtpa Nominal)							
Site Wide for Mine Site	a) Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural revegetation. b) Remaining area will not be a safety hazard to humans and wildlife. c) Remaining disturbed area is physically and geotechnically stable. d) Area facilitates the desired wildlife movement. e) Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk. f) No long-term active care is required. g) Dust levels safe for people, vegetation, aquatic life and wildlife. h) Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.	**Geotechnical/Engineering Investigation** • Satisfactory final inspection by professional NU engineer • Closure design and drainage construction inspected and signed-off by a Professional engineer, as-built drawings produced **Environmental Site Assessment** • CCME contaminated sites guidelines or site-specific risk-based criteria met **Flora and Fauna** • Post-closure monitoring demonstrates flora and fauna use in the area. **Air Quality** • Mean Total Suspended Particulate concentrations less than 60 $\mu g/m^3$ annual and 120 $\mu g/m^3$ 24 hr average (NU Ambient Air Quality Standard) or site-specific risk-based criteria met. **Land Use** • No visible buildings, equipment or non-local materials. Re-vegetation activities (scarification) applied to disturbed areas	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year 1** – Rehabilitation of laydown areas **Year 2** – Decommission roads and water crossings – Rehabilitation (re-grading and scarification) of all surfaces	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring 4. Air Quality Monitoring	IOL
Open Pit	a) Remaining area will not be a safety hazard to humans and wildlife. b) Surface runoff and seepage water quality is safe for humans and wildlife c) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Open Pit, Stockpile and Sedimentation Ponds effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria **Environmental Effects Monitoring Program (EEM)** • Achieve the "Recognized Closed Mine" status as defined by Section (4) of MMER **Safety Compliance Inspection** • Satisfactory final inspection by Inspector of Mines	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation	**Year 0** – Site audit **Year 1** – Rehabilitation of ore stockpiles **Year 2** – Decommission sedimentation ponds – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring 2. Environmental Effects Monitoring Program 3. Safety Compliance Inspection	IOL
Waste Rock Stockpile	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met. c) Will not be a safety hazard to humans and wildlife.	**Aquatic Monitoring** • Discharge quality meets for Open Pit, Stockpile and Sedimentation Ponds effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria **Environmental Effects Monitoring Program (EEM)**	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation	**Year 0** – Site audit **Year 1** – Rehabilitation of ore stockpiles **Year 2** – Decommission sedimentation ponds – Rehabilitation (re-grading and scarification)of all surfaces	1. Aquatic Monitoring 2. Environmental Effects Monitoring Program 3. Safety Compliance Inspection	IOL

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
		• Achieve the "Recognized Closed Mine" status as defined by Section (4) of MMER **Safety Compliance Inspection** • Satisfactory final inspection by Inspector of Mines					
Ore Stockpile and Sedimentation Ponds	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Open Pit, Stockpile and Sedimentation Ponds effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria **Environmental Effects Monitoring Program (EEM)** • Achieve the "Recognized Closed Mine" status as defined by Section (4) of MMER **Safety Compliance Inspection** • Satisfactory final inspection by Inspector of Mines	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation	**Year 0** – Site audit **Year 1** – Rehabilitation of ore stockpiles **Year 2** – Decommission sedimentation ponds – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring 2. Environmental Effects Monitoring Program 3. Safety Compliance Inspection	IOL
Civil works, including: • Camp Pads • Laydowns • Air Strip • Ore Dock • Freight Dock • Site Roads • Water crossings • Conduit berms	a) Any surface runoff and seepage water quality is safe for humans and wildlife. b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Contact Water effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part I, Item 23 and limits established based on site-specific risk based criteria	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year 1** – Rehabilitation of laydown areas **Year 2** – Decommission roads and water crossings – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL
Landfills, including: • All non-hazardous waste disposal locations	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Landfill effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 21, Table 7 or site-specific risk-based criteria	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year 1** – Routine inspection of facilities. **Year 2** – Application of cover material and rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	IOL
Polishing Waste Stabilization Ponds (PWSP)	a) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Sewage Treatment Facilities to the freshwater effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 17, Table 4 or site-specific risk-based criteria	• Maintain/monitor water quality	• Maintain/monitor water quality	**Year 0** – Site audit **Year 1** – Decommission sedimentation ponds **Year 2** – Breach and re–profile all pond sites	1. Aquatic Monitoring	IOL

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Fuel and Hazardous Materials, including: • Fuel Tank Farm and Fuel Dispensing Facilities (Arctic Diesel, Jet–A Fuel) • Hazardous Material Storage Areas • Waste Management Facilities Including Temporary Storage Areas • Hazardous Waste and Hazardous Chemicals • Fuel • Explosives • Explosives Storage	a) All fuel and hazardous materials removed from site b) Surface runoff and seepage water quality is safe for humans and wildlife c) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Bulk Fuel Storage Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria and/or discharge quality meets Oily Water Treatment Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria (as appropriate).	• Maintain/secure	• Maintain/secure fuel • De-mobilize all hazardous materials	**Year 0** – Site audit **Year 1** – Decontamination and disposal of all non–essential fuel and hazardous materials **Year 3** – Off-site disposal of all remaining material – Rehabilitation of all surfaces	1. Aquatic Monitoring	IOL
Borrow Pits and Quarries	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Borrow Pits and Quarries effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria	• Remove quarry equipment • Secure access	• Remove quarry equipment • Secure access	**Year 0** – Site audit **Year 2** – Rehabilitation for borrow pits and quarries – Secure access as required.	1. Aquatic Monitoring	IOL
Railway (For Transportation of 18 Mtpa)							
Site Wide Railway, including: • Track • Embankment • Tunnels • Access Road Alignment • Water crossings (bridges and culverts)	a) Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible. b) Remaining area will not be a safety hazard to humans and wildlife. c) Remaining disturbed area is physically and geotechnically stable. d) Area facilitates the desired wildlife movement. e) Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk. f) No long-term active care is required. g) Dust levels safe for people, vegetation, aquatic life and wildlife. h) Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.	**Geotechnical/Engineering Investigation** • Satisfactory final inspection by professional NU engineer • Closure design and drainage construction inspected and signed-off by a Professional engineer, as-built drawings produced **Environmental Site Assessment** • CCME contaminated sites guidelines or site-specific risk-based criteria met **Flora and Fauna** • Post-closure monitoring demonstrates flora and fauna use in the area. **Air Quality** • Mean Total Suspended Particulate concentrations less than 60 $\mu g/m^3$ annual and 120 $\mu g/m^3$ 24 hr average (NU Ambient Air Quality Standard) or site-specific risk-based criteria met. **Land Use** • No visible buildings, equipment or non-local materials. Re-vegetation activities (scarification) applied to disturbed areas	• Routine inspection and maintenance to ensure integrity	• Routine inspection and maintenance to ensure integrity	**Year 0** – Site audit **Year TBD** – Rehabilitation of laydown areas **Year TBD +1** – Decommission roads and water crossings **Year TBD +2** – Rehabilitation (re-grading and scarification) of all surfaces – Secure stream banks to prevent erosion – Secure access as required. **Year TBD +3** – Remove rails and railway ties – Cap tunnels	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring 4. Air Quality Monitoring	Crown/IOL

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Borrow Pits and Quarries	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets for Borrow Pits and Quarries effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria	• Remove quarry equipment • Secure access	• Remove quarry equipment • Secure access	**Year 0** – Site audit **Year TBD** – Rehabilitation for borrow pits and quarries – Secure access as required.	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring	Crown/IOL
Steensby Port Site (Site Fully Developed for Railway Phase)							
Site Wide at Steensby Port	a) Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural revegetation. b) Remaining area will not be a safety hazard to humans and wildlife. c) Remaining disturbed area is physically and geotechnically stable. d) Area facilitates the desired wildlife movement. e) Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk. f) No long-term active care is required. g) Dust levels safe for people, vegetation, aquatic life and wildlife. h) Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.	**Geotechnical/Engineering Investigation** • Satisfactory final inspection by professional NU engineer • Closure design and drainage construction inspected and signed-off by a Professional engineer, as-built drawings produced **Environmental Site Assessment** • CCME contaminated sites guidelines or site-specific risk-based criteria met **Flora and Fauna** • Post-closure monitoring demonstrates flora and fauna use in the area. **Air Quality** • Mean Total Suspended Particulate concentrations less than 60 $\mu g/m^3$ annual and 120 $\mu g/m^3$ 24 hr average (NU Ambient Air Quality Standard) or site-specific risk-based criteria met. **Land Use** • No visible buildings, equipment or non-local materials. Re-vegetation activities (scarification) applied to disturbed areas	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year TBD** – Rehabilitation of laydown areas – Decommission roads and water crossings – Rehabilitation (re-grading and scarification) of all surfaces	1. Geotechnical/Engineering Monitoring 2. Environmental Site Assessment 3. Flora and Fauna Monitoring 4. Air Quality Monitoring	Crown
Ore Dock	a) Any surface runoff and seepage water quality is safe for humans and wildlife.	**Aquatic Monitoring** • Discharge quality meets Contact Water effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit areas **Year TBD** – Decommissioning/ dismantling of all equipment – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown
Civil works, including: • Camp Pads • Laydowns • Freight Dock • Site Roads • Water crossings • Conduit berms	a) Any surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Contact Water effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 26, Table 11 or site-specific risk-based criteria.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year TBD** – Rehabilitation of laydown areas – Decommission roads and water crossings – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
Landfills, including: All non-hazardous waste disposal locations	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Landfill effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 21, Table 7 or site-specific risk-based criteria	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year TBD** – Routine inspection of facilities. – Application of cover material and rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown
Landfarm	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Landfarm facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 23, Table 9 or site-specific risk-based criteria	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	• Site access is secured. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation of the civil works.	**Year 0** – Site audit **Year TBD** – Routine inspection of facilities – Application of cover material(if required) and rehabilitation ((re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown
Ore Stockpile and Sedimentation Ponds	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Open Pit, Stockpile and Sedimentation Ponds effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria • Discharge quality meets acute toxicity tests under the Fisheries Act	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation.	• Site access is secured. • Site is maintained in its current state at time of closure. • Routine inspection of facilities. • Maintenance of site as required to prevent erosion/ degradation	**Year 0** – Site audit **Year TBD** – Rehabilitation of ore stockpiles – Decommission sedimentation ponds – Rehabilitation (re-grading and scarification) of all surfaces	1. Aquatic Monitoring	Crown
Polishing Waste Stabilization Ponds (PWSP)	a) Surface runoff and seepage water quality is safe for humans and wildlife b) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Sewage Treatment Facilities to the ocean effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 18, Table 5 or site-specific risk-based criteria	• Maintain/monitor water quality	• Maintain/monitor water quality	**Year 0** – Site audit **Year TBD** – Decommission sedimentation ponds – Breach and re–profile all pond sites	1. Aquatic Monitoring	Crown
Fuel and Hazardous Materials, including: • Fuel Tank Farm and Fuel Dispensing Facilities (Arctic Diesel, Jet–A Fuel) • Hazardous Material Storage Areas • Waste Management Facilities Including Temporary Storage Areas • Hazardous Waste and Hazardous Chemicals	a) All fuel and hazardous materials removed from site. b) Surface runoff and seepage water quality is safe for humans and wildlife c) Water quality run-off objectives in receiving water bodies are met.	**Aquatic Monitoring** • Discharge quality meets Bulk Fuel Storage Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria and/or discharge quality meets Oily Water Treatment Facilities effluent limits as defined by Type A Water Licence 2AM-MRY1325 Amendment No.1 Part F, Item 24, Table 10 or site-specific risk-based criteria (as appropriate).	• Maintain/secure	• Maintain/secure fuel • De-mobilize all hazardous materials	**Year 0** – Site audit **Year TBD** – Decontamination and disposal of all non–essential fuel and hazardous materials – Off-site disposal of all remaining material – Rehabilitation of all surfaces	1. Aquatic Monitoring	Crown

Major Infrastructure Components	Closure Objective	Closure Criteria	Temporary Closure Activities (up to 1 year)	Long-Term Closure Activities (over 1 year)	Final Closure Activities (Permanent)	Associated Monitoring Program(s)	Land Ownership[9]
• Fuel • Explosives • Explosives Storage							

7 SHORT-TERM TEMPORARY MINE CLOSURE - CARE AND MAINTENANCE

Short-Term Temporary "Care and Maintenance" activities will occur when the Project ceases operations for a period of less than one (1) year with the intent of resuming operational activities or final closure activities. When entering a "Care and Maintenance" phase, the main objective is to maintain all equipment and facilities in a state of readiness to resume operation with minimal delay or have project components at the ready for use to support closure activities.

Care and maintenance of the Project sites will be implemented and executed by operational maintenance staff and other support personnel on site and will be carried out within approximately six (6) months of the initiation of the Temporary Closure Care and Maintenance phase based on the level of effort required. Access to the Project sites, buildings and structures will be restricted to authorized persons only, as during operations. Buildings where potential hazards exist will be locked or otherwise secured.

The Mine Site Reclamation Policy for Nunavut (2002) and the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (2013) require that contingency measures be established in the ICRP for Temporary Closure of a mine site. Temporary closure is defined as the planned shutdown of a mine site for a period of less than one (1) year. This section of the report presents the plans for suspension of activities of less than one (1) year. Section 8 below covers Long-term Temporary Closure beyond one year. TABLE 6-1 provides an overview of the actions taken for each component of the Project for a Temporary Closure Care and Maintenance scenario.

7.1 HEALTH AND SAFETY OF WORKERS AND THE PUBLIC DURING TEMPORARY CLOSURE

The health and safety of workers and the Public will be ensured during Temporary Closure Care and Maintenance. Infrastructures will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. Access to buildings and infrastructures will be restricted to authorized personnel only (see Section 7.2).

Employees on site will be trained in site-specific health and safety requirements. Baffinland commits to abide by all applicable *NWT/Nunavut Mines Safety Act* and Regulations, and the *Explosives Use Act*.

Baffinland will ensure that emergency procedures are updated, if required, and implemented and that all equipment necessary to properly carry out these procedures will be accessible and kept in good working condition.

7.2 Restriction of Access and Site Security

During Temporary Closure Care and Maintenance, the Mine Site and Milne Port will be maintained in a secure condition through the provision of on-site site security. Mine dewatering and water treatment, where required, will be on-going. As a result a number of operational maintenance staff, environmental personnel and other support personnel will be onsite at the Mine Site and Milne Port. Access to buildings, structures, and storage compounds will be restricted to authorized persons, as during operations. Buildings where potential hazards exist will be locked or otherwise secured. Fences and/or barriers with signs will be constructed to restrict access as required.

Security personnel will carry out routine inspections of security, safety and environmental measures and maintain a record of these inspections. Contact information will be provided to pertinent government and Inuit agencies to facilitate their communication and potential access to the Mine Site and/or Milne Port, if and when necessary.

The explosives contractor will manage explosives in accordance with applicable regulatory requirements as per NRCan Permit and the Mine Safety Act.

During Temporary Closure Care and Maintenance, reclamation activities such as re-grading may continue as per the progressive reclamation plan (see Section 5). Erosion and discharge streams will be controlled as part of regular maintenance activities. Additionally, all unused pipelines will be drained and/or care will be taken that lines and pipes do not freeze and rupture.

7.3 Security of Mine Openings

Due to the current configuration of Deposit No 1 as an above grade deposit, an open pit is not expected to occur until years 10 to 12 of operation at full production volume (21.5 Mtpa nominal). Once a pit is formed, closure activities will take into consideration access to the mine pit. The entrance ramp to the open pit will be fenced using boulders or other means to prevent inadvertent access. Signage indicating an “Open Hole” will already be in place around the open pit perimeter during operations as per NWT/Nunavut Mines Safety Act Regulations.

7.4 Security of Mechanical, Hydraulic Systems and Electrical Systems

During Temporary Closure Care and Maintenance, equipment required for the security and safety of the infrastructure systems, including environmental aspects, will be maintained in working condition.

Buildings will be locked or otherwise secured to prevent inadvertent access once the Mine Site, Tote Road and Milne Port are evacuated by the majority of the personnel, except as required by the onsite staff for site maintenance and security. Non-essential machinery, equipment and systems will be left in a no-load condition or removed from site. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

7.5 Hazardous Materials & Waste Management Sites

During or prior to Temporary Closure Care and Maintenance, an inventory of all hydrocarbon products, chemicals, explosives and hazardous wastes/materials (e.g. used oils, ammonium nitrate and greases) will be updated and the materials stored in a secure and environmentally sound manner.

All storage facilities that contain any such materials will be secured and monitored. Inert waste will be disposed of in the landfill site at the Mine Site or other approved repositories.

During Temporary Closure Care and Maintenance, the non-hazardous waste management facilities at the Project will continue as in normal operations on an as-required basis. If waste management facilities are no longer required, landfills will be covered with 1.5 m of overburden.

If the Temporary Closure Care and Maintenance phase lasts longer than one (1) year, all hazardous materials and wastes will be removed from Project sites via sealift and disposed of at a licensed hazardous waste disposal facility in Southern Canada (see Section 8.5).

7.6 Docks and Airstrip

During Temporary Closure Care and Maintenance activities, the airstrip, dock infrastructure and equipment will be left in place. All non-essential airstrip and dock machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

7.7 Control of Effluents

The water management requirements at the Mine Site and Milne Port during Temporary Closure Care and Maintenance will include:

- Domestic sewage treatment.
- Surface/discharge waters, as per applicable regulatory requirements.

The drainage system established during operations will be retained and surface water will continue to collect in existing settlement ponds and, where required by the Water Licence, waters will be treated prior to discharge to the receiving environment.

The waste rock stockpile will be monitored during operations (see Section 7.11). Current investigations identify that most of the waste rock will not be prone to metal leaching or acid drainage; however, if ongoing work characterization studies show that the minor portion waste rock that is potentially acid generating (PAG) could cause unacceptable impact to runoff and seepage, the waste rock stockpile construction strategy will be modified accordingly. If treatment is required, water will be batch treated with lime dosing for Acid Rock Drainage (ARD) affected water or a treatment plant such as a High Density Sludge (HDS) treatment plant may be provided.

The Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) provides treatment options in the event that waste rock run-off requires treatment. The Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010) provide the design criteria and operations and maintenance requirements for the collection and treatment of the site's wastewater.

7.8 Stabilization of Stockpiles

Ore and waste rock stockpiles will be visually assessed for stability at the start of the Temporary Closure Care and Maintenance period and stabilized if required. The stockpiles will be periodically inspected.

7.9 Site Inspection Program

The general site areas at the Mine Site, Milne Port and Tote Road will be periodically inspected by onsite security personnel. Visual inspections of the Mine Site and Milne Port will be carried out to verify the physical stability of quarries/borrow pits, waste rock stockpiles and pit walls. Section 7.11 identifies the environmental management and monitoring plans that will be implemented during any potential Temporary Closure Care and Maintenance period.

7.10 Notification of Temporary Closure

Employees, local communities, and the public will be notified in advance of any scheduled short term temporary closure activities.

7.11 Environmental Management and Monitoring

During the Temporary Closure Care and Maintenance period, all terms and conditions of Type 'A' Water Licence 2AM-MYR-1325 will remain in force. "Care and Maintenance" monitoring program will include routine inspection, monitoring and reporting as required by Type' A' Water Licence Amendment No.1 2AM-MYR-1325 and its associated management plans. As the facilities are not operational, key monitoring requirements are established within the following management plans:

- Environmental Protection Plan (BAF-PH1-830-P16-0008);
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (BAF-PH1-830-P16-0026);
- Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027);
- Fresh Water, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010);
- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002);
- Emergency Response Plan (BAF-PH1-830-P16-0007);
- Spill Contingency Plan (BAF-PH1-830-P16-0036);

- Explosives Management Plan (BAF-PH1-830-P16-0009);
- Waste Management Plan (BAF-PH1-830-P16-0028);
- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011);
- Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031);
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039).

Throughout the Temporary Closure Care and Maintenance period, Baffinland will continue to report on its activities on an annual basis to the NIRB (as per Project Certificate No. 005), the NWB (as per Type A Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301). If a Care and Maintenance monitoring schedule is required differing from Operations, it will be established in compliance with the AEMP and other applicable Management Plans in consultation with applicable regulators.

Although through a Care and Maintenance monitoring program regulatory compliance monitoring will continue to abide by all applicable project authorizations and adaptive management, Environmental Monitoring Programs outlined in the Project Certificate will likely be suspended in consultation with applicable regulators and landowners, until recommencement of Operations.

8 LONG-TERM MINE CLOSURE & SUSPENSION OF ACTIVITIES

Baffinland may extend the mine closure over a longer timeframe than one (1) year should economic conditions deteriorate while the facility is in Temporary Closure Care & Maintenance. In the event the Project ceases operation for a period of greater than (1) year with the intent of resuming activities in the future, Long-Term Temporary Mine Closure activities will occur. Long-term Temporary Mine Closure activities will ensure the Project sites are maintained in a secure condition, and all facilities and equipment are de-energized and winterized. Hazardous waste and explosives would be removed from the site. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

A detailed "Long Term Care and Maintenance Plan" would be submitted to the NWB and the Land Owner at least 60 days prior to entering the Long-term Mine Closure period. Site personnel will conduct general inspections periodically and may decrease that frequency if the site inspections indicate that the site infrastructure is stable. A record of these inspections will be maintained. The names of contact persons will be provided to the pertinent regulators and government agencies such as AANDC and Landlord for their information, and to facilitate their access to the site, if and when necessary. The Project could reopen when the circumstances requiring the Long-term Temporary Closure change (e.g., when economic or other conditions that caused the temporary cessation of operations is no longer of concern).

The following sub-sections describe the detailed activities that would be undertaken to secure the Project components in the event of Long-Term Temporary Mine Closure. in TABLE 6-1.

TABLE 6-1 provides an overview of the actions taken for each component of the Project for a Long-term Temporary Closure scenario. Once these measures have been implemented, the labour force on site is reduced to the minimum required to ensure security of the site and on-going monitoring requirements. It is expected the following activities will be carried out within approximately six (6) months of the initiation of Long-term Temporary Closure based on the level of effort required.

8.1 Health and Safety Of Workers and the Public During Long-term Temporary Closure

Health and safety of workers and the Public will be ensured during Long-term Temporary Closure. Infrastructures will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful.

Access to buildings and infrastructures will be restricted to authorized personnel only (see Section 8.2). Safety will be reinforced by an inspection program (see Section 8.8).

Employees on site will have been trained for site-specific health and safety. Baffinland commits to abide by the NWT/Nunavut Mines Safety Act and Regulations, and the Explosives Use Act.

It will be ensured that emergency procedures will be applicable and that all equipment necessary for these procedures will be accessible and kept in good working condition.

8.2 Restriction of Access and Site Security

During Long-term Temporary Closure, the Mine Site and Milne Port will be maintained in a secure condition. Access to the buildings, structures and storage compounds will be locked and/or fenced/gated. Potentially unsafe areas will be posted with appropriate signage. Unused machinery and equipment will be removed, where practical.

The explosives contractor will manage explosives in accordance with applicable regulatory requirements by NRCan and the Mines Safety Act. On commencement of Long-term Temporary Closure, explosives will be either removed from the Project or/and detonated in a controlled and safe fashion by experienced and licensed personnel at appropriate locations away from sensitive receptors.

During Long-term Temporary Closure, reclamation activities such as re-grading will continue as per the progressive reclamation plan (see Section 5). Erosion and discharge streams will be controlled as part of regular maintenance activities. Additionally, care will be taken that lines and pipes do not freeze and break.

8.3 Security of Open Pit

Following notice of Long-term Temporary Closure the pit walls of the open pit will be inspected by a qualified engineer to assess the physical stability. Pit water will be monitored during the course of the operation for any indication of contamination at levels that exceed MMER or may adversely affect the receiving environment. During Long-term Temporary Closure dewatering of the open pit will cease and the open pit be allowed to naturally flood.

It is anticipated that the final configuration of the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources such as direct precipitation and surface runoff (KP 2008). Therefore, it is anticipated that the open pit will not completely flood during Long-term Temporary Closure and drainage from the open pit is not considered to be an issue.

Other Long-term Temporary Closure activities to close out the open pit include:

- Barricading access ramps into the open pit.
- Placing of fencing and “Danger”/”Open Hole” signage as necessary.

8.4 Security of Mechanical, Hydraulic, and Electrical Systems

All buildings will be locked and/or otherwise secured to prevent inadvertent access once the Project is evacuated by the majority of the personnel, except as required by the onsite staff for site maintenance and security. All non-essential machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

8.5 Hazardous Materials and Waste Management Sites

Inert waste will first be disposed of in the landfill site at the Mine Site or other approved repositories. During operations the landfills will be covered with an interim soil cover layer to ensure wastes are encapsulated within permafrost. As such, contaminated runoff or seepage from the landfill sites are not anticipated during Long-term Temporary Closure.

During or prior to the Long-term Temporary Closure an inventory of all hydrocarbon products, chemicals, explosives and hazardous wastes (e.g. used oils, ammonium nitrate and greases) will be updated and all hazardous materials and wastes will be shipped south to the appropriate hazardous waste disposal facility via sealift. All storage facilities that contained any such materials will be secured and monitored. Inert waste will be disposed of in the landfill site at the Mine Site or other approved repositories.

8.6 Stabilization of Stockpiles

At the onset of Long-term Temporary Closure the waste rock stockpile may undergo minor re-contouring and the physical and chemical stability of the waste rock stockpile will be assessed. Following this investigation and according to the stockpile geometry at the time of Long-term Temporary Closure, aspects related to erosion, runoff control, slopes, benches, and discharges will be addressed.

Ore stockpiles are expected to be depleted prior to Long-term Temporary Closure. In the event the ore stockpiles remain during Long-term Temporary Closure, they will be monitored.

8.7 Docks and Airstrip

During Long-term Temporary Closure activities, airstrip the ore dock, ore dock office, and the ship loader will be left in place. All non-essential machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards. The dock office will be secured to prevent inadvertent access. Infrastructure will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. The names of contact persons will be provided to the pertinent regulators and government agencies such as AANDC for their information, and to facilitate their access to the site, if and when necessary.

8.8 Control of Effluents

Mine Site and Milne Port water management will be required during Long-term Temporary Closure, including:

- Domestic sewage treatment;
- Surface/discharge waters, as per applicable regulatory requirements.

Surface water will be collected in settlement ponds and those for the ore stockpiles and waste rock stockpile will be tested for Mining Metal Effluent Requirements (MMER). The waste rock stockpile will be monitored during operations. Based on current investigations it is anticipated that most of the waste rock will not be prone to metal leaching or acid drainage. However, if ongoing work characterization studies show that the minor portion waste rock that is potentially acid generating (PAG) could cause unacceptable impact to runoff and seepage, the waste rock stockpile construction strategy will be modified accordingly. If treatment is required, water will be batch treated with lime dosing for Acid Rock Drainage (ARD) affected water or in a treatment plant such as a High Density Sludge (HDS) treatment.

The Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) provides treatment options in the event that waste rock run-off requires treatment. The Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010) provide the design criteria and operations and maintenance requirements for the collection and treatment of the site's wastewater.

8.9 Site Inspection Program

The Project areas at the Mine Site, Milne Port and Tote Road will be periodically inspected by onsite security personnel. Visual inspections of the Mine Site and Milne Port will be carried out to verify the physical stability of quarries/borrow pits, docks, and port facilities, waste rock stockpiles and pit walls. The environmental management and monitoring requirements for the Long-term Temporary Closure Care and Management period are identified in Section 8.10.

8.10 Environmental Management and Monitoring

During Long-term Temporary Closure, all terms and conditions of Type 'A' Water Licence Amendment No. 1 2AM-MYR-1325 would remain in force unless an amendment to this Licence is requested by Baffinland as part of the "Long-Term Care and Maintenance Plan". The application for a licence amendment would identify the changes proposed for the facilities required to be shutdown, the location of new discharges (if any), updates to any management plans and/or the Aquatic Effects Monitoring Plan (AEMP) (BAF-PH1-830-P16-0039) (if required), and an indication of sites to be permanently rehabilitated. A monitoring schedule, if differing from Operations, will be established as part of the "Long-Term Care and Maintenance Plan" in compliance with the AEMP and other applicable Management Plans in consultation with applicable regulators.

Routine inspection, monitoring and reporting as required by the Type' A' Water Licence 2AM-MYR-1325 Amendment No. 1 and its associated management plans remain applicable. As the facilities are not operational, key monitoring requirements are established within the following management plans:

- Environmental Protection Plan (BAF-PH1-830-P16-0008);
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (BAF-PH1-830-P16-0026);
- Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027);
- Fresh Water, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010);
- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002);
- Emergency Response Plan (BAF-PH1-830-P16-0007);
- Spill Contingency Plan (BAF-PH1-830-P16-0036);
- Explosives Management Plan (BAF-PH1-830-P16-0009);
- Waste Management Plan (BAF-PH1-830-P16-0028);
- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011);
- Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031);
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039).

Baffinland will continue to report on its activities throughout the Long-term Temporary Closure period on an annual basis to the NIRB (as per Project Certificate No.005, Amendment No. 1), the NWB (as per Type A Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

Although regulatory compliance monitoring will continue to abide by all applicable project authorizations, adaptive management Environmental Monitoring Programs outlined in the Project Certificate will likely be suspended in consultation with applicable regulators and landowners, until Operations recommence.

9 FINAL MINE CLOSURE AND RECLAMATION MEASURES

Mining activities are anticipated to be completed when the ore deposit is exhausted and the mine ceases operations without the intent to resume mining activities in the future. As per Type "A" Water License 2AM-MRY1325 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly. The Final Mine Closure and Reclamation Plan will be issued to relevant stakeholders including the Land Use Engineer of AANDC (Territorial Land Use Regulations, Sections 33 and 35), to the Lands Director at QIA, and to the Nunavut Water Board.

For final mine closure and reclamation, materials and equipment will either be removed from site or disposed of in on-site landfills/approved waste disposal areas, and all hazardous materials and wastes will be removed from site to licensed disposal facilities. The open pit and waste rock stockpiles will be inspected for physical and chemical stability. Roads, airstrips and development areas will be re-contoured as required to provide long-term stability and reduce the potential for erosion. The ore dock at Milne Port will remain in place but all equipment and associated surface infrastructure shall be removed. Based on current estimates of the level of effort required for closure activities, the Final Closure phase is expected to be three (3) years. Following the Final Closure Phase a minimum of five (5) years of post-closure safety and environmental monitoring and treatment, as and if required, will be conducted. A five (5) year post-closure phase is estimated to be required based on impacts assessment determinations described in the Mary River Project Final Environmental Impact Statement and this estimate is expected to be validated by the operations monitoring program as the Project progresses.

This section describes the measures that will be undertaken for final closure of the Project, based on the current design. Project components will be considered closed and reclaimed when closure criteria outlined in TABLE 6-1.

TABLE 6-1 are met. As the Project advances through the detailed design phase, changes to the Project may occur that will alter the Interim Mine Closure and Reclamation Plan. Though changes may occur, at this time, it is anticipated that the major components of the Project will remain the same.

Prior to closing out the Project Baffinland will consult with the Landlord and surrounding communities regarding transfer of ownership of structures that may be utilized by the surrounding communities during harvests, camping and other recreational uses or relocated to local hamlets.

9.1 Health and Safety Of Workers and the Public

Health and safety of workers and the Public will be ensured during Final Mine Closure. Until final reclamation of infrastructure, all infrastructures will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. Access to buildings and infrastructure will be restricted to authorized personnel only (see Section 9.2). Safety will be reinforced by an inspection program.

Employees on site will have been trained for site-specific health and safety. Baffinland commits to abide by all applicable Northwest Territories and Nunavut Health and Safety Regulations, including the Mine Health and Safety Act and the Explosives Use Act.

Emergency procedures will be revised as necessary to ensure they will be applicable during final closure.

9.2 Open Pit

Backfilling of open pits at closure is rarely conducted due to the high cost even when sufficient materials are present on the property. As previously mentioned, due to the configuration of Deposit No 1, an open pit is not expected to occur until years 10 to 12 of operation at full production volume (based on a nominal 21.5 Mtpa). The proposed closure activities for the open pit suggest that the open pit be allowed to naturally flood to form a “pit lake”. At closure, inert wastes (i.e. material having insignificant leachability and pollution content) may be disposed of in the open pit. It is anticipated that the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources such as seepage into the pit, direct precipitation and surface runoff (KP 2008). There are a number of different potential scenarios for accelerating the pit filling which are presented below in Section 9.2.1. These will be further assessed prior to final closure if accelerated filling is deemed required.

Once the open pit fills to the point of overflow, pit drainage will enter the natural environment through the spillway and natural drainage from the southeast corner of the open pit (KP 2008). It is currently anticipated that the discharge from the open pit will not require treatment (AMEC 2010). However, if treatment is required several effective technologies are currently available to manage Acid Rock Drainage and/or Metal Leaching (ARD/ML). If ARD/ML drainage were to develop, batch treatments will be carried out to adjust the pH and/or metal concentrations of the water in the pit so that it meets

discharge requirements before overflow into the environment. The overflow location at the southeast area of the pit will provide emergency access to and from the open pit/pit lake.

Conceptual modelling of the pit water quality is presented in the Mary River Project FEIS. Open pit monitoring will be done throughout of the life of the Project as per the Type A Water Licence and in accordance with MMER requirements. Predictions of pit water quality will be updated throughout the life of the Project as more information comes available on the geochemistry of the waste rock and the pit wall. Although indications to-date demonstrate a low probability of ARD/ML, if monitoring results during Operations suggest a potential ARD/ML it shall be dealt with at that time and any associated impacts that ARD and/or ML would have on closure and reclamation planning, monitoring, Long-term maintenance and bonding will be addressed. If there are no indications from test programs or ongoing monitoring of ARD/ML throughout the Operation Phase, at final closure, the open pit will be inspected by a qualified engineering professional to assess the physical stability of the pit walls and pit lake and to reconfirm no indicators of ARD/ML.

ARD and ML will be periodically reassessed as a potential issue in the future ICRP revisions and in the Final MCRP. The Final MCRP will present a time frame for the potential development of ARD/ML conditions, if any, and discuss the impact of ARD/ML release on final closure identifying the need for ongoing monitoring, treatment, and potential mitigations

Other activities to close and reclaim the open pit will include barricading access ramps into the open pit, removal of any dewatering infrastructure (i.e., pumps, surge box and pipelines), cleanup of any soil contamination (i.e., hydrocarbon), and placing of boulder fencing or equivalent and hazard signage as necessary.

The Open Pit will be considered closed and reclaimed when the following closure objectives are met:

- Physically and geotechnically stable long term;
- Surface runoff and seepage water quality is safe for humans and wildlife;
- Area encourages the desired wildlife movement upon site abandonment;
- Water quality run-off objectives in receiving water bodies are met;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk.
- No long-term active care is required;
- Will not be a safety hazard to humans and wildlife.

9.2.1 Accelerated Pit Filling

The mining plan and the ongoing waste rock characterization plan will inform the prediction modeling of the mine pit water quality at the end of mine life. Should the modeling indicate potential exceedance of

water quality objectives, alternative pit closure scenarios will be considered, including accelerated pit filling. The discussion below regarding accelerated pit filling is largely theoretical as there will be significant limitations and challenges to undertaking an ongoing, year round pumping operation on the scale that would be required.

The filling of the pit can be accelerated via pumping water from a nearby water source – thereby complementing the accumulation of natural precipitation and ground water accumulation. The pit at final closure has an estimated "fill volume" of 43,400,000 m3 until the overflow lip is reached, at which point the pit will drain into Mary River.

Assisted pit filling is governed by two parameters – technical limitations that drive pumping costs and water source locations/drawdown limits. Costs are driven by materials and equipment required for the operation (e.g., heat-traced piping, pumps,, generators, and fuel requirements) as well as the construction and maintenance of the necessary roads and berms. Pumping water to the pit is uphill and therefore significant elevation head will provide technical challenges to any pumping design. Water source drawdown limits are designed to ensure that the volume of water extracted from a given source does not significantly lower the water table and has minimal impact on the aquatic ecosystem. Key factors to consider when calculating maximum acceptable drawdown of a lake include: potential spawning habitat as well as the residency time of the water body. The Department of Fisheries and Oceans (DFO) – Protocol for Winter Water Withdrawal from Ice-covered water bodies in the Northwest Territories and Nunavut, 2010 recommends, in the absence of a waterbody-specific assessment, that water withdrawals should not exceed 10% of the under ice lake water volume. Using this guidance as a proxy, Baffinland evaluated potential lake water sources for pit filling using annual water withdrawal of 10% of the total lake volume. Another consideration is distance to the pit and level terrain, in order to reduce pumping costs.

The Project pit has identified four potential water sources that can theoretically be used for filling the pit – Sheardown Lake, Camp Lake, Mary Lake and Mary River. This information is summarized in TABLE 9-1

TABLE 9-1: POTENTIAL WATER SOURCE PIT FILL DATA (CONCEPTUAL LEVEL)

Water Source	Pumping Distance	Total Volume/ Annual Flow (m^3)	Permissible Annual Water Take (m^3)	Number of Years to Fill Pit
Sheardown Lake (NW Basin)	2 km	8,175,410[1]	820,000	53
Camp Lake	4.7 km	27,511,100[2]	3,000,000	15
Mary Lake	12 km	169,606,250[3]	11,200,000	4
Mary River (at MR-12, east pond discharge location)	< 1 km	78,185,678 (mean)[4] 53,166,261 (10-year dry)[4]	23,000,000 (30% of Mean Annual Discharge)	2

Source:

1. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-3

2. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-1
3. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-7
4. Based on Mary River Project FEIS, Volume 7, Table 7-3.18 – Calculated from the Mary River MAD plus annual inputs from the east pond

Sheardown Lake and Camp Lake are closer to the proposed final pit at a distance of 2 km and 4.7 km respectively, as opposed to Mary Lake which sits at a distance of 12 km from the pit. This results in Sheardown and Camp Lakes having shorter pumping distances than Mary Lake. Unfortunately Sheardown and Camp Lakes have total volumes of 8,175,410 m^3 and 29,690,200 m^3, allowing to draw a maximum volumes of only 820,000 m^3 and 3,000,000 m^3 per annum, thus resulting in a total theoretical pit fill times of 53 and 15 years respectively. In addition to this Sheardown and Camp Lakes have a very long "residence" time for the water in the lake to completely recycle itself. As a result it may be necessary to draw even less than 10% of the total lake volume in order to ensure no significant impact to the Sheardown or Camp Lake ecosystem.

The main basin of Mary Lake has a volume of 112,000,000 m^3 providing a total draw volume of 11,200,000 m^3 per annum. Assuming the maximum available volume of water is drawn this will result in a pit fill time of approximately four (4) years. In addition to this Mary Lake has a very high recharge rate completely "recycling" approximately every 1.5 years – resulting in minimal impact to the lakes ecosystem. Unfortunately Mary Lake is located 12 km from the pit, which would result in substantial pumping costs and technical challenges – which are not expected to be economically feasible.

The Mary River offers the fourth pit filling alternative. DFO (2013) provides guidance on determining ecological flow requirements to establish water withdrawal volumes and rates that are not expected to have an impact. Withdrawals greater than 10% of the instantaneous flow and 30% of the Mean Annual Discharge (MAD) require rigorous assessment. To determine the potential viability of Mary River as a water source, 30% of the MAD has been applied in TABLE 9-1 to establish a 2-year pit filling period. Pumping may not be possible in low flow years. Between approximately 60 to 70% of the annual flow in the Mary River occurs during a 30 to 35 day freshet period in most years, so much of the annual withdrawal would need to take place during this brief period. Given the shorter length of pipeline, Mary River would likely be the preferred option for pit filling, subject to further study.

9.2.2 Periodic Pumping

Periodic pumping involves pumping from the Mary River during the summer months only, when ice cover is not an issue. This period, June to September provides us with a maximum four month pumping window. Pumping during this time is essential as Mary River freezes solid during the winter months. Warm weather pumping also reduces the cost of constructing and maintaining a pipe line.

Assuming pumping continues 24 hours a day for the entire summer period this would require a pumping system that could deliver 8700 m^3/hour, over approximately a 1 km distance and an approximate

elevation head of 200 m. During the winter months the pump and pipeline would be drained and locked out to ensure that the equipment is not damaged by the winter conditions.

9.2.2.1 CONTINUOUS PUMPING

Continuous pumping assumes that water will be pumped to the Mine Site pit 24 hours a day all year long. Mary River is not an option for this scenario as it freezes during the winter, leaving Mary Lake the only option for continuous pumping. Technical and economic feasibility is unlikely assuming 24 hour continuous pumping with no delays or malfunctions for the entire year at a pumping rate of 1,300 m^3/hour, over a 12 km distance and 250 m elevation head.

Over winter pumping also presents other challenges including: the heating of pipe lines, snow removal, ice removal from discharge and intake points, extreme weather conditions, increased maintenance costs and risk to personnel. Given these conditions it is expected that continuous pumping would not be a technically and economically feasible option.

9.3 REMOVAL OF BUILDINGS AND INFRASTRUCTURE

Upon Final Mine Closure, buildings and infrastructure will be decommissioned and decontaminated, if necessary, as appropriate to contamination type. Buildings and infrastructure located at the Mine Site, Tote Road and Milne Port will be removed and either:

- Transported to Milne Port for shipment to the mainland for either disposal or salvage;
- Disposed of in the open pit;
- Disposed of in the onsite landfills or other approved repository;
- Donated to local communities.

The water supply system at the Mine Site and Milne Port will be demolished, removed and either sealifted to the mainland for disposal/salvage or will be disposed of in the onsite landfills or other approved repository.

The sewage treatment plants located at the Mine Site and Milne Port will be decommissioned as per the manufacturer's specifications. The remaining sewage treatment plant components will be either transported for sealift to the mainland for disposal or salvaged or disposed of in the onsite landfill.

The Mine Site utilidor/corridor will be dismantled and disposed of in either the Mine Site landfill or transported offsite to the mainland via sealift for disposal at an approved facility.

Buildings and infrastructure will be considered closed and reclaimed when the following closure objectives are met:

- Will not be a source of contamination to the environment;

- Will not be a safety hazard to humans and wildlife;
- No long-term active care is required.

9.4 Concrete Structures

Concrete foundations will be demolished to grade and exposed rebar will be cut to grade to prevent safety hazards. Concrete and rebar will be disposed of in the open pit, waste rock stockpile or landfill, and the concrete foundation areas will be drilled to allow for water infiltration. The area will be re-graded to restore the natural drainage. Any remaining concrete piles will be cut to grade and covered with overburden. Concrete foundations will be considered closed and reclaimed when the following closure objectives are met:

- Will not be a source of contamination to the environment;
- Will not be a safety hazard to humans and wildlife;
- No long-term active care is required.

9.5 Removal of Mechanical Equipment

Salvageable machinery, equipment and other materials (incinerator, crusher, screen, stacker etc.) will be dismantled and taken offsite for sale or reuse if economically feasible. If not, they will be cleaned of oil and grease, where appropriate, and deposited within onsite landfills, the open pit or other approved repositories. Gearboxes or other equipment containing hydrocarbons that cannot readily be cleaned will be removed and sent to Milne Port for sea-lift to an approved disposal facility.

Empty fuel storage tanks, drums and other fuel storage containers will be drained and removed from the Mine Site and Milne Port for disposal at an approved facility or will be decontaminated and deposited within onsite landfills, the open pit or other approved repository. Secondary containment structures such as liners will also be removed, tested for hydrocarbon content and sent to an approved offsite facility for disposal or will be decontaminated and deposited within onsite landfills, the open pit or other approved repository , as required.

Mechanical equipment will be considered closed and reclaimed when the following closure objectives are met:

- Will not be a source of contamination to the environment;
- Will not be a safety hazard to humans and wildlife; and
- No long-term active care is required.

9.6 TRANSPORTATION CORRIDORS

Bridges, culverts and other water crossings along the Milne Inlet Tote Road will remain in place until all the closure activities requiring Milne Port access at the Mine site are completed. This road is part of the Inuit-Owned Lands referenced in the Nunavut Land Claims Agreement. It is designated for public use and the road will be left in good physical condition in accordance with Project requirements, with water crossings removed. The final decision on the removal of the water crossings will remain with the Land Owner although the removal cost of the bridge spans has been included for closure planning. Bridge abutments will be left in place to maintain long term stability of the section of the road abutting the water course however this strategy will be reviewed based on performance of the structure throughout the Project life cycle.

The bridges, culverts and other water crossings associated with the Steensby Port rail alignment will be decommissioned and the natural drainage and water flows will be restored. Tunnel portals will be backfilled and plugged with rock or equivalent material as available and the openings at each end sealed with concrete.

The steel rails and rail ties will be removed from the Railway and transported to Steensby Port for sealift and offsite salvage. The embankment will remain.

The reclamation measures for the rail alignment will be carried out on the entire length of the rail and on a width of 10 m. Reclamation for these transportation corridors will take place on both Inuit Owned Land and Crown Land.

The railroad embankment is to be left in place upon closure. However, the rail ballast will be tested to determine if it can be left in place at closure. If found unacceptable (from an environmental perspective), the ballast will be cleaned. The resultant fines material will be hauled away for more controlled disposal.

Locomotives and cars will be sea lifted offsite for resale, salvage or disposal at an approved facility.

As more information becomes available, the discussion of railroad closure may be expanded to include the following:

- Railroad maintenance facilities – wastes and releases. Solvents are often an issue at maintenance facilities, as are heavy metals;
- Railroad fuelling facilities – diesel spillage, diesel recovery, water treatment, soil remediation. Storage of gasoline at fuelling facilities;
- Quarries and their reclamation: 27,000,000 tonnes of rock will be quarried for railroad use from 63 quarries;

- Phase I Environmental Site Assessment (ESA) will be carried out on the rail embankment. Further assessment will follow the ESA protocols;
- Other materials to be hauled on the line such as diesel which may ultimately contaminate ballast and soils.

The shelters and communication towers along the rail alignment will be dismantled and disposed of in either the Mine Site or Steensby Port landfills or transported offsite via sealift for disposal at an approved facility.

Transportation corridors will be considered closed and reclaimed when the following closure objectives are met:

- Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation; remaining disturbed area is physically and geotechnically stable and adverse impacts to permafrost along the route have been limited;
- Impacts to the environment, fish, and wildlife, from localized areas of contamination that may be present along a route have been minimized;
- Any surface runoff and seepage water quality is safe for humans and wildlife;
- Area facilitates the desired wildlife movement;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- No long-term active care is required.

9.7 Docks and Airstrip

The causeway and docks at Milne Port will be left in place. Dock infrastructure at Milne Port will be removed and either recycled, shipped offsite to an appropriate facility for disposal, or deposited within onsite landfill, the open pit or other approved repositories.

The docks at Steensby Port will be left in place. The rock causeway connecting Steensby Port and Steensby Island will be left in place. Dock infrastructure at Steensby Port will be removed and either recycled, shipped offsite to an appropriate facility for disposal, or deposited within onsite landfill, the open pit or other approved repositories.

The lighting associated with the airstrips will be removed. The airstrips will be re-graded and reclaimed unless otherwise directed by regulatory agencies or the Land Owner to provide emergency/rescue landing spots for regional aircraft, when no other options are available.

Docks and airstrips will be considered closed and reclaimed when the following closure objectives are met:

- Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation;
- Remaining disturbed area is physically and geotechnically stable;
- Remaining area will not be a safety hazard to humans and wildlife;
- Any surface runoff and seepage water quality is safe for humans and wildlife;
- Area facilitates the desired wildlife movement;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- No long-term active care is required.

9.8 Removal of Chemicals

At final closure, Baffinland will undertake a comprehensive site Phase 1 Environmental Site Assessment (ESA) to determine extent of contaminated areas and appropriate techniques and methods to deal with such sites.

The stock of explosives will be depleted towards the end of the operations phase and any remaining explosives will be securely contained and shipped from the site by a licensed contractor to an approved facility for disposal or reuse or detonated in a controlled and safe fashion by experienced and licensed personnel at appropriate locations away from sensitive receptors.

Oil, grease, ammonium nitrate and chemicals will be transported offsite for disposal at an approved facility or where applicable for reuse. All batteries and hazardous waste will be removed and disposed of or recycled at an approved facility offsite.

9.9 Waste Management Sites

Combustible non-hazardous wastes will be incinerated at the Project incinerators. Once the incinerators are no longer required, they will be managed as described in Section 9.5. Sewage treatment facilities disposal is also addressed in Section 9.5.

Liners will be removed from polishing ponds and Polishing Waste Stabilization Ponds (PWSPs), and berms will be re-graded and levelled.

The onsite landfill located at the Mine Site will be reclaimed by capping the landfill with 1.5 m of overburden or equivalent material to freeze the core of the landfill. The landfill sites will be scarified to encourage natural re-vegetation.

A list of non-salvageable materials has been developed and will be provided annually as part of the Annual Security Review process conducted in accordance with Schedule C of Type "A" water licence 2AM-MRY1325. Any additional disposal locations identified as the project progresses, shall align with the disposal location criteria outlined in Section 9.10.1.

Waste disposal locations, such as the landfills or PWSPs, will be considered closed and reclaimed when the following closure objectives are met:

- Physically and geotechnically stable long term;
- Surface runoff and seepage water quality is safe for humans and wildlife;
- Area encourages the desired wildlife movement upon site abandonment;
- Water quality run-off objectives in receiving water bodies are met;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- No long-term active care is required;
- Will not be a safety hazard to humans and wildlife.

9.9.1 Quality Assurance and Quality Control Program for Waste Management sites

Quality assurance (QA) procedures will be implemented at final disposal sites to ensure all activities will result in meeting reclamation objectives and closure criteria defined in Section 6. To ensure QA is being met at final disposal sites, quality control (QC) systems will be implemented to evaluate QA procedures and identify any deviations or non-compliance and make the require correction prior to having an undesired result.

A comprehensive Quality Assurance and Quality Control (QA/QC) Program will be developed prior to final disposal of any final closure material based in part on the Project's current approved onsite landfilling operating procedures and aligned with industry best practices for Arctic conditions. Procedures for managing the demolition landfill and other waste disposal areas will be captured therein. Operating instructions and maintenance procedures shall be adhered to and documented to ensure that activities function safely and meet reclamation objectives.

The QA/QC Program shall, at a minimum, include the details of the proposed methods and standards of inspections and testing, reporting by the designated QA/QC personnel and decisions regarding any necessary corrective actions taken.

The plan may consist of the following, QA procedures:

- Waste tracking and documentation. Waste streams will be sorted, stacked, and/or piled within designated laydown areas to create distinct areas of like materials for loading and transportation, as directed based on Project waste streams;
- Pre-demolition review. Identified work areas shall be reviewed for specific hazards from an engineering survey and/or site characterization;
- Daily work activity tracking log;
- Periodic work activity review meetings;
- Regularly track the turn-around time for trucks hauling waste to each disposal facility;
- Compliance with project specifications, traffic laws, permits, best management practices etc.;
- Samples and measurements of the physical parameters of landfill test areas.

9.10 Soils Testing

A site investigation will be conducted at the onset of closure to identify soils that may be contaminated with hydrocarbons or chemicals. Soil materials found to exceed the appropriate cleanup criteria for hydrocarbons (based on CCME contaminated sites guidelines or site-specific risk-based criteria) will be remediated onsite in the landfarm units or removed offsite to a licensed waste management facility.

If there is reason to suspect an area of soil has been contaminated by chemicals other than hydrocarbons (such as explosives), samples will be collected and the soil will be tested. If the applicable regulatory requirements are exceeded, an appropriate method of disposal will be sought in consultation with the appropriate authorities.

9.10.1 Materials Suitability for Closure Needs

Reclamation activities shall restore the physical and chemical stability of areas where material was removed or altered for Project purposes (i.e. excavation activities). Reclamation activities may include, but are not limited to, replacing those affected areas with suitable cover materials sourced locally, importing/producing fill, restoring drainage to limit unnatural standing water through re-grading, routing of any trapped surface water and scarification. All such reclamation activities shall be performed in a manner that will reduce the risk of erosion and sedimentation to the surrounding environment and limit disturbance to the permafrost.

Criteria for sourcing suitable materials for closure needs requires consideration of several chemical (i.e.: pH, sodicity, salinity, saturation, etc.) and physical (i.e.: texture, moist consistency, content, etc.) properties. A comprehensive assessment of suitable materials for closure needs will be completed prior to the use of any material for cover purposes focusing on the following objectives:

- Identifying and mapping suitable locations of material as well as its distribution. Locations will be evaluated for chemical and physical stability, impact to natural environment, etc.;

- Geochemical and physical characteristics for suitability for reclamation such as the consistency to prevent erosion, porosity, ability to alter natural snow and water runoff conditions, stability, etc.;
- Determining depth and volumes of material types;
- Development of a schedule of availability.

9.11 Waste Rock Stockpile

At closure the principal objectives of the waste rock stockpiles are the safety of the public and maintaining the physical and chemical stability of the permanent structure to ensure that there is no long-term environmental impact. Mine planning will ensure that at closure the exterior of the dump consists of a layer of non-PAG material up to 50 m thick. To minimize active layer thickness, a stockpile of overburden will be retained to spread a layer of less permeable material over the top of the dump.

Studies of waste rock in permafrost demonstrate that permafrost forms an effective long-term barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone. The surficial “active” zone, which will be subject to seasonal freeze-thaw, will not reach the 50m thickness of non-PAG material in the long-term (within 200 years) under the influence of climate change (Intergovernmental Panel on Climate Change, 2007). Therefore, over the long term, runoff water quality which is influenced by contact water that flows through the active layer in the waste rock stockpile will not be affected.

The Waste Rock Stockpile will be considered closed and reclaimed when the following closure objectives are met:

- Physically and geotechnically stable long term;
- Surface runoff and seepage water quality is safe for humans and wildlife;
- Area encourages the desired wildlife movement upon site abandonment;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- Water quality run-off objectives in receiving water bodies are met;
- No long-term active care is required;
- Will not be a safety hazard to humans and wildlife.

9.11.1 Waste Rock Characterization Program

At the onset, the waste rock pile design will consider final closure considerations. A detailed sampling and testing program for the characterization of the waste rock for the period of 2012-2014 involves:

- Devising a representative sampling program for the waste rock based on the configuration of the ore body and the mining plan;
- Analysis of the lithology, morphology and mineralogy of the waste rock;
- Additional testing (both static and humidity cell).

This program has been reviewed with guidance by independent experts. The objective of this program is to inform prediction of expected runoff quality over time. Contingencies will be put into place if there are acid rock drainage issues and treatment if necessary. The characterization program will be ongoing for the Life of the Project and will guide the development of adaptive management strategies for waste rock management. Regular updates on waste rock characterization and prediction of runoff water quality will be provided in future updates of the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) as they are developed.

9.11.2 Closure of the Waste Rock Stockpile

The waste rock stockpile at final closure is expected to have a total volume of about 640 Mt with average side slopes of 2H: 1V. The physical stability of the waste rock stockpile will be investigated at the onset of closure. This investigation will take into account the final geometry of the stockpile, including the aerial extent, height, cross-sections and the volume in place. A preliminary assessment of this geometry and its impact on erosion, runoff control, slopes, benches, and discharges will be done, and be included in future Interim and Final Closure and Reclamation Plans. If geo-technical investigations indicate it necessary, the waste rock stockpile may undergo re-contouring to ensure physical and chemical stability. Following re-contouring and stabilization investigations and activities, as required, the waste rock stockpiles will be considered closed. Based on the current state of the Mine Site prior to mining activities, the Mine Site is characterized by a rugged rocky terrain with minimal vegetation. Therefore, an uncovered waste rock stockpile is considered environmentally compatible with the current undisturbed surrounding areas.

9.11.3 Runoff from the Waste Rock Stockpile

Runoff from the Waste Rock Stockpile will be discharged from two runoff ponds that will be left in place and monitored as described in Section 13. Following closure, generation of ARD/ML is not anticipated. During operations drainage from the waste rock stockpile will be monitored and should ARD/ML be identified the waste rock will be segregated based on acid generating potential. If treatment is required following closure a variety of ARD/ML treatment technologies are available. If treatment is required the waste rock stockpile drainage will be treated with batch lime doses. During operations total suspended solids (TSS) may be identified as being a potential problem. If TSS is identified as a concern following operations the surface water from the waste rock stockpiles will be directed to additional settlement ponds for treatment prior to discharge to the surrounding environment. Please refer to the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) for further discussion on potential treatment methods.

9.12 Quarries and Ore/Aggregate Stockpiles

Each quarry permit application presents a quarry development plan, drainage information as well as a closure plan. All borrow areas and quarries will be progressively reclaimed maintaining stable side slopes in accordance with the individual site permit. At the onset of closure the borrow areas and quarries will be investigated to assess for potential thermal damage and instability due to thaw impacts. At closure re-contouring and filling with overburden may be required to ensure slope stability and restore the natural drainage due to thermal disruptions.

The ore/aggregate stockpiles will be depleted upon closure. Soils below the stockpiles will be sent for testing and treatment, if required, as discussed in Section 9.10. The ore/aggregate stockpile bases will be re-contoured as necessary scarified and allowed to naturally re-vegetate. If ore/aggregate stockpiles remain at closure, they will be graded and re-contoured to ensure long term physical stability.

The quarries, borrow sources and stockpiles will be considered closed and reclaimed when the following closure objectives are met:

- Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation;
- Disturbed area is physically and geotechnically stable;
- Water quality run-off objectives in receiving water bodies are met;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- Will not be a safety hazard to humans and wildlife;
- No long-term active care is required.

9.13 Watercourses and Drainage Ways

Disturbances to the surrounding areas of the Project may cause thermal disruptions to the permafrost zone resulting in ponding, settlement and/or subsidence due to changes in the active zone (the upper 1 to 2 m of soil). During closure these areas will be drained of excess water, filled with clean material to re-establish the active layer and graded, restoring the natural drainage of the area as necessary. Water crossings (bridges and culverts) will be decommissioned and the drainage channels restored to natural drainage conditions.

Water crossings will be considered closed and reclaimed when the following closure objectives are met:

- Pre-disturbance surface conditions including drainage patterns have been re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation;

- Remaining disturbed area is physically and geotechnically stable and adverse impacts to permafrost along the route have been limited;
- Impacts to the environment, fish, and wildlife, from localized areas of contamination that may be present have been minimized;
- Any surface runoff and seepage water quality is safe for humans and wildlife;
- Area facilitates the desired wildlife movement;
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk;
- No long-term active care is required.

9.14 Re-Vegetation

It is anticipated that re-vegetation will be difficult to re-establish due to the arctic environment. The present re-vegetation strategy is to encourage disturbed areas to naturally re-vegetate. Natural re-vegetation for the Project will include:

- Re-grading and scarifying disturbed and compacted areas;
- Allowing vegetation to re-establish through natural processes;
- As noted in Section 5.2.2, observations will be undertaken to determine which plant species, if any, are better suited to colonizing disturbed and graded areas. Results of these studies will inform any potential efforts for re-vegetation.

10 IMPLEMENTATION SCHEDULE FOR "CARE AND MAINTENANCE" AND FINAL CLOSURE ACTIVITIES

Upon initiation of Final Closure activities, a Short Term Temporary Care and Maintenance phase would be implemented consistent with Section 7, as required, to facilitate final closure planning and logistics. It is expected this phase to last no longer than one (1) year for a planned closure scenario. As consistent with the activities outlined in Section 7, the Short Term Temporary Care and Maintenance period prior to Final Closure activities would focus on maintaining a state of readiness of project components. Although activities would be consistent, the primary difference in a Short Term Temporary Care and Maintenance period prior to Final Closure is activities would be performed to ensure project components are maintained in a state of readiness to support final closure activities rather maintained in a state of readiness with the intent of resuming operational activities in the future. TABLE 6-1 presents an overview of the actions to be taken for each major Project component (by Project site) for Short Term Temporary Care and Maintenance as well as Long-Term Temporary Closure and Final Closure. The sub section below outlines the planned activities, including this Short Term Temporary Care and Maintenance period, for Final Closure activities.

It should be noted that Baffinland also recognizes that Short Term Temporary Care and Maintenance and Long-term Temporary Closure could occur during the construction or commissioning phases of the Project. The Project is being implemented in gradual phases and therefore not all components of the approved Project would be in place, or operational, should various economic drivers force the Company in Temporary Closure, Long-term Closure or Final Closure. TABLE 3-1 presents the current status of components related to the Project at the time of publishing.

10.1 Duration of Closure Activites

The activities to achieve Baffinland's Site Abandonment Goal (see Section 2.2.2) are undertaken with the intent of achieving component specific closure criteria, as outlined in TABLE 6-1, in as short duration as practicable. For planned closure, once the decision has been made to permanently close the Project and the NWB and Land Owners have approved Baffinland's Final Closure Plan, it is anticipated that the major closure activities, as described in Section 9, will be completed between July and October over a period three (3) years. This period is preceded by a one year final closure planning period (Year 0) and proceeded by a five (5) year post-closure monitoring period (Year 4 to 8).

In a planned closure scenario, the expectation of requiring a year duration for a final closure planning period (Year 0) is attributed to the relatively straightforward nature of the reclamation activities required and the level of information already available in a planned closure scenario. Mainly, the reclamation program will be predominantly an earthworks exercise with a simple demolition contract and therefore a relatively simple engineering scope. This would indicate long durations for planning, design, procurement, and coordination are not required. In addition, based on the information

developed and reviewed to date as part of this document, the level of information developed and discussed during the ongoing ASRs, and the expected content and review process for future ICRP revisions and the Final CRP, it is expected reclamation strategies would be developed in sufficient detail that the final closure planning period would be expedited and any required approval processes initiated well in advance. It is therefore reasonable to assume that excessive review, planning and revision of the reclamation scope and methodology would not be required and a year duration for a final closure planning period (Year 0) would be sufficient in a planned closure scenario. For the purpose of the ASR and unplanned closure, a two (2) year final closure planning period is assumed to be required. This is based on the assumption a 3rd Party would need additional time to go through an regulatory approval processes that, in a worst case scenario, is not reasonably expected to be able to be completed in year or less.

The expectation of an active final closure and reclamation activity period of three (3) years is based on estimated duration and level of effort required for identified active closure activities[10]. Based on the ASR process, all active closure activities have a case-by-case person days associated with them to complete each task or sub-task. The summation of the total person days needed to complete the comprehensive list of active closure tasks expected to be required to meet closure objectives and criterion - including consideration of productivity factors and travel time - demonstrates it can be accommodated in three (3) year period assuming final closure and reclamation work is conducted only during the summer month period (mid-June to mid-September) with a total site-wide available camp space of no more than 100 beds.

The expectation of a five (5) year post-closure monitoring period (Year 4 to 8) is based on findings from the Mary River FEIS that show no significant adverse residual effects are predicted for the VECs (Valued Ecosystem Component) or VSECs (Valued Socio-Economic Component) associated with the Project. As shown in the Mary River FEIS, the Project is not expected to compromise the ecosystematic integrity of the Nunavut Settlement Area. In addition, no significant adverse residual effects are predicated to occur to VSECs identified within the socio-economic environment, and the Project is expected to have significant positive effects for most of the VSECs as the Project reflects the priorities and policies of the Government of Nunavut as well as the aspirations of local communities, and is expected to enhance the future well-being of the residents and communities of the Nunavut Settlement Area and the rest of Canada. See Section 11 for further discussion on Predicted Residual Effects.

Based on this understanding, Baffinland is currently expecting a five (5) years Post Closure monitoring and reporting to be required to confirm the prediction that no significant adverse residual effects have been actualized by the Project. This duration in compliance with Section 12.3 of QIA Commercial Lease No.: Q13C301 and was selected as a reasonable time-frame to demonstrate closure activity

[10] Estimated duration and level of effort required for identified closure activities is described in 'Annual Security Review (ASR)' documentation required under Section 9.2 of the Commercial Lease, No. Q13C301, and under Part C and Schedule C of the NWB Type "A" Water Licence No. 2AMMRY1325.

effectiveness based on the information currently available. As the project progresses into Operations and ongoing monitoring results are developed, if information indicates that five (5) years of post-closure monitoring is not a sufficient amount of time to determine closure activity effectiveness, or vice-versa, is overly conservative, this duration will be re-evaluated in consultation with the Land-Owner(s) and other stakeholders.

10.2 Summary of Activities during Final closure by year

A high level schedule for planned Final Closure (by year) has been developed assuming productive use of resources performed in a logical manner with consideration given to unique challenges of working in the Arctic, such that reclamation can be accomplished in a timely fashion, in accordance with the ICRP and the regulatory framework established by the Inuit, Federal and Territorial governments. This schedule will be reviewed and revised to include additional and more detailed information as the final closure phase is approached. New information, when available, will be provided in subsequent revisions of the ICRP.

The current high level Final Closure schedule (by year) for planned closure includes, but will not be limited to:

Year 0 – Following Notification of Closure to Land Owners and NWB

Final Closure Preparation Activities

- During the first year, activities will be limited to pre-closure shutdown tasks and post-closure inspection by Landlord and any other relevant stakeholders.
- Phase 1, 2 and 3 Environmental Site Assessments for hydrocarbon contaminated soils, as required.
- Prioritize decommissioning sequence, identify equipment to remain on site for use during closure activities, and mobilize contractors.
- Care and maintenance of site as described by Section 7.

Year 1 – Following approval of Final Closure Plan by NWB and Land Owners

Routine Inspection and Monitoring:

- Monitoring of road, culverts and bridges for integrity.
- Monitoring of borrow areas.
- On-going environmental monitoring and reporting (AEMP, wildlife, other), see Section 13.
- Treatment of contaminated soil in landfarms.

Decommissioning Activities:

- Demobilize on-site contractor equipment and material for shipment through Milne Port or Steensby Port.
- Excess fuel return from Mary River Mine Site shipped to Milne Port and/or Steensby Port.
- Decommissioning and demobilization of Baffinland owned equipment identified for salvage
  - Crushing and sizing equipment.
  - Mining fleet.
  - Miscellaneous mobile equipment.
  - Locomotives, railway maintenance equipment and other specialized equipment.
- Decontamination and disposal of mobile equipment not suitable for salvage.
- Mobilization sealift of third party contractor to either Milne Port or Steensby Port and demobilization sealift of current site contractors and Baffinland equipment and material to the Port of Valleyfield.
- Begin dismantling of facilities/buildings no longer required for mining and maintenance of trucking and transport equipment fleet.
  - Maintenance buildings, warehouses.
  - Tanks farms.
  - Sewage treatment plants.
  - Camps (partial).

Year 2 – Final Closure Activities

The majority of closure and reclamation activities will occur in Year 2, including:

Routine Inspection and Monitoring:

- Monitoring of road, culverts and bridges for integrity.
- Monitoring of borrow areas.
- On-going environmental monitoring and reporting (AEMP, wildlife, other), see Section 13.

Decommissioning Activities:

- Decommissioning of the open pit, mineral exploration areas, remote sites, and stockpiles.
- Develop Mine open pit overflow discharge channel.
- Begin systematic closure of remaining borrow pits and quarry sites (re-grading and contouring).

- Mary River Mine Site, Milne Port and Steensby Port Camps are demobilized, demolished as appropriate, landfilled or packaged and shipped.
- During the decommissioning of Mary River Camp, Deposit No. 1 haul road and airstrips are inspected, graded and contoured as required.
- Decommissioning of fuel storage facilities:
  - Bulk fuel demobilization sealift.
  - Mary River Mine site – fully decommissioned.
  - Milne Port – retain one 5 ML Arctic Diesel fuel tank
  - Steensby Port – retain one 10 ML Arctic diesel tank.
  - Decontaminate fuel storage tank farm site as required.
- Waste management including:
  - Permanent closure of the Mine site landfill.
  - Packaging of hazardous waste for future shipment to disposal facilities in the south.
  - Disposal and closure of sewage and sewage ponds at Mine site, Milne Inlet and Steensby Port.
- Begin systematic removal of culverts from the Milne Inlet Tote Road if the complete decommissioning and reclamation of Mary River is completed. This will be completed following complete decommissioning of the Mary River Camp. Inspections for erosion along the road embankment will be completed and repairs made, as required.
- Begin decommissioning removal railway tracks, ties; systematic removal of culverts and bridges.
- Treatment of contaminated soil in landfarms.
- Final site cleanup of Mary River Mine Site; including grading and contouring of the site.

Year 3 – Final Closure Activities

The remaining site closure and site rehabilitation activities will occur in the third year:

Routine Inspection and Monitoring

- Monitoring of decommissioned and rehabilitated areas/sites.
- On-going environmental monitoring and reporting (AEMP, wildlife, other), see Section 13.

Decommissioning Activities:

- Complete the removal of Milne Inlet Tote Road culverts and stabilization of the road for final closure (if not completed in Year 2).

- Complete the removal of railway culverts/bridges and stabilization of the Railway bed/service road for final closure (if not completed in Year 2).
- Final site cleanup of Milne Port and, Steensby Port; including grading and contouring of the site.
- Treatment of contaminated soil in landfarms.
- Application of soil cover to any permanent disposal areas;
- Demobilization sealift from Milne Port and Steensby Port to Valleyfield of third party equipment and residual reclamation equipment, material and supplies;
- Remaining bulk fuel demobilization sealift.
- Remove/dispose of remaining camp facilities at Mary River, Milne Port and Steensby Port.
- Complete all site contouring and drainage work.

Year 4 and Year 8 – Post-Closure Activities

Baffinland anticipates that all Project sites will be fully decommissioned and rehabilitated by the end of the third year of Final Closure based on level of effort estimates for direct closure activities. The Post-Closure monitoring and reporting activities to be conducted during this period are discussed in Section 13.

Year 8 – Site Abandonment

By the end of Year 8, Baffinland expects that the Final Closure objectives and criteria for all project components will be achieved.

11 RESIDUAL EFFECTS

Residual effects refer to the remaining environmental effects identified for the Project, post-mitigation, at the expected closure period of the Project. As the Project is in the early stages of operations and no major changes to the initial mine plan have occurred, the predicted residual impacts from the Mary River Project FEIS are considered to be accurate. As stated previously, based on the information presented in the Mary River Project FEIS, the Mary River Project as planned will have no significant adverse residual effects for the VECs identified within the biophysical environment. The Project is not expected to compromise the ecosystematic integrity of the Nunavut Settlement Area. In addition, no significant adverse residual effects are predicated to occur to VSECs identified within the socio-economic environment, and the Project is expected to have significant positive effects for most of the VSECs. This position is supported by comprehensive site specific studies (baseline and modeling studies), IQ, extensive public consultation, and expert opinions.

A detailed description of the assessment methodology used, from the Mary River Project FEIS, to develop this residual effect position is provided in Section 11.1. A summary of the non-significant residual impacts identified for each VEC and VSEC as part of the Mary River Project FEIS is provided in Section 11.2. Section 11.4 identifies the associated closure and post closure monitoring programs proposed to be implemented to ensure residual effects are monitored appropriately.

Further detail of the Project residual effects is presented in Volume 4 through 8 of the Mary River Project FEIS.

11.1 Residual Effects Assessment Methodology

11.1.1 Determining Significance of Residual Effects

Residual project effects refer to the environmental effects identified for the Project, post-mitigation. The significance of residual environmental effects was determined from the following criteria (NIRB, 2009):

- Direction or nature of an effect (i.e., positive/beneficial versus negative/adverse);
- Magnitude and complexity of an effect;
- Extent of the effect, including such as the geographical area that will be affected, the size of the affected human populations, and/ or the size of the affected wildlife populations and habitat;
- Frequency and duration of an effect;
- Reversibility or irreversibility of an effect;
- Probability of occurrence of the effect;
- Confidence in the effect prediction; and
- Context of the effect.

These criteria were adopted for this assessment, as specified in the Guidelines and because the criteria have precedence of use for other environmental assessments in the Canadian Arctic (NIRB, 2007, 2009; Lawrence Environmental 2000, 2004; Wolfden Resources Inc., 2006; De Beers Canada Inc., 2004). In addition to the above attributes, NIRB (2009) directed Baffinland to consider additional qualifiers in its significance evaluation. Definitions and assessment criteria for each are identified in Table 11-1, which lists the complete set of attributes (criteria and qualifiers), provides a definition and rationale as well as a summary of their relevance or context to the Mary River Project, and describes how the attribute was incorporated into the assessment.

TABLE 11-1: ATTRIBUTES USED TO EVALUATE SIGNIFICANCE OF RESIDUAL EFFECTS

Attribute	Definition and Rationale	Role in Significance Determination[2]
Direction and Nature[1]	The ultimate long-term trend of an environmental effect - positive, neutral, or negative.	**Qualifier** Only negative effects are assessed for significance
Magnitude [1]	The amount or degree of change in a measurable parameter or variable relative to existing conditions (the exposed population)[3]. This attribute can also consider complexity - the number of interactions (Project phases and activities) contributing to a specific effect.	**Primary Criterion** High magnitude = high significance **Secondary Criterion** If magnitude and geographic extent are related, the higher the potential significance
Extent[1]	The geographic area over which the interaction will occur.	**Secondary Criterion** The larger the zone of influence, the higher the potential significance
Frequency[1]	The number of times during a project or a project phase that an interaction or environmental effect can be expected to occur.	**Secondary Criterion** Greater the frequency of occurrence, the higher the potential significance
Timing	The Project Phase within which the environmental effect will occur.	**Qualifier** Provides context
Duration[1]	The period over which the environmental effect will occur.	**Secondary Criterion** The longer the duration of an interaction the higher the potential significance
Reversibility[1]	The likelihood that a VEC/VSEC or Indicator will recover from an environmental effect, including consideration of active management techniques. Reversibility is considered for biological VECs at the population level. Therefore, although an effect like mortality is irreversible, the effect at the population level might be reversible.	**Primary Criterion** The greater the potential to reverse an effect, the lower its potential significance
Probability[1]	The likelihood that an interaction and a consequent effect will, in fact occur.	**Qualifier** (considered only for potentially significant effects) The higher the probability of occurrence, the greater the significance
Certainty[1]	The level of confidence in the knowledge or analysis that supports the prediction, in particular with respect to limitations in overall understanding of the ecosystem, and limitations in the ability to foresee future events or conditions.	**Qualifier** (considered only for potentially significant effects) The lower the certainty of occurrence, the more conservative the approach to prediction of significance

Attribute	Definition and Rationale	Role in Significance Determination[2]
Ecological/Socio-economic context/value[1]	The general characteristics of the area in which the Project is located, as indicated by existing levels of human activity and associated types of disturbance. Interpreted to mean the basis for assigning "value" to the particular VEC.	**Qualifier** VECs/ VSECs and Indicators have been identified as "valued"
Environmental Sensitivity[1]	Environmental sensitivity of the area likely to be potentially affected. Refers to areas of heightened sensitivity that will be identified where applicable in relation to the Project (i.e., areas sensitive to spills; caribou calving areas).	**Qualifier** The Magnitude of an effect within an area of environmental sensitivity will be greater; therefore environmental sensitivity is considered in the discussion and rating of the Magnitude attribute.
Historical, cultural, archaeological significance[1]	To be considered within the geographic area to be potentially affected	**Qualifier** (see Extent - above) Historic, cultural and archaeological significance is evaluated within the archaeology effects assessment (Volume 4)
Human and wildlife populations, and the size of the affected wildlife populations and related habitat[1]	The size of the potentially affected human populations; and the size of the potentially affected wildlife populations and related habitat.	**Qualifier** (See Extent - above)
The extent of the effects of the project on other regional human populations and wildlife populations, including the extent of the effects on Inuit harvesting activities[1]	The Project might have the potential to affect other human and wildlife population, if there are residual effects to marine wildlife or socio-economic benefits that extend outside Nunavut.	**Qualifier** Consider within the Transboundary Effects Assessment (FEIS Volume 9, Section 4)
The potential for cumulative adverse effects given past, present and future relevant events[1]	The Project might have the potential for cumulative effects where residual effects from the Project are expected to occur.	**Qualifier** Consider in the Cumulative Effects Assessment (FEIS Volume 9, Section 1)
Ecosystem function and integrity[1]	Ecosystem function and integrity is important to identified VECs and humans.	**Qualifier** Outcome of the significance determination
The effect on the capacity of resources to meet present and future needs (sustainability) [1]	The sustainability of this Project, and any major industrial project, is an important element to assess.	**Qualifier** Outcome of the significance determination
Value[1]	The value attached to the affected VEC or VSEC by those who identified them. An environmental or socio-economic component was identified as "valued" and was addressed in the EIS if it was found to have a high value to communities.	**Qualifier** Addressed as part of Issues Scoping where the "value" of each component is considered. The value attached to a VEC or VSEC is more or less equivalent to "Sensitivity" described above.

NOTES:

1. Specifically required by NIRB guidelines.
2. Criterion – directly contributes to the determination of significance. Primary criteria are given greater weight than secondary criteria. Qualifier – acts as a modifier to be considered when assigning values/rankings to assessment criteria.
3. In the majority of cases there is either a poor or no estimate available of the total population. However for the purpose of undertaking an environmental assessment, an effects prediction can be made by making reasonable assumptions. The most common approach is to take an area that is less than the full range of a population and, often on the basis of density estimates (or by using habitat as an indicator), a conservative prediction is possible, i.e. If the effect is calculated for a portion of the population and it results in a magnitude of effect that is beneath a defined threshold, then it is reasonable to predict the effect on the entire population, even in the absence of a total population estimate. This approach is not greatly different from that used by resource managers that have the mandate to manage wildlife populations, who are challenged to develop harvest quotas, even where they do not have an accurate or complete population estimate available to support these decisions.

Volumes 4 through 8 of the Mary River Project FEIS present the effects predictions for individual resource-specific component themes presented in each volume. Volume 9 of the Mary River Project FEIS presents the cumulative environmental effects assessment.

11.1.2 Rating of Residual Biophysical Impacts

For the categories for criteria and qualifiers applied directly to the determination of significance for residual biophysical effects, with due consideration to the NIRB requirements cited above, see Table 11-2.

TABLE 11-2: RATINGS FOR EVALUATING RESIDUAL BIOPHYSICAL EFFECTS

Criteria	Classification	
Magnitude (Specific to the VEC and the impact)	Level I	An effect on the exposed indicator/VEC that results in a change that is not distinguishable from natural variation and is within regulated values
	Level II	An effect that results in some exceedance of regulated values and/or results in a change that is measurable but allows recovery within one to two generations
	Level III	An effect predicted to exceed regulated values and/or results in a reduced population size or other long-lasting effect on the subject of assessment
Extent The physical extent of the effect, relative to study area boundaries	Level I	Confined to the LSA
	Level II	Beyond the LSA and within the RSA
	Level III	Beyond the RSA
Frequency How often the effect occurs	Level I	Infrequent
	Level II	Intermittent
	Level III	Frequent or continuous
Duration The length of time over which a Project effect will occur	Level I	Short term (effect lasts up to four years)
	Level II	Medium term (up to 25 years, for the life of the Project)
	Level III	Long term (beyond the life of the Project) or permanent
Reversibility The likelihood of the VEC to recover from the effect	Level I	Fully reversible
	Level II	Reversible with cost/effort
	Level III	Irreversible
Qualifiers		
Certainty Limitations in the overall understanding of the ecosystem and ability to predict future conditions	High	Baseline data are comprehensive; predictions are based on quantitative data; effect relationship is well understood
	Medium	Intermediate degree of confidence between high and low
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is not well understood
Probability The likelihood that the predicted impact/residual effect will occur	Unlikely	Less than 20% likelihood of occurrence
	Moderate	Between 20 and 60% likelihood of occurrence
	Likely	Over 60% likelihood of occurrence

Each of the five criteria contributes to the determination of significance. Criteria are categorized in three levels (Levels 1, 2, and 3), where Level I is indicative of a negligible or limited potential to contribute to an overall significant environmental effect, and Level III is indicative of a high potential. Level II represents the intermediate condition.

For the assessment table formats used to summarize the effects assessment of biophysical VECs, see Table 11-3 and Table 11-4. Note that adjustments and adaptations can be made to suit the individual analyses. These are noted in each VEC discussion presented in the Mary River Project FEIS.

TABLE 11-3: EFFECTS ASSESSMENT SUMMARY FOR SELECTED VEC/KEY INDICATOR

Effect	Direction and Nature of Effect	Residual Effect Evaluation Criteria					Significance
		Magnitude	Extent	Frequency	Duration	Reversibility	Rated Significance of Residual Effect

TABLE 11-4: SIGNIFICANCE OF POTENTIAL RESIDUAL BIOPHYSICAL EFFECTS

Effect	Significance of Predicted Residual Environmental Effect		Likelihood[1]	
	Significance Rating	Level of Confidence	Probability	Certainty[2]

Key
Significance Rating: S = Significant, N = not Significant, P = Positive
Level of Confidence[1] : 1 = Low; 2 = Medium; 3 = High
Likelihood - only applicable to significant effects
Probability: 1 = Unlikely; 2 = Moderate; 3 = Likely
Certainty[2]: 1 = Low; 2 = Medium; 3 = High

NOTES:

1. Level of confidence in the assignment of significance
2. Certainty around the assignment of likelihood

11.1.2.1 QUALIFIER 1 - LEVEL OF CONFIDENCE

The level of confidence with predictions is an important qualifier in that a low level of confidence will require a conservative approach to each of the evaluation criteria. Level of confidence is related to limitations in the overall understanding of the ecosystem and limitations in accurately foreseeing future events or conditions. Uncertainties associated with each prediction are described in each effects assessment at a level of detail that corresponds to the relative uncertainty (i.e., where effects predictions have greater certainty, more emphasis was placed on articulating the uncertainties). A level of confidence is assigned to qualify significance rankings relative to the quality and confidence in the data used and the evaluation methodology.

"Low" is assigned where there is a high degree of confidence in the inputs, "Medium" when there is moderate confidence and "High" when there is a low degree of confidence in the inputs. Where rigorous field baseline data were collected and scientific analysis performed, the degree of confidence will generally be high.

11.1.2.2 Qualifier 2 - Likelihood

The likelihood parameter is assigned a probability dimension as well as a level of certainty, to qualify significance rankings relative to the likelihood that the predicted effects will actually occur:

- "Unlikely" indicates a low probability of occurrence,
- "Moderate" a moderate probability, and
- "Likely" a high probability.

For example, where effects are associated with unplanned accidental releases against which mitigation and emergency response protocols are in place, the probability is low. Certainty is assigned to indicate the relative level of confidence in the probability prediction. Collectively, the probability and certainty assignments indicate the overall likelihood of an effect.

11.1.3 Rating Criteria for Residual Socio-Economic Impacts

Similar criteria were applied to the socio-economic effects assessment with some modification and additional criteria in consideration of the nature, complexity, and multiple perspectives associated with socio-economic issues. For the attributes (criteria and qualifiers) identified as the determinants of significance of socio-economic effects, see Table 11-5.

Additional description of each criterion follows:

11.1.3.1 Direction

This criterion considers whether an effect is "positive" or "negative". The perceived direction of a given socio-economic effect is sometimes a subjective assessment that can vary across the population, so a "variable" option is also included in the classification. Determination of "direction" is based on values expressed during the community research and through existing documentation such as community economic development plans.

11.1.3.2 Geographical Extent

This attribute identifies whether the effect will be experienced in the smaller communities, in Iqaluit, or in both these areas. Some impacts might be relevant to specific communities, so a "community-specific" classification is included.

11.1.3.3 Social Extent

The "social extent" identifies the specific groups or social units most likely to experience an effect. These could include children, youth, women, family, or the entire community.

11.1.3.4 Equity

"Equity" considers whether those experiencing an effect have made a choice to engage in the project ("engaged individuals") or are simply bystanders who have not voluntarily associated with the project ("bystanders"). This criterion seeks to provide insight into how equitably the benefits and negative impacts are distributed.

11.1.3.5 MAGNITUDE

"Magnitude" is the level of change relative to the appropriate baseline, rated as low, moderate, or high. These magnitude ratings are linked to measurable parameters where appropriate. Measurable parameters may be applied in a conceptual sense.

11.1.3.6 FREQUENCY

The "frequency" of an effect provides an indication of how commonly the effect will occur during the Project, and is rated as low, intermittent, or continuous. Unless otherwise indicated the following definitions are associated with these levels:

- Infrequent - Occurring only occasionally.
- Intermittent - Occurring during periodic points in the project.
- Continuous - Occurring throughout the project life.

TABLE 11-5: RATING CRITERIA FOR EVALUATING RESIDUAL SOCIO-ECONOMIC IMPACTS

Criteria	Classification
Direction	Positive
	Variable
	Negative
Geographic Extent	Description of the area and communities most affected
Social Extent	Demographic groups or social units identified as most affected
Magnitude Intensity of the effect	Low
	Moderate
	High
Frequency How often the effect occurs	Infrequent
	Intermittent
	Continuous
Duration Length of time over which a Project effect will occur	Short term (less than four years)
	Medium term (up to 25 years, life of the Project)
	Long term (beyond the life of the Project)
Reversibility Likelihood of recovery from effect	Reversible
	Partly reversible with cost/effort
	Irreversible

11.1.3.7 DURATION

"Duration" refers to how long an effect will continue to affect those who experience it. It is rated using the following definitions:

- Short term - Over a period of several years.

- Medium term -Within the life of the project life.
- Long term - Beyond the project life.

11.1.3.8 REVERSIBILITY

The "reversibility" criterion considers the likelihood of recovery from an effect, including consideration of the active management interventions that may be required to bring the residual effect to an acceptable level.

Three definitions are used in considering reversibility:

- Immediately Reversible - Effect reverses within an acceptable time frame with no intervention.
- Reversible with a cost/effect.
- Management required - Active intervention is required to bring the effect to an acceptable level.
- Irreversible - Effect will not be reversed.

11.1.4 OVERALL EVALUATION OF SIGNIFICANCE

NIRB (2009) stated that impact significance is based on comparing the predicted state of the environment with and without the Project, and expressing a judgment as to the importance of the changes identified. NIRB directed that the EIS shall present the residual effects assessment of the Project so that the reader can clearly understand the real consequences of the Project, the degree of mitigation of effects, and which effects cannot be mitigated or compensated for.

NIRB also directed Baffinland to consider the dynamic change of ecosystems and their components in determining significance.

The overall significance of an effect is derived from the experience and professional judgment of the environmental practitioners who prepared the assessment, considering the rankings of the contributing attributes of significance. While substantially based on professional judgment, the following are general rules of thumb applied in determining significance:

- If the magnitude of the effect is low, then the predicted effect is "not significant," recognizing that magnitude includes consideration of sensitive species, habitats or populations. If effects on measurable components such as air or water quality meet applicable performance criteria, standards or guidelines, then the magnitude of the effect is negligible to moderate, and therefore the prediction will be for an effect that is "not significant."
- If the geographic extent of the effect is confined to the PDA or LSA, then the predicted effect is likely to be "not significant."
- If the extent of a negative socio-economic effect is limited to individuals who also receive a corresponding positive benefit, then the predicted effect is likely to be "not significant."

- If the effect has a moderate to high reversibility, the predicted effect is likely to be "not significant."
- If the duration of the effect is short term (e.g., construction period only) then the effect prediction is also likely to be "not significant."

NIRB (2009) also directed Baffinland to communicate with potentially affected communities and organizations to solicit input on the values placed on VECs and VSECs as well as significance of impacts:

The Proponent shall describe how it will ascertain that significance that different parties assigned to each impact, and how it will proceed if different parties ascribe varying significance to VECs, VSECs or the associated impacts. If it is impossible to attain a consensus on the significance of certain impacts, the Proponent shall present the range of viewpoints expressed and shall present and justify its preference, if any. Finally, the Proponent shall describe the significance it ascribes to each effect, and justify how the significance of the effect was determined, taking into consideration and avoiding duplication of, the information provided above. (NIRB, 2009)

Finally, in its Pre-Hearing Conference Report, NIRB (2011) directed Baffinland to reconsider the significance of potential Project impacts where parties raised concerns with the significance determinations presented within the Draft Environmental Impact Statement (DEIS).

To this end, Baffinland has attempted to assemble, synthesize and present feedback from the following sources:

- Records of public meetings from 2006 through the first part of 2011;
- Records from Inuit knowledge studies held to date (individual interviews and workshops);
- Kajjuqtikkut - a five-day workshop held in Arctic Bay March 10-14, 2008, attended by members of the five Inuit Knowledge Study working groups. The key themes of transportation (marine and rail), caribou, marine mammals, and socio-economic issues were discussed and minutes recorded;
- A five-day workshop jointly held by Baffinland and the QIA at Mary River the week of September 12-18, 2010, with community representatives selected by the QIA. The workshop focused on community perspectives on the significance of predicted impacts on caribou, marine mammals and land use; and
- Feedback of concerns raised with the significance determinations presented in the DEIS.

Baffinland has integrated a summary of the significance determination within each of the individual effects assessments in Mary River Project FEIS Volume 4 through Volume 8 while Volume 9 presents the cumulative environmental effects assessment. The approach in this EIS has been to present the evidence clearly and in the manner requested in the Guidelines.

11.2 Residual Effects Predicted at Planned Closure

Using the methodology presented in Section 11.1, the predicted residual impacts were assessed and the associated consequences were evaluated for each impact to a VEC or VSEC. Although no significant adverse residual effects were predicted for the Project at planned closure, this section provides a summary of all predicted residual impacts that were expected to exist beyond the closure of the Project site for both VECs and VSECs.

Residual impact criteria (e.g., direction, magnitude, reversibility, etc.) noted in the following sub-sections are defined in Section 11.1. Complete details including the environment consequence calculations, residual impact criteria classification, probability of occurrence and level of confidence all VECs and VSECs are presented in Volume 4 through 8 of the Mary River Project FEIS.

11.2.1 Atmospheric Environment

11.2.1.1 Air Quality

Residual effects air quality effects are those that remain when all mitigation options have been incorporated into the Project design and operation. The criteria identified in Table 11-6 were used to rate the effects on air quality of these residual effects from project activities. These criteria are consistent with but differ slightly from the assessment criteria defined in Section 11.1, having been modified to account for the nature of air quality effects. The overall rating as presented in Table 11-7 is a professional judgment based on consideration of the magnitude in relation to indicator thresholds, the geographic extent, the duration, the frequency, the reversibility of the effects, and the certainty and probability of the occurrence.

TABLE 11-6: RESIDUAL EFFECT RATING CRITERIA USED FOR THE AIR QUALITY ASSESSMENT

Criteria	Rating Term	Definition
Magnitude	Level I	The expected emission, ambient concentration, or deposition is less than the background value; is less than 10 % of the indicator threshold; or the associated change is less than 5 %
	Level II	The expected emission, ambient concentration, or deposition is more than the background value; is less than the indicator threshold; or the associated change is greater than 10 %
	Level III	The expected emission, ambient concentration or deposition is predicted to exceed the indicator threshold
Geographic Extent	Level I	The expected measurable changes are confined to the LSA
	Level II	The expected measurable changes extend beyond the LSA
Duration	Level I	The predicted effect persists briefly - no longer than several hours or several days per year
	Level II	The predicted effect persists for the duration of the project phase
	Level III	The predicted effect persists beyond the duration of the Project

Criteria	Rating Term	Definition
Frequency	Level I	Predicted effects occur only a few hours a year due to variable exposures from meteorological variability
	Level II	Predicted effects occur during clearly defined seasons
	Level III	The predicted effect occurs continuously and/or is associated with annual averaging periods
Reversibility	Level I	The predicted effect is reversible after the activity ceases
	Level II	The predicted effect is reversible with cost/effort when the activity ceases
	Level III	The effect cannot be reversed
Qualifiers		
Certainty	High	Baseline data is comprehensive; predictions are based on quantitative data; effect relationship is well understood
	Medium	Intermediate degree of confidence between high and low
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is not well understood
Probability	Unlikely	Less than 20 % likelihood of occurrence
	Moderate	Between 20 and 60 % likelihood of occurrence
	Likely	Over 60 % likelihood of occurrence

TABLE 11-7: EFFECTS ASSESSMENT SUMMARY FOR AIR QUALITY

Potential Effect			Evaluation Criteria				
Project Activity	**Direction and Nature of Interaction**	**Mitigation Measure(s)**	**Magnitude**	**Duration**	**Frequency**	**Extent**	**Reversibility**
Milne Inlet site operations	Negative: increased concentrations of CACs	Emission controls on fugitive emission sources	Level II for: TSP, metals, TSP deposition, PM_{10}, $PM_{2.5}$, and Other CACs	Level III for TSP Deposition Level II for all other parameters	Level III	Level I	Level I
Mine site operations	Negative: increased concentrations of CACs	Emission controls on fugitive emission sources	Level III for: TSP, metals, TSP deposition, PM_{10}, $PM_{2.5}$, and NO_2	Level III for TSP Deposition Level II for all other parameters	Level III	Level I for $PM_{2.5}$ and NO_2 and most metals Level II for $PM_{10,}$ TSP, TSP deposition, and Mn	Level III for TSP deposition Level I for all other parameters

Potential Effect			Evaluation Criteria				
Project Activity	**Direction and Nature of Interaction**	**Mitigation Measure(s)**	**Magnitude**	**Duration**	**Frequency**	**Extent**	**Reversibility**
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I
Rail operations	Negative: increased concentrations of CACs	None	Level I or II for all contaminants	Level II	Level III	Level I	Level I
Steensby operations	Negative: increased concentrations of CACs	Emission controls on fugitive emission sources	Level III for: TSP, metals, TSP deposition, PM10, PM2.5, and NO2	Level III for TSP Deposition Level II for all other parameters	Level III	Level I	Level III for TSP deposition Level I for all other parameters
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I
Construction and Closure Phases	Negative: increased concentrations of CACs	Best practices to minimize air emissions	Level III for: TSP, metals, TSP deposition, PM10, and PM2.5	Level III for TSP Deposition Level II for all other parameters	Level III	Level I	Level III for TSP deposition Level I for all other parameters
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I
Rail operations	Negative: increased concentrations of CACs	None	Level I or II for all contaminants	Level II	Level III	Level I	Level I
Steensby operations	Negative: increased concentrations of CACs	Emission controls on fugitive emission sources	Level III for: TSP, metals, TSP deposition, PM_{10}, $PM_{2.5}$, and NO_2	Level III for TSP Deposition Level II for all other parameters	Level III	Level I	Level III for TSP deposition Level I for all other parameters
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I
Construction and Closure	Negative: increased	Best practices to	Level III for: TSP, metals,	Level III for TSP	Level III	Level I	Level III for TSP

Potential Effect			Evaluation Criteria				
Project Activity	**Direction and Nature of Interaction**	**Mitigation Measure(s)**	**Magnitude**	**Duration**	**Frequency**	**Extent**	**Reversibility**
Phases	concentrations of CACs	minimize air emissions	TSP deposition, PM_{10}, and $PM_{2.5}$	Deposition Level II for all other parameters			deposition Level I for all other parameters
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I

NOTE(S):

1. CACs = CRITERIA AIR CONTAMINANTS [TSP, PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO].

The project residual effects to air quality can thus be summarized as: the ambient concentrations of the air quality parameters are at a Level I or II for all phases of the Project. Concentrations in excess of the thresholds are predicted to generally be confined to the LSA, and the effects are fully reversible. The residual air quality effects are predicted to be not significant.

The air quality assessment has identified TSP, metals, PM_{10} and $PM_{2.5}$ concentrations at the Mine Site and Steensby Port could be a concern. Visual observations will readily confirm the sources of excessive dust emissions and corrective actions will be taken as required. Periodic sampling of dust fall will be carried out to confirm Mary River FEIS dust fall predictions. Typically, TSP will be measured using hi-vol samplers over a period of several days or weeks. The information collected will be used to confirm modelling predictions. In terms of gaseous emissions, SO_2, NO_X and greenhouse gases emissions will be calculated on the basis of fuel consumption. This monitoring is described in the Air Quality and Noise Abatement Management Plan (Ref BAF-PH1-830-0002).

Meaningful dust deposition (measured as TSP) will occur mainly as a result of ore handling and will contain metals as described in this section. The residual effects of this dust deposition are addressed under the following VECs: vegetation, wildlife, freshwater quality, marine water quality, and marine mammals.

11.2.1.2 Noise and Vibration

Impacts from the significant noise and vibration producing activities such as on-site demolition activity, on-site equipment operation and air traffic are not expected to occur beyond the closure phase. During active closure of project facilities, including the Mine Site and ports, and transportation links such as roadways and the railway, may generate substantial amounts of noise that can affect human receptors and other VECs such as wildlife. However, the duration of these events is expected to be short-term, the frequency of effect is occasional and the effect is reversible. Based on this, the effect is anticipated to be not significant.

11.2.2 Terrestrial Environment

11.2.2.1 Landforms, Soils and Permafrost

Geotechnical investigations have been conducted across the PDA. Investigations and assessment has found construction and mining activities have the potential to create potential changes to sensitive landforms but the residual effect is not predicted to be significant. The residual effects related to sensitive landforms are assessed as:

- The magnitude of the effects is a change will not be distinguishable from natural variation and will be within regulated values (Level 1).
- The extent of the effects will be confined to the PDA (Level 1).
- The frequency of how
- often the effect occurs will be negligible as the mitigative measures will ensure that no effects occur (negligible)
- The duration is the length of time over which a Project effect will occur which will be negligible as there is negligible frequency (negligible).
- The reversibility is the likelihood of the sensitive landforms to recover from the effect will be negligible as there is negligible frequency and duration (negligible).
- While soils will be disturbed and there will be residual effects, soils are important as a matrix for vegetation and wildlife habitat which are assessed later in this subsection.
- As changes are expected to be limited to within the PDA, the potential residual effect to permafrost is predicted to be not significant.

11.2.2.2 Vegetation

Assessment methods for vegetation follow the general methodology presented in Section 11.1 to assess potential changes to documented baseline conditions based on Project implementation. The assessment of the Project's effect on vegetation is based on three measurable parameters: vegetation abundance and diversity; culturally valued vegetation; and vegetation health. For the purpose of quantifying the effects of the Project at planned closure, three assumptions are made to simplify the assessment:

- New disturbance within the footprint of the Project will remove all vegetation within the entire PDA for the life of the Project.
- All land is terrestrial habitat and, therefore, is potentially vegetated; though much of the RSA is considered barren or sparsely vegetated.

- Regeneration of the disturbed area is a slow process and will not occur until beyond the life of the project.

Loss of vegetation within the PDA is a residual effect — it is not expected that disturbed areas will become re-vegetated until after closure of the mine. Some of the mine footprint may never return to baseline conditions. This includes blueberries which are considered culturally valued vegetation. However, since effects are expected to be limited to the PDA any changes to vegetation abundance and diversity (including culturally valued vegetation) occurring outside of the PDA due to dust, NO_2 emission or N deposition are expected to occur and a small magnitude and extent. Consequently, there is high confidence that project related activities will have a not significant effect on vegetation abundance/diversity and culturally valued vegetation at the scale of the RSA.

Regarding vegetation health, during project construction, operation, and closure activities, it is predicted that annual dust deposition could occur outside of the PDA beyond the 55 g TSP/m²/a threshold level, which may have an effect on the health of vegetation communities. It is estimated that those effects would be limited to a small portion of vegetated areas in the RSA (<0.01 %), and small proportion of each vegetation class (<0.01 %) relative to their individual availability in the RSA. The effects would be reversible when the dust-producing activities cease after project closure. When the air emissions and nitrogen deposition cease at project closure, the effects of nitrogen additions to the ecosystems will persist. This can result in long-term effects on plant community composition and individual species resilience. The prediction is that those effects will be limited to only small proportions (<0.1 %) of the more sensitive vegetation classes within the RSA. Metals contained in dust will likely accumulate to some degree in soils beyond the PDAs, although the affected area is expected to be relatively small in comparison to the RSA. Plant responses to metals in soil are extremely varied and dependant on the species in question, but are primarily determined by soil pH. Since soil and substrate pH were found to be in a neutral range of 6 to 7.5 (based on baseline results) within the Project study area, bioavailability of metals is expected to be maintained at low levels, thereby minimizing or preventing potential phyto toxic effects. The prediction is that any effects will be small in extent and could be minimized by several monitoring and mitigation measures. Based on this there is moderate confidence that project related activities will have a not significant effect on plant heath within the Regional Study Area.

It is noted the prediction confidence is moderate for the effects on vegetation health. Thresholds have not been developed for dust effects on plants, and the literature acknowledges a lack of data of effects of atmospheric emissions and its effects on Arctic vegetation. The effects levels are an estimate based solely on available literature, much of which is based on research, and little in Arctic communities. The potential effects of metals on plants either from aerial deposition or uptake from soils are highly dependent on site-specific conditions and the plant species themselves. Under near neutral pH soil conditions such as those found in baseline soil studies, a significant barrier to metal uptake typically exists that prevents metals from being bioavailable to plants. If metals in soil have limited bioavailability, then the potential for effects on plant health is greatly diminished. In an effort to

further address this uncertainty, Baffinland in undertaking additional reclamation research on natural re-vegetation to ensure closure objectives and criteria can be met (see Section 5.2).

11.2.2.3 Migratory Birds and Habitat

Project-related activities could potentially alter bird behavior and cause displacement during during project construction, operation, and closure activities but activities will be confined to the Project footprint, which is relatively small in relation to the availability of suitable habitat nearby. Densities of bird key indicators (Peregrine Falcon, Snow Goose, Common and King Eider, Red-throated Loon, Thick-billed Murres, Lapland Longspur) are expected to decline within the footprint, and possibly within adjacent zones of influence. However, these changes are expected to be a result of displacement out of the affected areas and not a result of mortalities to the birds or their offspring.

Based on this, the residual effects 5of Project activities on bird key indicators at planned closure include habitat changes such as localized direct habitat loss and chronic disturbance; however, overall effects are not likely to have serious implications for any species' regional populations. Species abundance and habitat use will almost certainly be altered within the port footprints, and to some extent within a certain zone of influence around them as some individuals are forced out to less-disturbed neighboring areas but because of the vast amount of available suitable habitat nearby, the overall effect of the Project to the key indicators specifically, and to all bird species in general, is expected to be minimal and the effect is anticipated to be not significant.

11.2.2.4 Terrestrial Wildlife and Habitat

Construction, operation and closure activities have the potential to effect distribution and abundance of wildlife VECs in the RSA through planned closure. The key indicator of the Project's effects on the VEC "Terrestrial Wildlife" is caribou. During construction, operation, and closure of the Mary River Project, monitoring of caribou abundance will be very important for determining the effectiveness of mitigations and the precision of effect predictions. The current low population of caribou in the RSA makes it difficult to predict effects because there are so few receptors of any potential effects. Consequently, monitoring will be necessary to determine how the effects change as abundance increases. An adaptive wildlife management plan will be the key to reducing any effects of the mine on the terrestrial wildlife. Four measurable parameters were selected to allow prediction of the effects of the Project on caribou. These are: habitat, movement, mortality and health.

Habitat

Loss of habitat within the PDA (footprint) of the project is a residual effect - Baffinland does not expect that habitat will be reclaimed (re-vegetated) within a generation of caribou or by planned closure. Sensory disturbances that reduce habitat effectiveness within a zone of influence can only be partially mitigated until post-closure. Caribou will find some project activities disturbing. It is uncertain to what degree caribou will adapt to those disturbances. However, over the entire range of the north Baffin Island caribou, habitat effectiveness is predicted to be reduced by 1.72 % during the calving season, 1.67

% during the growing (summer) season, and by 1.83 % during the winter season. This effect will last for the duration of the project's activities or until caribou adapt to the disturbances.

The loss of calving habitat will be entirely from disturbance associated with the mine, and therefore is reversible at planned closure. Given the broad distribution of calving sites within the RSA, the assumed availability of alternative calving areas, and the minimal competition for calving areas, Baffinland is moderately confident that after mitigation the Project will have a not significant effect on calving caribou.

Movement

Alterations to the landscape that will remain post-closure are consistent with the surrounding environment and will be immeasurable features on the landscape given the rough terrain in the RSA. Transportation embankments and building foundations do not exceed the characteristics of the current landscape. The caribou population is expected to rebound and large numbers of migratory caribou, relative to current levels, are expected to return to the area. Trails that were altered because of transportation infrastructure will be re-established as caribou return to and start to move through the region again. The overall residual effect of the project on caribou movement may be that caribou travelling on five of 52 (9.6 %) known trails of may experience a barrier to their movement on those trails. This effect is expected to have a not significant effect on the movement of North Baffin caribou.

Mortality

There are no known features of the project that will remain post-closure that will reduce health to a level of increased mortality for the north Baffin Island caribou herd. There are no expected residual effects of the project on caribou mortality. Mortality, if it occurs, will be limited to individuals within the PDA. The effect of the Project on North Baffin caribou mortality is not significant.

Health

No residual effects of the Project on caribou health are anticipated due to metal exposure from dustfall. Most dustfall will be associated with the Mine Site and the primary metals are relatively innocuous to caribou.

11.2.3 Freshwater Environment

11.2.3.1 Freshwater Quantity

The water component of "Freshwater quantity" refers to surface water (rivers, streams, lakes) and groundwater; however, groundwater quality is generally not considered to be at risk in the Project area because the extensive permafrost layer acts as an impermeable barrier eliminating/limiting potential migration of contaminants into the groundwater located below. Article 20 Inuit Water Rights of the Nunavut Land Claims Agreement (NLCA) formally recognizes the importance of water quantity and flow

to the Inuit. Under the NLCA, Inuit require compensation if a project or activity will substantially affect the quantity of water flowing through Inuit-Owned Lands. Therefore, water quantity has been identified as a VEC with respect to hydrology. The water quantity VEC can be defined as the spatial and temporal variability of the volume of water within the RSA that may be subject to alteration by Project activities.

Potential residual effects of the Project on water quantity will be addressed under the following three (3) key issues: withdrawal, diversion, and discharge. Based on these (3) key issues related to freshwater quality, residual effect predictions results in the following:

- The Project will not have significant adverse residual effects on the under-ice water volume of water. All withdrawals meet DFO guidelines for the Regional Study Area.
- Withdrawal will not have significant adverse residual effects on the outflow of water from waterbodies. Magnitude threshold will be exceeded at only one location, 3km Lake within the Steensby LSA, during June and September; however, the extent of the effect is minor relative to the entire LSA and will occur only while access is being established to ST347 Lake, the permanent water source for the Steensby Port. All withdrawals are within thresholds.
- The Project will not have significant adverse residual effects on water quantity resulting from water diversion. Magnitude threshold will be exceeded in several cases within the Mine Site and Steensby Port LSAs; however in all cases the extent of the effects is minor relative to the applicable LSA. The majority of these diversions do not alter total water quantity; they merely redistribute the water.
- The Project will not have significant adverse residual effects on water quantity resulting from effluent discharge. Magnitude threshold will be exceeded in several cases within the Mine Site LSA; however, in all cases the extent of the effects is minor relative to the applicable LSA. The majority of these discharges do not alter total water quantity; instead, they redistribute during it.

Based on this, the Project is not predicted to have significant adverse residual effects on Water Quantity resulting from combining the Key Issues of Water Withdrawal, Diversion and Discharge. In all cases the relative extent of the effects is minor as they redistribute rather than alter the total quantity. The Level of Confidence in all Water Quantity significance ratings is either moderate or high, based on an assessment of the quality of available information used to evaluate the residual effects for each watershed.

11.2.3.2 Water And Sediment Quality

For the same reason “Water Quantity” is important to Inuit values and selected as a VEC, so is “Water and Sediment Quality”. Water and sediment quality is an essential component of the aquatic environment with the potential to affect the food chain, fish and fish habitat, and local residents. Project-related effects on sediment quality were primarily assessed qualitatively due to limited data availability, limited information on hydrodynamics, hydraulics, transport and conversion of potential contaminants, and limitations in accurately predicting future effects on sediment quality. In most instances, effects on sediment quality were assessed using surface water quality VEC as a proxy.

Residual effects on water quality were considered likely to induce a similar residual effect on sediment quality.

Effects on the surface water and sediment quality VEC were assessed in accordance with the methodology outlined in in Section 11.1. VEC-specific modifications were made to the general methodology, which are highlighted below to determine residual effects:

- Regional and local study areas were determined;
- VECs, Key Indicators and Thresholds were identified;
- Project activities that could affect surface water and sediment quality were identified;
- Project interactions with, and effects on, the surface water and sediment quality VEC were identified;
- Linkage evaluations were performed outlining potential effects related to various phases of the Project (Construction, Operation, and Closure) and Project LSAs (Milne Port, Milne Inlet Tote Road, Mine Site, Railway Alignment, and Steensby Por)t;
- Mitigation measures were identified to avoid or reduce the potential effects during the various phases of the Project;
- Residual effects and their relative significance were identified for the surface water and sediment quality VECs; and
- Long-term monitoring programs were identified to distinguish Project-related impacts from natural variability, in order to verify impact assessment predictions and to meet compliance/conformance criteria.

Based on this methodology, residual effects of Project infrastructure and activities were assessed with a focus on mine contact water that will be discharged into the freshwater environment at planned closure and 'other water discharges' that have potential residual impacts that may remain at planned closure.

Mine Contact Water Discharges Post-Closure

Project-related emissions of mine contact water may result in impaired surface water and sediment quality in the Mine Site LSA. Management of storm water and process water that has been in contact with the iron ore (mine contact water) is required at the Mine Site. The following sources have been identified for inclusion in the aqueous point source emissions residual effect assessment because they involve mine contact water that will be discharged into the freshwater environment at planned closure:

- West Waste Rock Stockpile runoff to Camp Lake and Tributaries.
- Pit lake water and waste rock discharges to Mary River in post-closure.

The rationale for the residual effects ratings for these two (2) mine contact water discharges is provided below. Given the variability in runoff flows, the ponds were sized to accommodate the two-year

extreme event. Discharge is anticipated to be distributed evenly with the natural flows from approximately mid-June until September. Details regarding theoretical treatment options are provided in the Life of Mine Waste Rock Management Plan (Ref BAF-PH1830-P16-0031 Rev 0) . The main findings suggest that, with sufficient storage and upstream control, any water quality issues that arise can be managed. If the only challenge with the water quality is TSS concentration, this will often be solved using retention time alone. With a buffer pond that has a sufficiently large retention time it is possible to allow particles to settle while discharging - either by gravity or pumping - in a continuous system.

All mine contact water (including that from the ore stockpiles) in the Milne Port and Steensby Port LSAs is discharged to the ocean; their potential effects are assessed as part of consideration of the Marine Environment (see Section 11.2.4).

West Waste Rock Stockpile Runoff to Camp Lake and Tributaries

The mass balance modelling indicates that several parameters will have Level II magnitude effects to water quality under both mean and low flow conditions at the nearest downstream location inhabited by fish at L0, and in Camp Lake (Hazard Quotient - HQ of >1 and <10). An HQ >10 and <100 was applied for mercury using 90th percentile baseline concentrations. All other parameters are at Level I or lower. Each of the metals showing an HQ >1 (a Level I effect) or HQ >10 (a Level II effect) is identified in the humidity cell testing as having >50 % non-detects, and half the detection limits were assumed for non-detect results. Consequently, the derived source terms for these metals are substantially based on the MDLs. Most of these same parameters (including arsenic, cadmium, chromium, mercury, selenium and silver, as well as other metals that do not trigger a Level I effect) have measured baseline concentrations that are mostly non-detect, and therefore the calculated mean or 90th percentile concentrations are substantially based on MDLs. On this basis, the assignment of a Level II magnitude rating for water and sediment quality effects arising from discharge of stormwater from the waste rock pond to the Camp Lake tributaries and Camp Lake is considered to be highly conservative. Baffinland is exploring options for re-testing or additional testing to obtain a dataset of more precise measurements for these parameters.

Discharge of mine contact water from the West Waste Rock Stockpile into the lower reach of Camp Lake tributary L1 will be required during the Operation, Closure and post-closure phases of the Project and therefore a Level III duration rating was assigned. The frequency of the potential effect will be annual, limited to the period between June and September therefore a Level II frequency rating was assigned. The extent of the potential effect is expected to be limited to the Mine Site freshwater LSA and to reach negligible levels where Camp Lake discharges into Mary Lake therefore a Level I extent rating was assigned. The potential effects are anticipated to be partially reversible therefore a Level II reversibility rating was assigned.

Based on these ratings, discharge of mine contact water from the West Waste Rock Stockpile into the tributary of Camp Lake is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA.

Pit Lake Water and Waste Rock Discharges to Mary River in Post-Closure

At the end of mining, the open pit will gradually fill with water from precipitation; time is estimated at 85 to 147 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008). During the years that the pit is filling, runoff will continue to discharge to tributary F0 and the Mary River from the East Waste Rock Stockpile. AMEC (2012) developed water quality estimates for pit water for the final year of mining (Year 21), which were applied in a water quality model under the assumption that, once the pit has filled, in each subsequent (post-Closure) year all precipitation into the open pit will accumulate and spill over the southwest edge facing the Mary River, behaving like a spillway, and that water will be released during the open water period according to the natural hydrograph.

Based on pit water quality for Year 21 of mining, it is possible the water will have a pH of around 4.2, which is outside of the pH range of the MMER (6.0 to 9.0). If required, adjustment of pH will be carried out periodically through closure using either batch lime treatment or in-line treatment, drawing down the pit lake periodically. The mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions and management plans.

Mass loading modelling carried out indicates that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

The effects associated with the discharge of pit water and waste rock runoff into the Mary River are permanent and therefore a Level III duration. The waste rock seepage will run off into the Mary River starting in the first year post-closure, whereas the pit water is not expected to discharge to the Mary River until the pit fills, after 80 years or more. The frequency of the potential effect will be annual, limited to the period between June and September when exploration drilling is scheduled and therefore a Level II frequency rating was assigned. The extent of the potential effect is likely to be limited to the Mine Site freshwater LSA therefore a Level I extent rating was assigned. The effects associated with the discharge of pit water and waste rock runoff into the Mary River is partially reversible therefore a Level II reversibility rating was assigned.

Based on these ratings, discharge of pit water and stormwater from the East Waste Rock Stockpile into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The Level of Confidence is Medium, due to the assumptions made in the mass loading models and the consequently highly conservative nature of the effect prediction.

It is noted Baffinland recognizes there is potential uncertainty with waste rock and open pit discharge predictions. In an effort to address this uncertainty, Baffinland in undertaking additional reclamation research on Waste Rock Stockpile and Open Pit discharges to ensure closure objectives and criteria can be met (see Section 5.2).

Other Water Discharges Post-Closure

In addition to the aqueous point source emissions discharged into the freshwater environment at planned closure, there may be remaining infrastructure and activities that were widespread or had non-point source discharges that have potential residual impacts that may remain at planned closure. The effect of these non-point source emissions were assessed in a qualitative manner on a Project-wide basis rather than assessing residual effects for each individual water body. These activities included: ground preparation and earthworks, site water management, laydown areas, quarries and borrow areas, tunnelling and rock cuts, camps and fuel management, water use and management, and airstrips and airstrip use. Based on this approach, it was found project activities resulting in non-point source discharges may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs, however with appropriate use of mitigation measures, monitoring and adaptive management, this is not anticipated to result in significant adverse residual effects on water (freshwater) or sediment quality. This significant determination is generally based on the effect confined to the LSA, the effect being fully or partially reversible after activity is complete, and the effect is expected occur greater than threshold value(s) only rarely or is expected to occur intermittently or continuously within threshold values.

11.2.3.3 Freshwater Biota and Habitat

Closure activities have the potential to effect distribution and abundance of freshwater biota and habitat in the RSA. Arctic Char was identified as the key indicator for the “Freshwater Biota and Habitat” VEC. Potential linkages between the Project components/activities and Arctic Char fall into three key issues:

- Key Issue #1: Potential effects on the health and condition of Arctic Char.
- Key Issue #2: Potential effects on their habitat.
- Key Issue #3: Potential effects on their direct mortality.

Based on these three (3) key issues, it was determined overall the Project will not have significant adverse residual effects on Arctic Char. The Project will cause residual effects across the five LSAs, but the effects will be confined to these areas or portions of these areas, the magnitude of residual effects is

predicted to be Low or Medium, and effects are expected to be reversible. The specific characteristics that were considered related to the three (3) key issues are further descried briefly below.

Health and Condition

Potential effects on Arctic Char health and condition relate to changes in water quality, which may occur during the Construction, Operation, and Closure phases in relation to aqueous discharges and due to dust deposition during Construction and Operation. The greatest effects are predicted to occur within small tributaries to Camp and Sheardown lakes in relation to dust deposition and for Camp Lake Tributary 1, due to both dust deposition and discharge from the West Waste Rock Stockpile. Water quality effects are also expected in Camp and Sheardown lakes, most notably near tributary mouths. Mary River may also experience exceedances in CCME PAL guidelines during Operation, Closure and post-Closure due dust deposition and the discharge of effluents and runoff. The magnitude of residual effects on Arctic Char health and condition will range from Low in Mary River to Medium in tributaries to Camp and Sheardown lakes due to cumulative effects of the Project on water quality. Effects will also vary over time, with the largest effects occurring in the Operation phase during spring freshets, when dust introduction will be greatest, and during periods of effluent discharge. Effects related to runoff from the East and West Waste Rock Stockpiles and pit water release (after the pit has filled) will extend into the post-Closure period. Effects will range from short-term to long-term duration, will be confined to the LSA, and will be reversible

Habitat

Potential effects on Arctic Char habitat include increased sedimentation rates, loss of habitat to Project footprints in waterbodies, water withdrawals, alterations in water levels and flows due to diversions that may reduce the amount of available habitat, and collectively, reduction of productive capacity in streams and lakes due to all of these effects pathways. Following mitigation, residual effects on Arctic Char habitat are expected to be a small to moderate reduction in the amount and productive capacity of habitat in LSA waterbodies, most notably in smaller tributaries to Camp and Sheardown lakes. Effects will be of moderate or long-term duration, limited to the LSA, and reversible.

Mortality

No residual effects on direct mortality of Arctic Char are predicted following mitigation.

11.2.4 Marine Environment

11.2.4.1 Sea Ice

During the scoping activities, sea ice and Project-related effects to sea ice were identified as being of utmost importance to Inuit as it relates to their culture, as well as to animals that rely on ice. Therefore, sea ice was identified as VEC. A number of pathways were identified through which construction, operation, and closure activities would interact with sea ice. These include:

- Disruption of landfast ice at Steensby Port during construction activities, including on-ice construction activities.
- Treated wastewater discharge during construction and operation of the Project.
- Disruption of landfast ice at Steensby Port and Milne Port due to dust deposition on the ice surface.
- Disruption of pack ice through Hudson Strait and Foxe Basin by icebreaking ore carrier passage.

It is noted given the timing for shipping from Milne Port, the ERP will not involve any components that interact with Sea Ice or Landfast Ice. Consequently there will be no effects on this VEC.

Based on a residual effects assessment, annual icebreaking activity represents the residual effects on sea ice. There is potential for the physical alteration of a maximum cumulative annual total of 136 km2 of landfast ice within Steensby Inlet. This represents 4.0 % of the landfast ice within the Inlet and less than 0.5 % of landfast ice within Foxe Basin and the RSA. This effect is an unavoidable result of shipping at Steensby Port. Effects on integrity of the landfast sea ice from shipping are predicted to be "not significant" because they will be small in magnitude, confined to within the LSA, long in duration, and fully reversible following Project closure. There is no predicted residual effect to sea ice in post-closure.

11.2.4.2 Water And Sediment Quality

For the same reasons "Water and Sediment Quantity" in the Freshwater Environment is important, so is "Water and Sediment Quantity" in the Marine Environment and therefore it was identified as VEC. A number of pathways were identified through which closure activities would interact with Water and Sediment Quantity in the marine environment. These include:

Dismantling of Marine Infrastructure (including Ore Dock)

Dismantling of marine infrastructure has the potential to increase to concentrations of TSS, nutrients, and metals in the water column as a result of sediment disturbance. It also has the potential to lead to sediment suspension and redeposition near the site of origin. However, with the application of proven mitigation measures (e.g. silt curtains will be placed in as close proximity as feasible around the activity) the residual effects of dismantling the marine facilities on marine water and sediment will be of moderate magnitude (Level 2), confined to within a small area of the LSA (Level 1), frequent through the Closure period (Level 2), of short duration (Level 1), and reversible (Level 1). The environmental effect of dismantling of marine facilities on marine water and sediment quality is predicted to be "Not Significant".

Vessel Traffic (ice-free season only)

Vessel traffic during the closure phase is not anticipated effects to TSS, nutrient, or metal concentrations in the water or sediment due to resuspension of substrates from propeller currents as it is expected that the seafloor will have stabilized by planned closure. In addition, there are no anticipated increases in

hydrocarbon concentrations in water or sediments assuming normal vessel operations. It is assumed all ships will comply with the Anti-Fouling Systems Convention and will not introduce tributyl-tin to the environment. Based on this, vessel traffic is expected to have negligible or no effect on water or sediment quality during the Closure Phase of the Project.

Discharge of Ballast Water

The environmental effect of the discharge of ballast water during planned closure includes potential localized temperature threshold exceedances and/or localized reduction in nutrient concentrations in water. However, mitigative measures require the ballast water to be exchanged in nutrient poor areas of the high seas (according to the Ballast Water Control and Management Regulations administered under the Canada Shipping Act), and is expected to be discharged over a large area (e.g., within protected waters).Based on this, the environmental effect of the discharge of ballast water during planned closure will be of low magnitude (Level 1), confined to areas within the LSA (Level 1), infrequent (Level 1) of short duration (Level 1) and fully reversible (Level 1). The environmental effect of the discharge of ballast water on water and sediment quality in Milne Inlet is predicted to be "Not Significant".

Wastewater and Site Water Discharge

The environmental effect of the discharge of wastewater and site run-off (oiled site water, and overland run-off) may cause potential increases in BOD and concentrations of TSS, nutrients, metals, and hydrocarbons in the water and nutrients, metals, and hydrocarbons concentrations in the sediment. However, all discharges of wastewater, oiled water, and contact water will be treated to meet the respective guidelines prior to discharge. Based on this, during closure and post-closure activities, the environmental effects of wastewater and site water discharges to Milne Inlet will be low magnitude (Level 1), confined to within the LSA (Level 1), frequent (Level 2), of short duration (Level 1), and reversible (Level 1). The environmental effect of wastewater and site water discharges to the Marine Environment is predicted to be "Not Significant".

11.2.4.3 Freshwater Biota And Habitat

Closure activities have the potential to effect distribution and abundance of marine biota and habitat in the RSA. Arctic Char was identified as the key indicator for the "Marine Biota and Habitat" VEC. Arctic char are seasonally abundant in marine coastal waters, and are of value as a cultural, subsistence and commercial resource.Potential linkages between the Project components/activities and Arctic Char fall into two key issues:

Marine Fish Habitat

During closure activities, potential effects on marine fish habitat relate to discharge of wastewater and site drainage (Increase TSS, alter sediment composition, alter productive capacity), barge and ship traffic (ice-free season only) (no change in TSS, sediment composition, or productive capacity), noise

disturbance due to infrastructure removal and vessel activities (avoidance by fish), and ballast water discharge (water temperature and water-borne nutrient concentration change, decrease in benthic productivity). It is expected that the magnitude of these residual effects will be low (Level I). Project activities leading to residual effects on water quality (short-term water quality guideline exceedances) would be reversible and related effects on marine habitat (e.g., changes due to ballast water) are also expected to be reversible. Based on this, the Project will have no significant adverse residual effects on marine fish habitat.

Arctic Char Health and Condition

During closure activities potential effects on anadromous Arctic Char health and condition relate to habitat-related effects (including the loss of a negligible amount of habitat contained within infrastructure footprints), possible reduced benthic productivity due to ballast water discharge, and possible avoidance of a small area around the dock sites due to underwater noise. It is expected that these effects will be contained to within the respective LSAs, and would be of small consequence in the context of feeding habitat available within Milne and Steensby Inlets. These effects are expected to be reversible. Project activities are expected to cause no direct mortality (e.g., fishing by employees will not be permitted) or effect the size of anadromous Arctic char populations. Residual effects on water and sediment quality may result in low magnitude effects on char health and condition, but these effects are expected to be confined to within the Milne and Steensby Inlets LSAs. Project activities leading to residual effects on water quantity will be reversible and effects on Arctic char are also expected to be reversible. As such, the residual effects are predicted to be “not significant”.

11.2.4.4 Marine Mammals

Based on issue scoping during development of the Mary River Project EIS, the following marine mammals were selected as an indicator species: ringed seal, bearded seal, walrus, beluga whale, narwhal, bowhead whale and polar bear. Scoping also indicated that the influences of noise on the behaviour, health, distribution and abundance of marine mammals in the LSA and RSA were of primary concern. The residual effects assessment therefore focuses on the potential effects of noise from various Project activities. Other Project activities such as the discharge of wastewater will interact with some marine mammals, but with mitigation measures in place residual effects are expected to be negligible to very minor. The approach for predicting how many marine mammals might be exposed to noise of sufficient level (and duration) that could elicit a behavioural response or cause hearing impairment is intended to provide guidance on the expected level of effect. Based on this assessment approach, the residual effects were determined as follows:

Ringed Seal

The Project is predicted to have no significant residual effects on ringed seals. Habitat change, disturbance, hearing impairment, masking, and mortality effects are predicted to be low magnitude and confined to the LSA.

Bearded Seals

The Project is predicted to have no significant residual effects on bearded seals. Habitat change, disturbance, hearing impairment and masking effects are predicted to be low magnitude and confined to the LSA.

Walrus

The Project is predicted to have no significant residual effects on walruses. Habitat change, disturbance, hearing impairment, and masking effects are predicted to be low magnitude and confined to the LSA. No mortality is expected.

Beluga Whale

The Project is predicted to have no significant residual effects on beluga whales. Habitat change, hearing impairment, and masking are predicted to be low magnitude and confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be undertaken to address these uncertainties and ensure that beluga whales do not incur significant effects.

Narwhal

The Project is predicted to have no significant residual effects on narwhals. Habitat change, hearing impairment, and masking are predicted to be low magnitude and confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of vessels transiting Eclipse Sound and Milne Inlet during the open-water period and with ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be undertaken to address these uncertainties and ensure that narwhals do not incur significant effects.

Bowhead Whale

The Project is predicted to have no significant residual effects on bowhead whales. Habitat change, hearing impairment, and masking are predicted to be low magnitude and, with perhaps the exception of masking, confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be

undertaken to address these uncertainties and ensure that bowhead whales do not incur significant effects.

Polar Bear

The Project is predicted to have no significant residual effects on polar bears. Habitat change and disturbance effects are predicted to be low magnitude and confined to the LSA. A minimal number of bears may be killed to protect humans but this would be taken out of the quota with compensation provided.

11.2.5 Human Environment

11.2.5.1 Population and Demographics

The Project will have multiple residual effects on the Population Demographics VSEC for some of the communities in the North Baffin LSA. These will affect individuals, families and communities, and may include positive as well as negative directions. Residual effects arising from in-migration and out-migration are expected to arise; however, these effects are not expected to be sufficient to cause adverse effects on demographic stability of the affected communities. Therefore these residual effects are assessed to be not significant although it is recognized that the dynamic nature of human and community interactions makes it difficult to predict the overall direction (positive or negative) and magnitude of such changes. Mitigation measures implemented by Baffinland aim to enhance the positive residual effects of the Project on this VSEC. Based on the best available understanding of the dynamics involved in these decisions, there is moderate confidence that negative residual effects will have no significant effect on Population Demographics.

11.2.5.2 Education and Training

The assessment of the Project's residual effects on life skills and on education and skills leads to a conclusion that the Project will have a significant positive effect on education and training. This is attributed to positive residual effects on life skills amongst young adults that are anticipated to arise from the Project through access to industrial work supported by pre-employment preparation and on-the-job training and beneficial residual effects on education and skills across the LSA. It is recognized that there is a potential that individuals may drop out of school or forego further education in order to work at the Project; however, the overall effect of the Project will be to increase the value of education and thereby the "opportunity cost" of dropping out of school.

This Project's residual effects on life skills and on education and skills are expected to be confined to the LSA and should have sustained benefits beyond panned closure. Given the mitigation measures that have been committed to, as described in the Human Resource Management Plan (HRMP, found in the FEIS, Volume 10F-3 December 2010 Rev 0), confidence in this assessment is high.

11.2.5.3 Livelihood and Employment

The Project is assessed to have no significant adverse residual effects on the Livelihood and Employment VSEC. The Project will have a positive effect on wage employment in the North Baffin by introducing new job opportunities and assisting local residents to access these jobs while building capacity that will last past project closure. The Project will also have a positive effect on the ability of local residents to progress in their jobs and career choices. This effect will arise as a result of the new career paths that will be introduced to the region, from entry-level through step-by-step advancement to higher level jobs. Based on this, and with successful implementation of planned mitigation, it is assessed to have significant beneficial effects on this valued component.

Although no significant adverse residual effects on the Livelihood and Employment are predicted, it is noted stakeholders, including QIA and INAC, have expressed concerns on Project effects on Inuit harvesting. In order to provide further context for this concern to make sure it is addressed appropriately in closure planning, the potential Project interactions with individuals, households, communities, and marine and terrestrial wildlife after completion of planned closure are summarized in Table 11-8 below.

TABLE 11-8: SUMMARY OF PROJECT INTERACTIONS WITH INUIT HARVESTING AFTER COMPLETION OF CLOSURE ACTIVITES

Socio-Economic Effects

- Inter-community Inuit migration – This may lead to more Inuit becoming interested in hunting in a particular region (and a consequent reduction in hunting in some other region). This is predicted to be a low magnitude effect.
- Improved life skills – Increased well-being associated with improved life skills could lead to a greater interest in rediscovering traditional Inuit values and activities, including perhaps a renewed interest in harvesting. This could lead to more hunting activities.
- Increased household purchasing power – Those who gain income from the Project will have improved access to purchasing the gear, equipment, and supplies needed to support harvest activities of family and friends. They may or may not choose to apply their purchasing power to these ends however. If this does occur to a substantial degree, it is possible that hunting intensity may increase. Whether this leads to a change in harvesting patterns is not known—the baseline does not provide adequate insight into current harvest patterns in terms of the balance between "weekend hunters" and "intensive hunters."
- Wildlife harvesting by Inuit – Harvesting by Inuit was assessed based on the parameter of harvest quantity per level of effort, meaning the number of harvests by species, or total quantity (i.e., weight) of country food obtained, in relation to an estimated level of effort (amount of time spend hunting). Taking into consideration the results of the assessments on marine wildlife and arctic char the residual effects on harvesting were predicted to be negligible. The residual effects on caribou

harvesting were predicted to be not significant because the measurable parameter was predicted to change by less than 1 % in magnitude.

Effects on Caribou

- Sensory effect on wildlife – Effects includes noise and dust emissions that are limited to the zone of influence and are addressed under loss of habitat.
- Caribou habitat – The Project will lead to small reductions in caribou habitat and habitat effectiveness. Assessment conclusion: We are moderately confident that Project related activities will have a "not significant" loss of habitat and a "not significant" reduction in the effectiveness of caribou habitat within the North Baffin caribou range.
- Movement – The overall residual effect of the project on caribou movement may be that caribou travelling on five of 52 (9.6 %) known trails experience a barrier to their movement on those trails. Few caribou currently exist within the RSA, so few caribou will be affected by the mine infrastructure and activity. Assessment conclusion: We are moderately confident that Project related activities will have a "not significant" effect on traditional caribou migration on north Baffin Island.
- Mortality – There are no expected residual effects of the project on caribou mortality. Mortality, if it occurs, will be limited to individuals within the PDA. There are no expected indirect effects on the north Baffin Island caribou population as a result of hunter access.

Effects on Marine Mammals

- The small area of the dock footprints is a negligible part of nearshore habitat and therefore a "not significant" effect on marine mammal nearshore habitat in is predicted after completion of planned closure.

As stated above, none of the Project interactions were considered to lead to significant impacts on any of the indicators related to harvesting. However, some agencies have asked how multiple "non-significant" residual effects might combine over the course of the Project. The possibility for such aggregations of residual effects is acknowledged, however, given what is known about Inuit land-use and harvesting practices the probability that any such combination would lead to a significant adverse effect on Inuit harvesting is considered to be unlikely. The following points provide a rationale in support of this conclusion:

- Households that gain access to better transportation and harvesting equipment directly or indirectly related to Project-derived income may improve their opportunity to harvest. This is important to intergenerational transfer of harvesting values, culture and knowledge to the younger generations.

- Contribution of the Project to trends related to "sharing" versus "commercialization" of harvested country food is considered to be complex and multi-directional. Some aspects of the Project may support the development of commercial harvesting activity, while others may serve to strengthen traditional sharing networks.

- To illustrate the previous point, the culture of sharing harvested food is difficult to maintain among families that are dependent on social assistance for their sustenance. The ability of members of these households to gain employment may, for some, present the ability to have enough income that groceries, money, hunting equipment, or the proceeds of harvesting can be shared beyond the immediate household. This sharing could serve to maintain and strengthen traditional sharing cultures by enabling a greater portion of the population to participate in sharing relationships.

- The Project may contribute to trends in the adoption of technology by harvesters. It will provide some households with the income they need to acquire and support this technology. This could lead to a divergence between those harvesters who have access to the technology and those who do not. However, current income differentials already exist amongst households in the LSA. Those with access to the largely public sector jobs have far more income than households who have no substantial wage income. Introduction of mine jobs may lead to improved wealth distribution in communities. Traditions of sharing equipment in exchange for country food should serve to further reduce the gap between technology "haves" and "have-nots."

The complexity of factors that are understood to affect trends in Inuit harvesting activities are highly inter-twinned with other factors affecting harvesting in the LSA. The potential for beneficial outcomes is equally or more highly anticipated than the potential for negative effects. Monitoring of specific Key Indicators that relate to Inuit harvesting—such as effects on wildlife habitat and populations and effects on employment—will be carried out as described in the Mary River FEIS. However, given the complex and indirect nature of many of these interactions—along with the concurrent influence of many other trends and interactions unrelated to the Project— these narrowly focused monitoring initiatives are not on their own expected to generate an integrated understanding of how Inuit harvesting may be affected from the combination and accumulation of these individual interactions. Baffinland will participate with Inuit and other agencies to support monitoring initiatives related to changes in Inuit land-use and harvesting, and associated culture and skills, by making available relevant data the Company generates.

Baffinland will also follow the outcome of socio-economic monitoring that is carried out by other agencies and companies. This will include reviewing the annual socio-economic monitoring reports to NIRB from projects such as the Meadowbank mine.

11.2.5.4 Economic Development and Self-Reliance

The overall direction of the effects of the Project on the Economic Development and Self-Reliance VSEC are assessed, with a high level of confidence, to be positive. Direct and indirect economic expansion associated with the Project will create new opportunities for employment and business across the RSA,

and particularly within the LSA. The Project will enhance labour force capacity and may increase Inuit business capacity. The assessment of Project interactions on land and land use dimensions of this VSEC suggest that these effects will be multi-dimensional. No significant adverse effects on the underlying VECs are assessed. The integrated analysis of the combined effects of the Project does not lead to an assessment of adverse effects on harvesting. Considering the Project's interactions with these multiple dimensions related to Economic Development and Self-Reliance, the residual effects of the Project are assessed to be positive and significant.

It is noted at planned closure however, there will be a reduction of benefits flowing from the Project. Loss of employment will be partially off-set by workers' eligibility for employment insurance payments. At final closure, Project employment will cease and individuals will be eligible for Employment Insurance (EI). During their EI benefits period, former workers may seek work elsewhere, either in the local economy or in the broader job markets.

The effect of job loss on individuals and households will depend on personal circumstances. Those who take advantage of the opportunities to acquire education and improved technical skills should have better prospects for employment than those who do not. Personal money management decisions may also affect the effects of job loss. Maintaining savings, staying up-to-date on rent and utilities obligations, and other good personal finance practices will help to ease the effects of temporary or permanent term layoffs from the Project. The inclusion of money management as a component in the training and Employee and Family Assistance Program (EFAP) program is outlined in the Human Resource Management Plan.

Temporary closure and final closure will also affect local businesses that take on opportunities with the Project or serve the increased consumer demand. This is an inherent risk of business. Businesses that may be most affected will be those that develop specifically to supply the Project. Clearly, when Project demand ceases, these companies will either need to quickly seek out new customers, change their product or close.

Mitigation measures to enhance the capacity of entrepreneurs to make informed decisions related to risk and reward are addressed in the Human Resource Management Plan. In particular, Baffinland will support the QIA's efforts to enhance Inuit business capacity through its contribution to a business capacity and start-up fund.

11.2.5.5 Human Health and Well-Being

The positive residual effects of the Project on the Human Health and Well-being VSEC are assessed to be significant. Improved income is a major factor in this assessment, as it will improve the well-being of most children whose parents work at the mine. Some negative residual effects are expected to occur in relation to the well-being of some children arising from absence of workers from the community. These effects are not expected to reach levels that would cause significant adverse impacts on the VSEC,

however. The Project will have positive and negative residual effects on substance abuse, but these are not assessed to be significant.

11.2.5.6 Community Infrastructure and Public Services

The assessment of the Project's residual effects on the Community Infrastructure and Public Services VSEC, combined with a consideration of the subjects of note, leads to a conclusion that the Project will have a significant positive impact this valued component. This conclusion is based on an assessment of no significant adverse residual effects on community infrastructure and services arising from competition for skilled workers, and on an assessment of significant labour force capacity development.

11.2.5.7 Contracting and Business Opportunities

The direction of the effects of the Project on the Contracting and Business Opportunities VSEC are assessed, with a high level of confidence, to be positive. Baffinland, through the IIBA, is committed to work closely with the QIA and will fund an initiative for capacity building that will be administered by the QIA. The company is also committed to an Inuit contracting policy adapted to the capacity of Inuit firms.

The successful implementation of these mitigation measures, and the active participation of individuals in these programs, will largely determine the significance of the Project's residual effects on contracting and business opportunities. In light of the mitigation measures adopted by Baffinland, the residual effects are assessed to be positive and significant.

11.2.5.8 Cultural Resources

The Project will involve the avoidance, protection and mitigation of archaeological sites in accordance with an Archaeological Mitigation Plan approved by CLEY, and a protection plan to reduce the potential for unintentional destruction of archaeological sites. With the implementation of both the mitigation and protection plans, the Project is expected to have negligible residual effect on the disturbance or removal of archaeological sites, and on the cultural resources VSEC.

11.2.5.9 Resources and Land-Use

The Project will interact with current land-use activities such as harvesting, travel and camping. Direct adverse residual effects on these activities are acknowledged. With planned mitigation described in the Key Indicator assessments these effects are predicted to be not significant. Concerns that Project effects on these Key Indicators along with other residual effects on relevant VECs and VSECs might combine to lead to adverse effects on Resources and Land-Use and on harvesting livelihoods were raised. The integrated analysis of the combined effects of the Project does not lead to an assessment of adverse effects on harvesting. The interactions are expected to be complex and highly inter-twinned with other factors affecting harvesting in the LSA (see Section 11.2.5.3). The potential for beneficial outcomes is equally or more highly anticipated than the potential for negative effects.

11.2.5.10 Cultural Well-Being

The Project will affect Inuit culture and its development through interactions with Inuit cultural values. To a large degree, these interactions will be positive. The opportunities for productive livelihoods based on self-reliance and sharing of resources, learning and sharing experience through supervisory and role-model functions, and for monitoring the environment are all relevant and supportive of these values. This conclusion that productive employment is aligned with Inuit culture in the contemporary context is something that has also been expressed by Elders during community consultations.

It is acknowledged, however, that culture has many facets. Different perspectives on industrial development and its effects on culture have been heard during community engagement. Some individuals have deep concerns about the effect of on-going economic development and expansion of the wage economy on Inuit culture. What may be a positive cultural effect for some—access to a job that enables one to provide for family and relatives—may be a negative cultural effect for someone else. For these reasons, Project effects on culture are considered to be diverse in their directions—neither positive nor negative. No significant impact is assessed.

11.2.5.11 Benefits, Royalty, and Taxation

After completion of planned closure, there will be a reduction of benefits flowing from the Project related to Benefits, Royalties, and Taxation VSEC, however though its contributions made under the IIBA, as well as payments of royalty, rents, and taxes, the Project will have a significant beneficial effect on the Benefits, Royalties, and Taxation VSEC that should last into post closure if managed appropriately. The Project is also expected to reduce social entitlement program expenditures while modestly increasing demands for discretionary social spending.

11.2.5.12 Government and Leadership

The Project is considered to fit well with the strategic priorities identified for both the RSA and the communities of the North Baffin LSA. Through an effective governance regime in place with the signing of an IIBA and, through partnership with the Q-SEMC, Baffinland will contribute to socio-economic monitoring important to the region's leadership into closure and post-closure. Therefore, the Project is considered to have a positive and significant effect on the Government and Leadership VSEC and no significant negative impact is assessed.

11.3 Current Predicted Residual Impacts

At this time, the residual effect and impact assessment results from the Mary River EIS remain relevant as the Project is in the relatively early stages of operation and development has proceeded largely as proposed. Collection of information and data occurs on an annual basis under Baffinland's environmental monitoring program and is used to assess current site conditions for comparison to initial predictions and assumptions from the Mary River EIS. Results are reported annually to the NIRB and other relevant stakeholders (see Section 4.5). Overall, based on environmental monitoring program results to date, Baffinland suggests the Project has provided net positive effects to the region. No

significant adverse effects have been identified. It is noted however, monitoring programs are in their early stages of implementation and will provide more information after several years of operating and monitoring.

Revisions to existing predictions of residual impact assessments will be completed where significant variances are identified. Ongoing and proposed future efforts to reduce the uncertainties relating to closure conditions are addressed within Section 5.2.

11.4 Closure and Post Closure Monitoring of Residual Effects

In order to ensure residual effect predictions are meeting expectations, Closure and Post-Closure monitoring and reporting will occur. Table 11-9 below provides summary of the potential residual effects specific to the proposed Project and their associated closure and post closure monitoring programs.

TABLE 11-9: FEIS PREDICTED RESIDUAL IMPACTS AND CLOSURE/POST-CLOSURE MONITORING

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
ATMOSPHERIC ENVIRONMENT								
Climate change	Greenhouse Gases (GHG)	• Increased GHG emissions • Climate change	• Arctic grade diesel fuel • Rail transportation of ore	• Increased GHG emissions	• PC-mandated annual calculation of Project GHG emissions (NIRB Annual Report)	• Minimal GHG emissions generated post-closure (limited to site visits)	• None	• Not applicable; monitoring prescribed by PC and not required to confirm closure objectives met
Air quality	Air quality	• Increased concentrations of total suspended particulate (TSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) • Increased deposition of dust, potential acid input (PAI)	• Apply best management practices for limiting air emissions • Use of low sulphur Arctic grade diesel fuel • Limit speed on roads • Ore crushing facilities are enclosed, vented and equipment with dust collection equipment • Apply dust suppressant as required in high traffic areas and stockpiles • Procurement policy on emissions from equipment (incinerator, generators, vehicles) • Waste segregation (incineration) • Where possible, use of granular material for road construction • Regular maintenance of equipment and vehicles	• Increased concentrations of TSP, SO_2, NO_2, CO • Increased deposition of dust and PAI	• TSP monitoring in Year 2 of active closure	• Negligible residual effects expected post-closure	• None	• Section 13.3.9
Noise and vibration	Noise and vibration levels	• Sensory impact on wildlife	• Procurement policy for noise for equipment and vehicles • Use of mufflers – regular maintenance of engines and equipment	• Sensory impact on wildlife (effect expected to be comparable to the construction phase)	• No monitoring proposed	• Negligible residual effects expected post-closure	• None	• Not applicable
TERRESTRIAL ENVIRONMENT								
Landforms, soil and permafrost	Sensitive landforms	• Soil contamination • Soil structure alteration • Soil destabilization and erosion • Thaw weakening and settlement • Creep settlement	• Sitting of facilities and alignment of roads and railway • Design foundations suitable for site conditions • Design stream crossing structures for extreme flood event • Ensure adequate drainage and prevent pooling of water	• No residual effect (disturbance of sensitive landforms) after mitigation	• Regular visual inspections • Geotechnical Inspection • Environmental site assessment and remediation of hydrocarbon contaminated soils	• Residual effects not expected to occur post-closure; if reclamation objectives have been met	• Post-closure geotechnical inspections at start and end of post-closure monitoring	• Active closure phase monitoring described in Section 13.2 • Post-closure monitoring described in Section 13.3
Vegetation	Vegetation	• Loss of vegetation abundance and diversity	• Limit physical footprint of facilities • Limit areas of access for vehicles • Progressive reclamation / closure	• Loss of vegetation limited to Project Development Areas (PDA)	• Invasive species monitoring (PC Condition 37) • Annual review of the TEMMP (PC Condition 38)	• Negligible adverse residual effects post-closure. Post-closure, the loss of vegetation will be reversed with natural revegetation. The risk of invasive plant species colonizing the area is negligible.	• None	• Closure and reclamation research will describe vegetation research projects, Section 5.2

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
TERRESTRIAL ENVIRONMENT (CONT`D)								
Birds	Bird key indicators identified in the FEIS, including species at risk	• Destruction of nests • Habitat loss • Mortality • Influences on health • Sensory disturbance	• Mitigation measures identified in the Terrestrial Environment Management and Monitoring Plan (TEMMP), including: • Employee awareness / environmental induction program • Minimize footprint of facilities • Conduct nest search prior to start of activities • No hunting policy • Avoidance of areas of large concentrations of foraging or moulting birds • Avoidance of known nests or nesting areas • To the extent possible, enforce closure of a 500 m radius of the nest until fledging occurs • Nest-specific management plans • To the extent possible, develop appropriate aircraft approach and departure flight paths	• Habitat loss • Mortality • Influences on health	• No monitoring proposed during active closure • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• Residual effects on bird species will gradually lessen with time as the project areas are naturally revegetated.	• Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• Post-closure flora and fauna monitoring described in 13.3.5
Terrestrial wildlife and habitat	Caribou	• Habitat loss • Restriction of movement • Mortality	• Use of dust suppressant on Tote Road during growing season • Speed limits for trucks and trains which will provide more time for caribou to get off the road or rail, and will increase the chance of a truck being able to stop before a collision with a caribou. • The train is expected to operate 300 days per year, so seasonal stoppages are possible if large groups of migratory caribou return to the area. • Baffinland has a no hunting policy for all personnel while working on site. • Snow management that will grade snow banks along railway and roadway so that caribou are able to easily cross the transportation corridor without being blocked by steep snow banks. • The railway embankment will be constructed of finer fill material at the five identified trails for easier caribou movement across the railway embankment. The finer fill will replicate natural trail conditions. • Physical barriers from trains will be reduced by limiting train traffic to four passes per day.	• Habitat loss • Restriction of movement • Mortality	• Same as above	• Same as above	• Same as above	• Same as above

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
FRESHWATER AQUATIC ENVIRONMENT								
Water quantity	Water quantity	• Reductions in water quantity due to water withdrawals • Increases in water quantity due to effluent discharges • Redistribution of water flows in the natural environment due to diversions	• Permit required for water withdrawal • Measurement of withdrawal quantities as per Water License • Implement measures to reduce water consumption	• Residual effects predicted to occur during the operation phase will either remain or will be reduced through the removal of diversions and watercourse crossings	• Implementation of Closure and Post Closure Aquatic Monitoring • Stream gauging as identified in the Aquatic Effects Monitoring Plan (AEMP) • The Stream Diversion Monitoring Program, a targeted study of the AEMP, will likely have concluded	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3
Surface water and sediment quality	Water and sediment quality	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Application of DFO guideline when using explosives near fish-bearing waterbodies • Prevent discharge of contaminants • Storage of fuel and other hazardous materials in secondary containment • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Implementation of Closure and Post Closure Aquatic Monitoring • Implementation of any remaining monitoring requirements of the closure phase AEMP	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Aquatic and AEMP monitoring until mine achieves “recognized closed mine” status from the Nunavut Water Board • Implementation of Closure and Post Closure Aquatic Monitoring • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal Mining Effluent Regulations (MMER), to seek “recognized closed mine” status from Environment Canada under the MMER, anticipate sampling in year 4 and 6 post closure.	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
FRESHWATER AQUATIC ENVIRONMENT (CONT'D)								
Freshwater fish, fish habitat, and other aquatic organisms	Arctic char	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality • Arctic char mortality	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures (culvert, bridges, etc.) • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Use of explosives in or near streams/water bodies as per DFO Guidelines • Prevent discharge of contaminants • All hazardous materials stored on impermeable surface/secondary containment • Tank farm and large storage tanks placed in secondary containment structures (lined and impermeable) • Smaller tank – double wall ISO-containers • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality • Arctic char mortality	• Fisheries monitoring of in-water works during the removal of bridges, culverts and outfalls, as per DFO Fisheries Authorization and Water Licence • Implementation of any remaining monitoring requirements of the closure phase AEMP • Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Fish and fish habitat monitoring as outlined in the AEMP until the mine achieves "recognized closed mine" status from the Nunavut Water Board • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal Mining Effluent Regulations (MMER), to seek "recognized closed mine" status from Environment Canada under the MMER. Monitoring in year 4 and 8. • Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
MARINE ENVIRONMENT								
Marine water and sediment quality	Marine water and sediment quality	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and malfunction (e.g. oil spill)	• Site runoff water management as per management plan • Hazardous substances contained within impermeable areas as per Waste Management Plan • Sewage treatment and wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Emergency and Spill Response Plan, Milne Port OPEP and Steensby Port OPEP; SOPEP for all ships • Ship on-board waste management - no discharge at sea	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and Malfunction	• Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3
Marine mammals	Ringed seals Bearded Seals Walruses Beluga whales Narwhals Bowhead Whales	• Disturbance caused by airborne and/or underwater noise from construction, shipping, and aircraft • Hearing impairment and/or damage caused by noise from construction activities • Masking of environmental sounds caused by vessel and construction noise	• Dock structures were designed to minimize the footprints in the marine environment • Schedule dock construction activity during period of low mammal occurrence – April to June (blasting, pile driving, dredging) • Use proven mitigation measures to reduce noise and noise propagation during construction (DFO's guideline overpressure limit, bubble curtain system for blasting) • Discourage marine mammals from the blast area with potential use of acoustic deterrent device • Vessels will maintain a constant course and speed whenever possible - reduce vessel speed in Milne Inlet • Vessels will minimize idling of engines when docked at Milne and Steensby ports • Aircraft will be operated at a minimum altitude of 450 m over marine areas, when weather conditions allow • Aircraft will be prohibited from flying low over marine mammals for sightseeing or photography	• Disturbance caused by noise from construction, shipping, and aircraft overflights • Masking caused by shipping noise	Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3
	Polar bears	• Habitat change resulting from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft • Mortality from human-bear interactions	• Primary use of Mary River airstrip during the Operation Phase • Educate workers about bear safety • Work areas kept clean of food scraps, garbage, and toxic materials • Use of bear monitor at camp sites • Use of bear deterrent devices	• Habitat change from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft overflights • Mortality if a bear is killed in defense of human life	• Implementation of Closure and Post Closure Aquatic Monitoring • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• None	• Implementation of Closure and Post Closure Aquatic Monitoring • Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• Closure and Post-closure Aquatic monitoring described in Section 13.3.3 • Post-closure flora and fauna monitoring described in Section 13.3.5.

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
HUMAN ENVIRONMENT								
Population demographics	Demographic stability	• In-migration of a small number of workers from south will have effect on the demographic make-up of communities • Migration of non-Inuit Project employees into the North Baffin LSA • Migration of non-Inuit into North Baffin for indirect jobs • Inter-community Inuit migration • Out-migration from the North Baffin	• Designation of North Baffin communities as "Point of Hire" (Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet) • Iqaluit and a southern hub are also designated "Point of Hire" • Free transportation from "Point of Hire" to Mine Site	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 13.3.8
Education and training	Life skills	• Improved life skills amongst young adults	• Work readiness training • Supportive work environment • Employee and family assistance program • "No drug, no alcohol" policy	• Improved life skills amongst many LSA residents	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Improved life skills amongst LSA employees and families	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	Education and Skills	• Incentives related to school attendance and success • Opportunities to gain skills	• Minimum age of 18 yrs for Project employment • Career planning • Priority hiring for Inuit • Upgrading opportunities • Summer experience • Career counselling • Training	• Transferable skills for LSA employees • Incentives related to school attendance and success •	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transfer of skills to alternate employment	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Livelihood and Employment	Wage Employment	• Creation of jobs in the LSA • Employment of LSA residents	• LSA points of hire • Recruitment strategy • Inuit hiring policy • Management commitment	• Ongoing employment of LSA residents for closure roles • Development of banking and money management skills	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Development of money management skills	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
	Job Progression and Career Advancement	• New career paths	• Individual career support • Inuit hiring / promotions policy • Management commitment	• Expanded employment options based on acquired skills and experience • Resume and other employment documents to support future employment	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Expanded employment options based on acquired skills and experience	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Economic Development and Self-reliance	Land	• Increased pressure on the land • Changes to human engagement in land-based economy	• Lease agreement • VEC-related measures • Resources and Land Use measures (see VSEC)	• Increased employment capacity and general well-being	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transferable employment and life skills • Improved education and training • Increased wealth • Increased capacity to engage in procurement processes/provide services on alternate projects, industries and government contracts	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	People	• Increased opportunities for youth • Improved education and training • Increased wealth and well-being	• Inuit recruitment strategy • Education and training program • Community support fund • Employee and family assistance program	• Improved ability to achieve strategic community development objectives	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased local businesses • Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	Community Economy	• Increased wealth in community • Rotational absence of residents • Increased local business opportunities	• Money management orientation • Community Fund • Monitoring to support decision-making	• Growth in the economy and related job creation and business expansion	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased local businesses • Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	Territorial Economy	• Expanded economic activity (GDP) • Increased diversity of territorial economy	• Direct and indirect investment in the economy • Payment of taxes • Payment of resource royalties	• Positive – increase awareness for LSA employees, focus on health and safety, employee assistance and counselling • Negative - increased ability to afford substances will have effects on substance	• "No drug and alcohol" policy remains in place consistent during active closure in addition to medical checks in relation to new employees on site	• Positive – increase awareness for LSA employees, focus on health and safety • Negative - increased ability to afford substances will have effects on substance abuse	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
				abuse				
Human health and well-being	Substance abuse	• Transport of substances through Project sites • Affordability of substances • Attitudes towards substances and addictions	• "No drug – no alcohol" policy • Measures to prevent transportation through sites • Employee and Family Assistance Program	• Improved well-being of children • Access to Employee and Family Assistance Program	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased life skills for parents and young adults of LSA employees	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	Well-being of children	• Changes in parenting • Increased household income and food security • Overall effects on children	• Orientation and training related to fly-in/fly-out adaptation, health, well-being • Employee and Family Assistance Program • Money management training • Community support fund	• Absence of residents while they are working at Project • Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• Ongoing monitoring of exit interviews and grievance procedure to understand impact of rotation on employees • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
	Community social stability	• Absence from community during work rotation	• Orientation and training related to fly-in/fly-out adaptation • Short rotation (two week in / two week out)	• Competition for skilled workers may lead to temporary effects on municipal services. • Long term improvement in labour force capacity	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Competition for skilled workers	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Community infrastructure and public service	Recruitment and Retention of Hamlet	• Competition for skilled workers • Labour force capacity	• Early start for skills training • On-going training • Employment experience	• Expanded market — business services to Project • Expanded market — consumer goods and services • Increased entrepreneurial capacity	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased entrepreneurial capacity • Increased ability to participate in procurement processes	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Contracting and business opportunities	Opportunities For Business	• Expanded market - business services to Project • Expanded market - consumer goods and services • Increased entrepreneurial capacity	• Inuit contracting strategy • Cooperation with QIA to build Inuit capacity • Establish a fund to support and build capacity • Management assistance to Inuit designated firms • Opportunities for local entrepreneurs to work with Project	• Chance of unmitigated archaeological sites subject to accidental or deliberate partial or complete destruction is minimal • Potential for chance finds • Increased traffic at Steensby Inlet could	• Ongoing procedures for archeological finds on site	• Potential for chance finds	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
				affect archaeological resources				
Cultural resources	Archaeological Sites	• Disturbance or removal of archaeological sites • Unauthorized removal of artefacts • Potential loss of regionally significant sites through approved mitigation	• Pre-development archaeological surveys to support avoidance and protections of sites, mitigation by SDR prior to construction, implementation of a chance finds procedure • Training, flagging and exclusion zones, implementation of government-approved mitigation plans, involvement of local people, management plans, implementation of chance finds procedure	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site	•	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Resources and land use	Inuit harvesting of wildlife	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Prohibition of harvesting by employees • Measures to mitigate VEC effects (see VEC assessments)	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around Steensby Port • Restrictions on camping locations around Steensby Port	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site during active closure	• Safety protocols developed as necessary for post closure including detours as necessary	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Resources and land use	Travel and camps	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around	• Road Management Plan • Mine Closure Plan • Safety Plan • IIBA Agreement with QIA • Designated railway crossing locations	• • Ongoing cultural awareness training for all staff and visitors on site • Increased awareness from cross-cultural training	• Ongoing monitoring of exit interviews and grievance procedure	• Increased awareness from cross-cultural training	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
		Steensby Port • Restrictions on camping locations around Steensby Port						
Cultural Well-Being	Cultural Well-Being	• Pijitsirnjiq – serving and providing for… • Pilnimmaksarniq – passing on of knowledge and skills • Avatittinnik Kamattiarniq – environmental stewardship	• Measures to support Inuit culture on site, including Inuktitut language plan • Inuit priority for employment • Inuit involvement in environmental monitoring	• Payments of payroll and corporate taxes to territorial government	• None	• None	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Benefits, taxes and royalties	Territorial own-source revenues	• Increased taxes and revenues from indirect and induced growth • Payments of payroll and corporate taxes to territorial government	• None	• IIBA agreement with QIA • Development of leadership skills	• Ongoing documentation of any supervisory skills training in place	• Increased leadership and team working skills	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8
Governance and leadership	Governance and leadership	• IIBA Agreement with QIA • Development of leadership skills	• Participation in initiatives to identify indicators of relevance to regional monitoring programs, share data generated by activities related to the Project, and discuss the interpretation of this data with others involved in these initiatives • Fit well with the strategic priorities identified for both the RSA	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring adn Reporting described in Section 13.3.8

12 EXPECTED SITE CONDITIONS FOLLOWING FINAL CLOSURE

12.1 LAND USE

The site abandonment goal of the final closure activities is to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities[11]. Baffinland closure principles, objectives and criteria's have been developed to achieve this future land use goal in as short of duration as reasonably practical.

As noted in Section 2.3 in order to best incorporate additional considerations for future land use of abandoned Project sites, Baffinland intends to establish a "Closure Working Group". The role of this Working Group will be to facilitate the integration of community representation and technical expertise by drawing on Inuit knowledge, arctic experience for similar mining operations, and discussion of alternative uses for decommissioned facilities into the reclamation options for various Project components. Once established, additional considerations for future land use of abandoned Project sites provided by the Closure Working Group will be incorporated into future versions of the ICRP as appropriate.

12.2 SITE TOPOGRAPHY

12.2.1 MINE SITE

Relative to predevelopment site conditions, the principal topographic changes to the site will include the following:

- The waste rock stockpile will remain at closure with a maximum elevation of ~810 masl.
- The open pit will naturally flood at closure ultimately forming a pit lake that will naturally drain in a designed manner.
- Remnants of other infrastructure at the Mine Site, including the crusher and buildings will be demolished and laydown areas re-graded and scarified to enhance natural re-vegetation at closure.

12.2.2 LONG-TERM MILNE PORT AND TOTE ROAD

Relative to pre-development conditions at Milne Port, the remnants of infrastructure including buildings will be removed and laydown areas re-graded and scarified to allow for natural re-vegetation at closure. Milne Port ore dock will remain in place to provide on-going fish habitat. The water crossings along the Milne Inlet Tote Road will be removed.

[11] Based on alignment with Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)

12.2.3 Steensby Port and Rail Alignment

Relative to predevelopment conditions at Steensby Port, the remnants of infrastructure including buildings will be demolished and laydown areas re-graded and scarified to enhance natural re-vegetation at closure. All dock structures will be left intact at Steensby Port but infrastructure will be removed.

Steel rails and ties will be removed from the Railway. All water crossings will be removed. The railway embankment will remain intact.

Tunnels will be sealed. The portals will be backfilled and plugged with rock and sealed with concrete.

12.2.4 Airstrips

The airstrips at the Mine Site, Milne Port and Steensby Port will be removed unless otherwise directed by regulatory agencies, Land Owner, or the Working Group to remain in place and left in operating condition. Abandoned airstrips may provide emergency landing locations for regional aircraft or helicopters, when other options are unavailable.

12.3 Local Surface Water

Disturbances to the surrounding areas of the Project may cause thermal disruptions to the permafrost zone resulting in ponding, settlement and/or subsidence due to changes in the active layer (approximately the upper 1 to 2 m of soil). During closure these areas will be drained of excess water, filled with clean material to insulate and re-establish the active layer and graded, restoring the natural drainage of the area as necessary.

The natural drainage of water courses will be re-established for long term stability.

13 MINE CLOSURE AND POST-CLOSURE MONITORING & REPORTING

13.1 Monitoring Activities during Temporary Closure Phases

Refer to Section 7.11 and 8.10 for environmental monitoring requirements during Short-Term Temporary Care and Maintenance and Long-Term Temporary Mine Closure, respectively.

13.2 Final Closure Environmental Management

Final Closure activities could result in significant changes to the Project sites and therefore Baffinland expects the Final Closure and Reclamation Plan to include updated management plans based upon the knowledge gained through studies during the design, construction and operational phases of the Project and consideration of the anticipated changes. The following management plans, which include monitoring and reporting requirements, are expected to be updated to support closure and post-closure activities. The management plans include, but are not limited to:

- Surface Water and Aquatic Ecosystems Management Plan
  - Updated to reflect re-contoured and natural drainage features re-established to pre-project condition, to the extent reasonably possible.
  - Consideration that sedimentation ponds will be breached and re-profiled.
  - As infrastructure is removed, amended to account for the site final configuration.
- Freshwater and Wastewater Management Plan
  - Updated to reflect sewage and wastewater treatment plants will be decommissioned, dismantled and disposed of.
- Waste Management Plan
  - Modified to account for disposal of equipment, material and waste resulting from demolition and dismantling of facilities considered.
- Terrestrial Wildlife Management Plan
  - Modified to account for closure activities.
- Aquatic Effects Monitoring Plan
  - As some infrastructure is removed, the AEMP will be amended to account for the site final configuration.

13.2.1 Final Closure Annual Reporting

Baffinland will continue to report throughout the Final Closure Phase on its activities on an annual basis to the NIRB (as per Project Certificate No.005 and its Amendment), AANDC Land Lease 47H/16-1-2, the

NWB (as per Type "A" Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

13.3 Closure and Post-Closure Monitoring & Reporting Programs

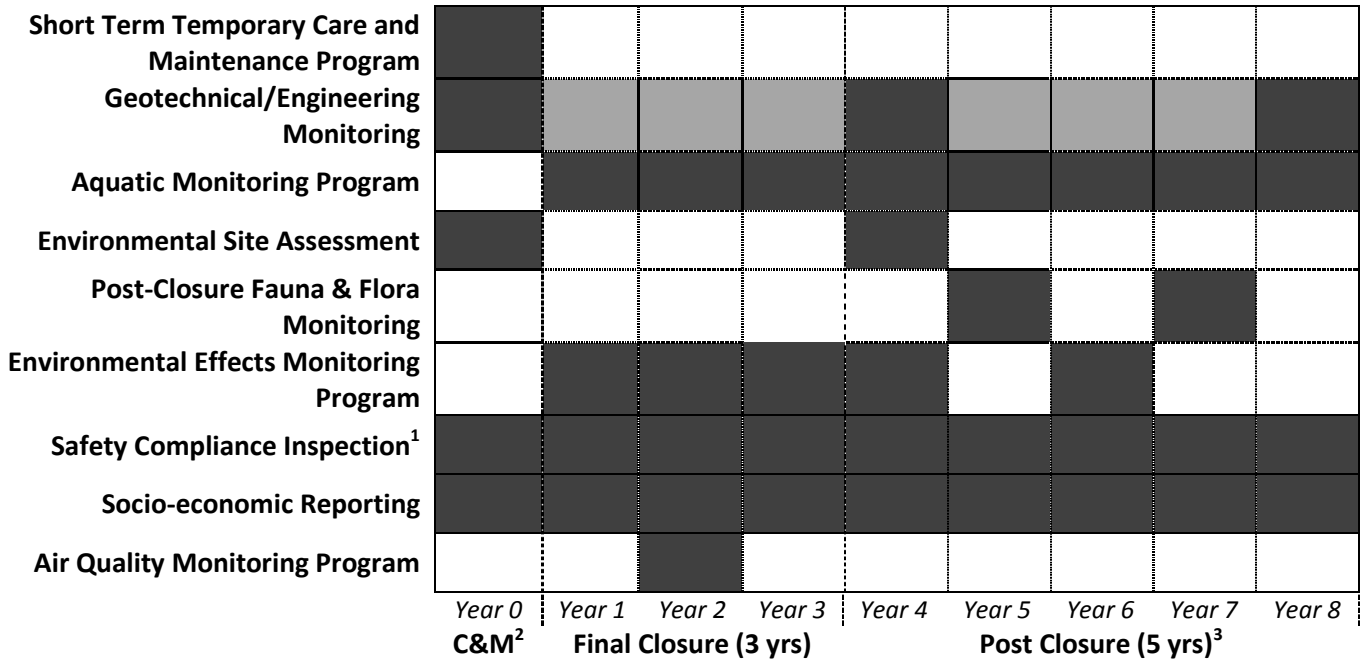
Upon commencement of the Final Closure Phase, a Closure and Post Closure Monitoring Plan will be updated and submitted as part of the Final Closure and Reclamation Plan. The activities to be identified in the Closure and Post-Closure Monitoring Plan are expected to focus on two (2) key objectives:

- Reporting on the physical stability of abandoned Project sites and remaining physical features (open pit, waste rock stockpile, road and railway embankments, stream crossings);
- Reporting on the chemical stability of the mine open pit, waste rock stockpile, and, other Project disturbed areas.

This could also be described as reporting on the residual effects of the mining activities at the end of mine life.

The monitoring programs presented in the subsequent sub-sections are conceptual in nature at this stage of the Project life (initial phased operations) and will be updated with additional detail as the results of studies are compiled and the Project evolves or approaches Final Closure. It is expected that post-closure residual effects will become better defined over time. When the concepts for mine closure are finalized, closure performance will be predicted and the predictions will be used to assess changes to residual environmental impact predictions if necessary. Monitoring the NIRB requirements, as required during planned closure, are dealt with in the implementation of current Management Plans that will be updated regularly throughout the life of the Project and through the monitoring and reporting programs shown below. These Management Plans will still be applicable during Closure and, as necessary, Post Closure Monitoring. See Table 16-2 for concordance to NIRB Project Certificate requirements.

Based on current environmental effect predictions, post-closure monitoring is expected to be required over a five (5) year period, although this time period may be revised, as necessary, as the monitoring programs are further developed to address additional information obtained over the Project lifecycle. The progressive reclamation activities described in Section 5, and the environmental effects monitoring over the life of the Project will help inform practices to be used for the Final Closure phase. FIGURE 13-1 represents the anticipated closure and post closure monitoring program schedule by closure/post-closure year. After closure activities are completed, the results from each monitoring and reporting program will be used to assess if prediction of no significant environmental or social effects are actualized.



NOTES:

[1] Frequency will be established at the discretion of the Chief Inspector of Mines in consultation with Baffinland

[2] Care and Maintenance Phase, up to one (1) year

[3] Post Closure activities are expected to last five (5) years based on environmental impact predictions but will be extended if closure criteria are not met in that timeframe.

[4] Years shaded in dark are where a monitoring program is scheduled (e.g. Environmental Site Assessment in years 0 and 5), years in light grey (e.g. year 1-3 of geotechnical/engineering monitoring) note that general monitoring for this program will occur, but no explicit reports will be produced

FIGURE 13-1: ANTICIPATED CLOSURE AND POST CLOSURE MONITORING & REPORTING PROGRAM SCHEDULE

13.3.1 Short Term Temporary Care and Maintenance Program

As described in Section 10, the anticipated Short Term Temporary Care and Maintenance program includes routine inspection, monitoring and reporting as required by Type 'A' Water Licence Amendment No. 1 2AM-MYR-1325 and its associated management plans. Please refer to Section 7.11 for more information. The Short Term Temporary Care and Maintenance period is expected to last no longer than one (1) year for a planned closure scenario. The goal of the Short Term Temporary Care and Maintenance period is to maintain required project facilities as necessary to support the upcoming active closure activities. As further definition of the a Short Term Temporary Care and Maintenance program is developed, it will be provided in future ICRP revisions and/or incorporated into the Closure and Post Closure Monitoring Plan submitted as part of the Final Closure and Reclamation Plan. If a Care and Maintenance monitoring schedule is required differing from Operations, it will be established in compliance with the AEMP and other appropriate management plans in consultation with applicable regulators and landowners.

Baffinland will continue to report on its activities in this Temporary Care and Maintenance period on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type A Water Licence 2AM-MYR-1325), and the Land Owners (as per Commercial Lease Q13C301). Through a Care and Maintenance monitoring program, regulatory compliance monitoring will continue to abide by all applicable project authorizations and adaptive management similar to that of Year 1 of Final Closure.

13.3.2 Geotechnical/Engineering Monitoring

The objective of the closure and post-closure geotechnical/engineering monitoring will be to demonstrate the physical safety of the Mine Site, Milne Port, Tote Road and Steensby Port to ensure that lands and structures remaining are left in a long-term physically stable condition. The geotechnical/engineering monitoring will also be utilized to identify any physical instability issues (e.g. slumping of slopes, the presence of rills and gullies, cracking, etc) in order to take appropriate corrective measures to ensure component specific closure criteria are met.

The year prior to Final Closure Activities (Year 0), Baffinland will commission an inspection of the sites/structures to determine long term stability of the Project sites and areas of focus for final closure activities. The year following completion of closure activities (Year 4), a second inspection of the sites/structures to confirm long term stability of the Project sites will be conducted. A final inspection will occur in the final year of Post Closure activities (Year 8) to ensure project specific closure criteria have been met long-term. All inspections will be carried by licensed NU engineer.

During geotechnical/engineering monitoring inspections, it is expected special attention will be given to the following areas:

1. Milne Port
    a) Ore and freight docks – integrity of dock embankment and indication of shore erosion.
    b) Port site drainage – indications of excessive erosion.
2. Tote Road
    a) Abandoned quarry sites – site condition and advancement of re-vegetation.
    b) Former water crossing – bank stability and indications of excessive stream bank erosion.
    c) Road – bed erosion and progress of re-vegetation cover.
3. Mine Site
    a) Overall site drainage patterns and indication of erosion channels.
    b) Open pit water level and barriers to access.
    c) Integrity of waste rock stockpile slopes (erosion, slumping of slopes).
    d) Landfill site status (indication of bank erosion, depression of cover material)
    e) Waste Rock temperature readings to ensure stability/permafrost aggradation
4. Railway Embankment and Stream Crossing Site

a) Abandon quarry sites –site condition and advancement of re-vegetation.
b) Former water crossing – inspection of bank stability and indications of excessive stream bank erosion.
c) Road/railway - embankment erosion.

5. Steensby Port

a) Ore and freight docks –integrity of dock embankment and indication of shore erosion.
b) Port site drainage –indications of excessive erosion.

In addition to the detailed geotechnical/engineering monitoring inspections described above carried out by licensed NU engineer, as part of the Closure and Post-Closure Aquatic Monitoring and Reporting Program (see Section 13.3.3), sampling personnel will be trained to indentify and document any suspected cases of physical or geotechnical instability of lands and structures remaining on site (e.g. visible signs of cracking, any indication of seepage, indication erosion that has taken place, natural re-vegetation progress, slope ratios, etc). Therefore, in the interim years between full geotechnical/engineering monitoring inspections, any suspected cases of physical instability will be identified and documented for annual review by licensed NU engineer. If the licensed NU engineer deems it necessary in order to meet established closure criteria, an action plan will be developed and implemented as appropriate to correct the situation and ensure long-term physical stability of the project component or lands in question. The component or lands in question, and similar components or lands, will also then become an area of focus for the subsequent detailed geotechnical/engineering monitoring inspections carried out by licensed NU engineer to confirm acceptable corrective action.

As indicated respectively by project component in TABLE 6-1, only when a satisfactory final inspection by professional NU engineer and/or a closure design and drainage construction is inspected (with as-built drawings signed-off) by a Professional engineer will it mean a project component has met the following closure objectives:

- Physically and geotechnically stable long term;
- Have had adverse impacts to permafrost limited;
- Pre-disturbance surface conditions including drainage patterns re-established to the extent possible and disturbed areas are scarified to promote natural re-vegetation;
- Will not be a safety hazard to humans and wildlife.

Baffinland will report on all Geotechnical/Engineering Monitoring results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type A Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

13.3.3 Closure and Post-Closure Aquatic Monitoring and Reporting Program

The Closure and Post-Closure Aquatic Monitoring and Reporting Program focuses on detecting the discharge of potential contaminants from various Project components. During Final Closure, the Aquatic

Monitoring program will be maintained as outlined by the Aquatic Effects Monitoring Plan (AEMP) (BAF-PH1-830-P16-0039) and in accordance with Type 'A' Water Licence 2AM-MRY1325. If the monitoring schedule is required to be revised from Operations, it will be established in compliance with the AEMP and other applicable Management Plans in consultation with applicable regulators and landowners.

Upon the commencement of Post-Closure phase, it is anticipated all project sites will be reclaimed and rehabilitated and therefore all "end of pipe" discharges sampling points will be eliminated. The Closure and Post-Closure Aquatic Monitoring and Reporting Program will thus be revised to focus on surface water quality monitoring at strategic locations on the abandoned sites. It is expected sampling of the revised, approved locations will take place up to three (3) time per year, during open water season. It is during these annual sampling events, that sampling personnel will identify and document any suspected cases of physical or geotechnical instability of lands and structures remaining on site as described in Section 13.3.2.

As indicated respectively by project component in TABLE 6-1, if monitoring of effluent discharge quality is in compliance with the appropriate respective section of Type 'A' Water Licence 2AM-MRY1325, the project component will be considered to have met the following closure objectives:

- Surface runoff and seepage water quality is safe for humans and wildlife
- Water quality run-off objectives in receiving water bodies have been met.

Baffinland will report on its Closure and Post-Closure Aquatic Monitoring and Reporting Program on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), the NWB (as per Type 'A' Water Licence 2AM-MYR-1325), AANDC Land Lease 47H/16-1-2, and the Land Owners (as per Commercial Lease Q13C301).

13.3.4 Environmental Site Assessment

The objective of the Environmental Site Assessment will be to determine areas of focus for final closure activities and to demonstrate conformance with CCME contaminated sites guidelines or site-specific risk-based criteria at the Mine Site, Milne Port, Tote Road and Steensby Port.

If not already done so, in the year prior to Final Closure activities (Year 0), Baffinland will commission an Environmental Site Assessment of project sites to help determine adequacy of Final Closure activities ability to meet closure criteria. Based on results, closure activities will be modified accordingly to ensure closure objectives are met. The year following completion of closure activities (Year 4), a second Environmental Site Assessment of project sites will be conducted to confirm CCME contaminated sites guidelines or site-specific risk-based criteria have been met. If results indicate CCME contaminated sites guidelines or site-specific risk-based criteria have not been met, additional closure activities will be performed as necessary to ensure closure objectives are achieved.

As indicated respectively by project component in TABLE 6-1, if Environmental Site Assessment results indicate a project component meets CCME contaminated sites guidelines or site-specific risk-based criteria, the project component will be considered to have met the following closure objectives:

- Will not be a source of contamination to the environment
- Impacts to the environment, fish, and wildlife, from localized areas of contamination that may be present have been minimized
- Any contaminated soils will be remediated to ensure they do not pose an unacceptable environmental risk.

Baffinland will report on any new Environmental Site Assessment results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

13.3.5 Post-Closure Fauna and Flora Monitoring

The objective of the Post-Closure Fauna and Flora Monitoring program will be to determine if Project areas encourage the desired re-growth of vegetation and wildlife movement upon completion of Final Closure activities. As noted in Section 2.3, Baffinland intends to establish a "Closure Working Group" and Baffinland expect this Closure Working Group to help drive desired wildlife movement and passive re-vegetation considerations upon completion of Final Closure activities.

Baffinland expects to commence the Post-Closure Fauna and Flora Monitoring program the second year following completion of closure activities (Year 5) incorporating lesson learned from Operations. This schedule was determined to allow for a one (1) year wildlife/vegetation activity normalization period between active Final Closure activities and Post-Closure monitoring activities to help ensure an accurate representation of abandonment conditions.

The Post-Closure Fauna and Flora Monitoring program is expected to be a focused program that's main objective will be develop evidence of use or occupation of key indicator species in the avian, terrestrial and marine environment for the Project area (visual sighting of species, bones, antlers, tracks, and trails, etc.). It is expected to be conducted by a team of two (2) experts for no more than (2) weeks accompanied by an associated Bear Monitor. For the flora, Baffinland will evaluate the re-vegetation of rehabilitated areas and conduct an invasive species assessment. Results of the first Post-Closure Fauna and Flora Monitoring period in Year 5 are anticipated to be confirmed using a similar, second period two (2) years after the first, in Year 7.

The Mary River Project FEIS assessed there to be negligible adverse residual effects post-closure to fauna and flora. Post-closure, the loss of vegetation will be reversed with natural re-vegetation and the residual effects on fauna species will gradually lessen with time as the project areas are naturally re-vegetated. The risk of invasive plant species colonizing the area is expected to be negligible however it will be monitored post-closure. The fauna and flora will be monitored throughout the life of mine with

various projects occurring during this time to assess the progressive rehabilitation of previously disturbed lands. See Section 5 for more detail on progressive rehabilitation and ongoing studies to assess the effectiveness of rehabilitation measures. As indicated respectively by project component in TABLE 6-1, if Post-Closure Fauna and Flora Monitoring program results indicate evidence of indicator species presence in the Project area, the project component will be considered to have met the following closure objective:

- Area encourages the desired wildlife movement upon site abandonment.

Baffinland will report on any new Post-Closure Fauna and Flora Monitoring program results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

13.3.5.1 Marine Environment

Discharges to the marine environment will be captured under the Closure and Post-Closure Aquatic Monitoring and Reporting Program (see Section 13.3.3).

The Marine Environmental Working Group (MEWG) will be functioning during the life of the Project to continually evaluate if there are any residual effects from Project activities on the marine environment at the Port. Based on current information that suggest effects on marine mammals is related to ship interaction, it is anticipated that there will be no significant residual effects at closure on the marine environment when ship interaction is removed. If operational monitoring indicates that the prediction of no significant residual effects at closure on the marine environment may be inaccurate, additional Post-Closure Marine Monitoring will be evaluated in the light of this new information.

13.3.6 Environmental Effects Monitoring Program (EEM)

Mandated by the Metal Mining Effluent Regulations (MMER), Schedule 5, the EEM Program focuses on determining if the discharge of mine contact water to the receiving environment will result in adverse environmental effects on the receiving streams and water bodies. As the locations of the mine contact water will not change after Final Closure (i.e. open pit water discharge, and, waste rock stockpile runoff discharge), it is expected the EEM component of the AEMP will remain unchanged until Baffinland has achieved the "Recognize Closed Mine" status under Section 4 of the MMER. Procedures for EEM monitoring are detailed in the AEMP (BAF-PH1-830-P16-0039) including sampling locations, number of samples for each location, frequency of sampling and methods of interpretation.

Baffinland expects to conduct the EEM Program annually during Final Closure activities (Year 1 to 3) to ensure component specific closure criteria are met. Post Closure confirmatory sampling would then be conducted the first year following completion of Final Closure activities (Year 4) and the third year following the completion of Final Closure activities (Year 6) to ensure closure objectives are met unless "Recognize Closed Mine" status under Section 4 of the MMER is achieved first. Although not anticipated

based on current monitoring results, this schedule was determined to ensure any potential environmental contamination is identified as early as possible so mitigation measures can be implemented if necessary.

For select project components as indicated respectively in TABLE 6-1, if EEM monitoring of effluent discharge quality is in compliance with MMER and the Project has achieved "Recognized Closed Mine" status as defined by Section (4) of MMER, the project component will be considered to have met the following closure objectives:

- Surface runoff and seepage water quality is safe for humans and wildlife
- No long-term active care is required.

Baffinland will report on any new EEM Program results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

13.3.7 Safety Compliance Inspection

The objective of the Safety Compliance Inspection will be to determine if project components are closed and reclaimed in compliance with the Northwest Territories (NT) and Nunavut (NU) Mine Health and Safety Act and Regulations, and the Explosives Use Act and Regulations. The Safety Compliance Inspection will be conducted by an Engineer/Inspector of Mines under the direction of the Chief Inspector of Mines working on behalf of the Workers' Safety and Compensation Commission (WSCC) of the Northwest Territories and Nunavut. Inspection frequency and scope will be established at the discretion of the Chief Inspector of Mines in consultation with Baffinland.

As indicated respectively by project component in TABLE 6-1, a satisfactory final inspection by Engineer/Inspector of Mines will mean a project component has met the following closure objective:

- Will not be a safety hazard to humans and wildlife.

Baffinland will report on any Safety Compliance Inspection results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 and its Amendment) and the Land Owners (as per Commercial Lease Q13C301).

13.3.8 Socio-economic Reporting

As per condition 149 of the Project Certificate No. 005, Baffinland published a Closure Scenario Report in September 2014 and submitted it to the Nunavut Impact Review Board (NIRB). The report examines the potential socio-economic and cultural impacts closure may have on Inuit employees and analysis of the risk of temporary and permanent mine closure.

Socio-economic and monitoring during closure will be governed by the following legislative drivers and agreements:

- The Nunavut Labour Standards Act
- Human Resources Skills and Development Canada's (HRSDC) Employment Insurance Regulations
- The Nunavut Agreement on Labour Market Development
- Canada-Nunavut Labour Market Agreement
- Inuit Impact and Benefit Agreement between the Qikiqtani Inuit Association and Baffinland.

In the event of permanent layoffs due to closure, under the Canada-Nunavut Agreement on Labour Market Development, Baffinland will engage with the Government of Nunavut to establish a Labour Market Partnership with the aim to develop and implement strategies for dealing with labour force adjustments. Under the Partnership Program a Joint Labour Adjustment Committee would be established to assist affected employees, a primary step being conducting a Needs Assessment to determine what labour adjustment issues have been addressed and determine appropriate programming required (e.g. job-search assistant, resume preparation, vocational counseling). Baffinland will also draw the on the expertise of the Mining Industry Human resources Council (MiHR) who has developed a Mining Workforce Transition Kit that may address the specific needs of employees and their communities.

Socio-economic reporting, as required by the Project Certificate and in accordance with articles of the Inuit Impacts and Benefits Agreement, will be reported on in the Annual Report to the Nunavut Impact Review Board and the Implementation Report for the IIBA for the life of the project.

13.3.9 Air Quality Monitoring

The objective of the Air Quality Monitoring program will be to determine if project components are closed and reclaimed in such a way that dust levels safe for people, vegetation, aquatic life and wildlife. Baffinland expects to do total suspended particulate (TSP) monitoring during the second year of closure activities (Year 2) incorporating lesson learned from operations. This schedule was determined to allow for one (1) year of baseline stabilization during closure activities to determine if any additional activities need to be conducted in the final year of closure (Year 3) to ensure objectives are met. TSP was selected to as particulate matter poses health concerns due to their ability to be inhaled and accumulate in the respiratory system. Small particulate matter (e.g. $PM_{2.5}$) also has the ability to behave in the atmosphere like a gas and due to is small particle size, can disperse over greater distances than larger sized particulates before deposition.

Air Quality Monitoring is expected to consist of up to five (5) sample locations using BAM-1020 or similar with a remote data logger for a period of no more than one (1) month during the summer months. It should be noted there are negligible residual effects expected during post-closure as dust is generated by crushing at the quarries and pit which will cease after enough cover material for closure has been

produced and the dust from closure activities will become negligible once the key Project areas have been rehabilitated.

As indicated respectively by project component in TABLE 6-1, if Air Quality Monitoring program results demonstrate Mean Total Suspended Particulate (TSP) concentrations less than 60 µg/m^3 annual and 120 µg/m^3 24 hr average (based on criteria stated in the Environmental Guideline for Ambient Air Quality, Department of Environment, Government of Nunavut, October 2011) or site-specific risk-based criteria are met, the project component will be considered to have met the following closure objective:

- Dust levels safe for people, vegetation, aquatic life and wildlife.

Baffinland will report on any new Air Quality Monitoring program results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

14 ESTIMATED CLOSURE AND RECLAMATION COSTS

Closure and reclamation costs for the Mary River Project are determined under the Annual Security Review (ASR) process conducted in accordance with Schedule C of the Type "A" Water Licence Amendment No. 1 2AM-MRY1325 and Commercial Lease No. Q13C301. Under the ASR process, Baffinland, the respective landowners (QIA & the Crown), the NWB, and other interested parties confer to determine the estimated closure and reclamation costs for an upcoming year on an annual basis. This approach allows for Baffinland to post financial security in incremental adjustments prior to the commencement of work. Publically available ASR document submissions for a respective year, describing in detail annual estimated closure and reclamation costs, can be downloaded from the NWB FTP site at: ftp.nwb-oen.ca, with Username: "public", and the Password: "registry", without the quotes.

14.1 Preliminary Mine Closure and Reclamation Plan Costs

Prior to commencement of the ASR process, which is the current overriding process to determine Project closure and reclamation costs, Baffinland's estimated closure and reclamation costs were established and outlined in the Preliminary Mine Closure and Reclamation Plan (Rev D, H337697-0000-07-126-0014) which was submitted as part of the Mary River Project FEIS (see FEIS Appendix 10G). Estimated costs and assumptions were made based on project design and costs available at the time of development using the Mining RECLAIM spreadsheet provided by Aboriginal Affairs and Northern Development Canada (AANDC). Details used to develop the Preliminary Mine Closure and Reclamation Plan (PCRP) Closure and Reclamation Cost Estimate are available within PCRP, Appendix B and C, and are summarized in the Section 14.1.2 for information purposes.

14.1.1 Addendum to PCRP Closure and Reclamation Cost Estimate

An addendum to the PCRP Closure and Reclamation Cost Estimate has been developed to support the Type 'A' Water License 2AM-MRY1325 amendment process for 2015. This addendum has been made using current and updated estimated closure and reclamation costs, established through the ASR process, for Milne Port and the Tote Road aggregated with estimated closure and reclamation costs for Mary River Mine Site, the Railway and Steensby Port that were presented in Baffinland's original submission of the PCRP in February 2012. The purpose of this addendum is to incorporate consideration of Baffinland's Early Revenue Phase to support the Type "A" Water License 2AM-MRY1325 amendment process. Details of the results of this process can be found in the following document: *Final Environmental Impact Statement (FEIS) Closure and Reclamation - Financial Security Estimate Addendum, H349001-0000-07-220-0001.*

Baffinland notes that the *Final Environmental Impact Statement (FEIS) Closure and Reclamation - Financial Security Estimate Addendum, H349001-0000-07-220-0001* does not override the ASR process and the ASR is still the governing process to determine reclamation financial security.

14.1.2 Summary of PCRP Closure and Reclamation Cost Estimate

The PCRP Closure and Reclamation Cost Estimate was developed using the Mining RECLAIM spreadsheet (ver 6) provided by Aboriginal Affairs and Northern Development Canada (AANDC) (formerly Department of Indian Affairs and Northern Development). The Mining RECLAIM spreadsheet model identifies several reclamation components:

- Open pit
- Waste Rock pile
- Buildings and Equipment
- Chemicals
- Water
- Mobilization
- Post Closure
- Ongoing water monitoring.

Several reclamation strategies ("Objectives") were listed for each component, and broken down into lists of actions that were priced separately. A unit cost spreadsheet provided a range of prices for actions which was completed where possible with the most accurate available or Project-specific costs at the time of estimate. To best estimate the total reclamation cost, some actions were modified or adapted to the strategies defined in the PCRP. The financial cost obtained was based on the information available at the time of publishing. Several assumptions and estimations have been made and are described in Appendix D of the PCRP. To make up for uncertainties, the highest prices of the range provided by the MINING RECLAIM unit costs spreadsheet were systematically chosen.

It should be noted this estimate of the financial cost of final closure and reclamation measures required for the fully developed Project as described in the original Mary River Project FEIS. It addresses Project-related activity areas and infrastructure related to the original the Project proposed in the FEIS including mobilization and post-closure monitoring. This estimate was intended to represent Baffinland's estimated closure and reclamation security for the Project, based on the information available at the time, at a planned closure scenario occurring at end of mine life.

14.1.2.1 Final Mine Closure Cost

MINING RECLAIM calculated the grand total capital costs required for the Project closure and reclamation. The cost was split into land and water liability. Additionally, the cost associated to Inuit Owned Land (IOL) and federal owned (Crown Land) was differentiated from north to south and therefore Milne Port, Tote Road, Mine Site, and the first 25 km of the Railway were attributed to IOL. The remaining section of the Railway and Steensby Port are located on federally owned land and were attributed to Crown Land. Costs relating to the infrastructure, equipments and remediation actions on

these sites were attributed to the corresponding category. Less tangible components, such as chemicals and soil management, water management and post-closure monitoring and maintenance were attributed on a basis of two thirds (2/3) to IOL and one third (1/3) to Crown Land. This was based on two of the main sites (Milne Port, Mine Site) being in IOL and one site (Steensby Port) located in Crown Land.

The Ultimate Project closure and reclamation cost, at the time of estimate, was $518,711,208. The break down between land and water liability and IOL/Crown Land is presented in TABLE 14-1.

TABLE 14-1: TOTAL COST AND BREAKDOWN FOR MARY RIVER PROJECT CLOSURE AND RECLAMATION

	Total Cost	Percentage	Land Liability	Water Liability
Inuit Owned Land	$411,234,800	79.2	$405,430,454	$6,106,421
Federal Owned Land	$107,476,408	20.7	$105,391,574	$2,160,637
Total	$518,711,208	100	$510,822,029	$8,267,058

15 LIST OF CONTRIBUTORS

This document has been prepared by Baffinland and a consultant team as follows:

Baffinland

- Erik Madsen – overall corporate responsibility
- Jim Millard – technical review
- Oliver Curran – technical review
- Fernand Beaulac – consultant advisor contributing to ICRP

Hatch Ltd.

- Kathryn Wherry – Senior review
- Adam Grzegorczyk – Lead author
- Tessa Mackay – Technical review
- Catalina Gonzalez – Technical design and development
- Shelley Potter – Technical design and development

16 CONCORDANCE TABLES

TABLE 16-1 has been prepared to characterize the content of the ICRP and updated with reference to this ICRP. The concordance table is consistent with the principles of the Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands ('the Policy') and structured in accordance with Appendix C of the QIA Security Policy (v3).

TABLE 16-1: QIA ABANDONMENT AND RECLAMATION POLICY FOR INUIT OWNED LANDS CONCORDANCE TABLE

Item	QIA Abandonment and Reclamation Policy for Inuit Owned Lands (v3)	Baffinland Response
1	Have **all** reports and plans including addendums and responses been submitted?	Yes
2	Are the submitted reports and plans executable standalone documents with adequate rational and detail?	Yes
3	Do all reports and plans contain appropriate referencing (document name, author, section, and page number) to **all** supporting information?	Yes
4	Do the reports and plans demonstrate a firm understanding, of QIA's *Guiding Principles on Reclamation* and provide rationale on how these principles have been satisfied?	Yes
5	Has IQ and consultation with Community Land and Resources Committee(s) been applied? Has the Tenant provided detailed community consultation records?	Closure and reclamation issues discussed at hearings related to the Project Certificate. Commitment to Mine Closure Working Group in the future to incorporate community input and IQ.
6	Are **all** the components that are considered in the abandonment and reclamation plan listed?	Yes
7	Does each component of the Project have an abandonment and reclamation objectives and criteria?	Yes
8	Has an A&R plan been provided with a financial security estimate?	Yes. Financial security estimate is conducted in accordance to Section 9.2 of Commercial Lease, No. Q13C301
9	Have Table 1, 2, 3 and 4 of Appendix B been used in completing the financial security estimate?	Yes – was adapted to suit project specific requirements.
10	Has evidence been provided to support the Policy assumptions for all reports and plans?	Yes

Table 16-2 has been prepared to show all the Project Certificate No. 005 commitments outlined in Appendix A of the Project Certificate that apply to this ICRP. Where the Project Certificate Terms and Conditions have requirements for Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post Closure Monitoring the requirements are dealt with by a current Management Plan that will be updated regularly throughout the life of the Project. These Management Plans will still be applicable during Closure and, as necessary, Post Closure Monitoring, however an initial post closure monitoring program has been outlined in this document to tie residual effects and proposed Post Closure Monitoring.

TABLE 16-2: NIRB PROJECT CERTIFICATE TERM AND CONDITIONS CONCORDANCE TABLE 4

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
2	Meteorology and Climate - Climate Change Validation and Studies	To provide feedback on the impacts that climate change might be having on the Project.	The Proponent shall provide the results of any new or revised assessments and studies done to validate and update climate change impact predictions for the Project and the effects of the Project on climate change in the Local Study Area and Regional Study Area as defined in the Proponent's Final Environmental Impact Statement.	1 – Climate Change	None planned at this time however any research conducted during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 13.3.9
3	Meteorology and Climate - Green House Gas Emissions	To confirm that the Proponent is exploring and implementing concrete steps to reduce greenhouse gases.	The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions.	1 – Climate Change	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program and any other initiatives taken to reduce greenhouse gas emissions during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 13.3.9
4	Climate Change - Consultation on Climate	To promote public awareness and engagement of affected groups.	The Proponent shall endeavor to include the participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research.	1 – Climate Change	Air Quality Monitoring Program Mine Closure Working Group	Both	Section 13.3.9 Section 2.3

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
5	Meteorology and Climate - Weather Monitoring Data	To provide families of employees with up to date information.	The Proponent shall endeavour to explore and implement reasonable measures to ensure that weather-related information for the various Project sites is readily accessible to the public on a continual basis throughout the life of the Project.	2 – Air Quality	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program will be provided during Annual Reporting	Both	Section 13.3.9
6	Meteorology and Climate – Emissions	To provide feedback on the Project's emissions.	The Proponent shall provide the results of any emissions calculations conducted to determine the level of sulphur dioxide (SO_2) emissions, nitrogen oxide (NOX) emissions and greenhouse gases generated by the Project using fuel consumption or other relevant criteria as a basis.	2 – Air Quality	Air Quality Monitoring Program	Both	Section 13.3.9
11	Air Quality - Incineration Management Plan	To mitigate impacts to air quality from incineration activities.	The Proponent shall develop and implement an Incineration Management Plan that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (2010).	2 – Air Quality	Waste Management Plan (carried over from Operations) will apply when incinerators in operation	Both	Section 9.9
14	Noise and Vibration - Noise and Vibration Monitoring	To mitigate noise and vibration at Project sites, especially living areas.	The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development.	3 – Noise and Vibration	Considered, however no monitoring proposed during closure and negligible residual effects expected.	Both	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
15	Noise and Vibration	To enhance public safety when travelling around the Project area.	Noise and Vibration Monitoring – The Proponent shall collaborate to the extent possible with the Qikiqtani Inuit Association and local Hamlet organizations when undertaking consultation with all affected communities regarding railway, tote road and marine shipping operations. During these consultations, it is recommended that the Proponent provide information including video, audio, and photographic representation as well as any other aids (i.e. models) that may enhance the general public's understanding of railway, tote road and marine shipping operations, as well as all safety considerations for members of the public who may be travelling around the project area.	3 – Noise and Vibration	When undertaking consultation with all affected communities, collaboration with the Qikiqtani Inuit Association and local Hamlet organizations performed via Mine Closure Working Group sessions.	Both	Section 2.3
17	Hydrology and Hydrogeology - Effluent Management	To prevent impacts to water bodies from effluent.	The Proponent shall develop and implement effectives measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment.	8 – Water Quality	Aquatic Monitoring Program Environmental Effects Monitoring Program	Both	Section 13.3.3 Section 13.3.6

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
18	Hydrology and Hydrogeology - Pit Lake Monitoring	To enhance predictions for mine site closure conditions.	The Proponent shall carry out continued analyses over time to confirm and update, accordingly, the approximate fill time for the mine pit lake identified in the FEIS.	8 – Water Quality 9 – Surface water and sediment quality	None. ICRP will be reviewed annually and updated regularly throughout the life of the Project to confirm and/or update, accordingly the approximate fill time for the mine pit lake identified in the FEIS.	IOL	Section 2.1.2.1
19	Hydrology and Hydrogeology - Water Infrastructure Monitoring	To mitigate impacts to natural water flow.	The Proponent shall ensure that it develops and implements adequate monitoring and maintenance procedures to ensure that the culverts and other conduits that may be prone to blockage do not significantly hinder or alter the natural flow of water from areas associated with the proposed mine. In addition, the Proponent shall monitor, document and report the withdrawal rates for water removed and utilized for all domestic and industrial purposes.	8 – Water Quality 9 – Surface water and sediment quality	Will be addressed in Annual Report.	Both	N/A
20	Groundwater/Surface Waters - Explosives	To ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the areas	The Proponent shall monitor the effects of explosives residue and related by-products from project-related blasting activities as well as develop and implement effective preventative and/or mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of	8 – Water Quality 9 – Surface water and sediment quality	None. Negligible once closure activities have ceased	N/A	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		surrounding the Project.	explosives do not negatively impact the Project and surrounding areas.				
24	Groundwater/Surface Waters – Effluent Management	To mitigate impacts to groundwater and surface waters from effluent	The Proponent shall monitor as required the relevant parameters of the effluent generated from Project activities and facilities and shall carry out treatment if necessary to ensure that discharge conditions are met at all times.	8 – Water Quality	Aquatic Monitoring Program	Both	Section 13.3.3
27	Landforms, Geology and Geomorphology – Natural Aesthetics	To mitigate impacts to natural aesthetics.	The Proponent shall include within its public consultation report information related to the sentiments expressed by affected communities about the impacts that changes to the topography and landscape have had on the aesthetic value of the Project area.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 13.3.2
28	Landforms, Geology and Geomorphology – Permafrost	To ensure that permafrost integrity is maintained.	The Proponent shall monitor the effects of the Project on the permafrost along the railway and all other Project affected areas and must implement effective preventative measures to ensure that the integrity of the permafrost is maintained.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 13.3.2

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
30	Landforms, Geology and Geomorphology – Quarries	To provide oversight on quarry design and management.	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 13.3.2
32	Vegetation – Construction and Operations	To prevent introduction of invasive species.	The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas.	5 – Vegetation	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
33	Vegetation – Monitoring	To facilitate monitoring.	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP).	5 – Vegetation	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
37	Vegetation – Monitoring	To prevent establishment of invasive species.	The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g. surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported	5 – Vegetation	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			to the Government of Nunavut Department of Environment.				
38	Vegetation – Adaptive Management	To mitigate impacts to vegetation abundance, diversity and health.	The Proponent shall review, on an annual basis, all monitoring information and the vegetation mitigation and management plans developed under its Environmental Management System, Terrestrial Environment and Monitoring Plan (TEMMP) and adjust such plans as may be required to effectively prevent or reduce the potential for significant adverse project effects on vegetation abundance, diversity and health.	5 – Vegetation	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
39	Vegetation – Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such program to incorporate measures for the use of test plots, reseeding and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.	5 – Vegetation	Progressive Rehabilitation Strategy Post-Closure Flora and Fauna Monitoring	Both	Section 5 Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
40	Vegetation – Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall include revegetation strategies in its Site Reclamation Plan that support progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.	5 – Vegetation	Progressive Rehabilitation Strategy Post-Closure Flora and Fauna Monitoring	Both	Section 5 Section 13.3.5
41	Freshwater Aquatic Environment – Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	Unless otherwise approved by regulatory authorities, the Proponent shall maintain a minimum 100-metre naturally-vegetated buffer between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching.	4 – Landforms, soil and permafrost 5 – Vegetation	Geotechnical/Engineering Monitoring	Both	Section 13.3.2
42	Freshwater Aquatic Environment – Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies.	4 – Landforms, soil and permafrost 5 – Vegetation	Geotechnical/Engineering Monitoring	Both	Section 13.3.2
44	Freshwater Aquatic Environment – Explosives	To mitigate impacts of explosives on freshwater aquatic habitat.	The Proponent shall meet or exceed the guidelines set by Fisheries and Oceans Canada for blasting thresholds and implement practical and effective measures to ensure that residue and by-products of blasting do not negatively affect fish and fish habitat.	8 – Water Quality	Aquatic Monitoring Program Environmental Effects Monitoring Program	Both	Section 13.3.3 Section 13.3.6

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
45	Freshwater Aquatic Environment – General	To mitigate impacts to freshwater aquatic habitat.	The Proponent 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.	10 – freshwater fish, fish habitat, and other aquatic organisms	Aquatic Monitoring Program Environmental Effects Monitoring Program	Both	Section 13.3.3 Section 13.3.6
46	Freshwater Aquatic Environment – Drainage	To mitigate impacts to freshwater aquatic habitat.	The Proponent shall ensure that runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities responsible for generating liquid effluent and runoff meet discharge requirements.	8 – Water Quality	Aquatic Monitoring Program Environmental Effects Monitoring Program	Both	Section 13.3.3 Section 13.3.6
49	Terrestrial Wildlife and Wildlife Habitat – Terrestrial Environment Working Group	The TEWG will provide direction and guidance to the Proponent regarding: adding to baseline information during construction and before project operations commence; monitoring and reporting regarding effects occurring during operations; and providing advice regarding changes	The Proponent shall establish a Terrestrial Environment Working Group ("TEWG") which will act as an advisory group in connection with mitigation measures for the protection of the terrestrial environment and in connection with its Environmental Effects Monitoring Program, as it pertains to the terrestrial environment. Members may consider the draft terms of reference for the TEWG filed in the Final Hearing, but they are not bound by them. The role of the TEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		that may be required to make sure the management of negative impacts is effective and that lasting damage is prevented.					
50	Terrestrial Wildlife and Habitat - General	To ensure appropriate and responsive adaptive management.	The Proponent shall continue to develop and implement Project-specific monitoring for the terrestrial environment, and will demonstrate appropriate refinements to design, incorporation of analytical methods and elaboration of methodologies. The monitoring plan shall contain clear thresholds to allow for the assessment of long-term trends and cumulative effects where project interactions are identified. Coordination and cooperation will be required where data collection, analysis and interpretation, or responsibility for mitigation and management requires the efforts of multiple parties (e.g., government, Qikiqtani Inuit Association, communities).	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
51	Terrestrial Wildlife and Habitat - General	To promote coordination of monitoring efforts.	The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating project-induced impacts. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions.	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
55	Terrestrial Wildlife and Habitat - Reporting	To mitigate potential impacts to wolves.	The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) to ensure compliance with the *Nunavut Wildlife Act.* Consideration must be given to the following: a. Monitoring for active wolf dens within a 10 km radius from the mine site, under the direction and prior approval of the GN DOE, and reporting the results through NIRB's Annual Reports on terrestrial wildlife in the Potential Development Area (PDA); b. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			such habitat as ecologically sensitive; c. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; and d. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development				
56	Terrestrial Wildlife and Habitat - Reporting		The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the *Nunavut Wildlife Act.* Overall, this will require the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics.	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
57	Terrestrial Wildlife and Habitat – Aircraft Disturbances	To mitigate and monitor for impacts to wildlife.	The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information: a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring. Reporting requirements will be addressed in Annual Report.	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; and h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.				

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
58	Terrestrial Wildlife and Habitat – Explosives	To mitigate and monitor for impacts to wildlife.	Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes: a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behavior and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails; c. A description of the extent of dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets; d. A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and dust fall contribute to cumulative effects of the project; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou	7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring. Reporting requirements will be addressed in Annual Report.	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available.				
59	Terrestrial Wildlife and Habitat – Operations (General)	To mitigate aircraft disturbance to wildlife and Inuit harvesting.	The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point to point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance. The Proponent, in collaboration with the Terrestrial	6 – Birds	Post-Closure Flora and Fauna Monitoring.	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			Environment Working Group shall develop a program or specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around project areas.				
61	Terrestrial Wildlife and Habitat – Public Engagement	To mitigate Project impacts to wildlife.	Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered by the work being carried out. An operational definition of 'endangered' shall be provided by the Terrestrial Environment Working Group.	6 – Birds 7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
62	Terrestrial Wildlife and Habitat – Waste Management	To prevent increased harvesting pressure on wildlife.	The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting.	None.	None.	N/A	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
63	Birds – Awareness	To keep communities up to date with Project operations.	The Proponent shall liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. At a minimum, The Proponent shall also meet annually in person with Hunters and Trappers Organizations to discuss wildlife monitoring and mitigation plans and address community concerns regarding wildlife interactions. The Proponent may be required to facilitate these meetings through payment of honoraria and meeting costs.	6 – Birds 7 – Terrestrial wildlife and habitat	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
64	Birds – Species at Risk	To prevent human-carnivore interactions.	The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures: a. Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and b. Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the	6 – Birds 7 – Terrestrial wildlife and habitat	Geotechnical/Engineering Monitoring	Both	Section 13.3.2

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).				
65	Birds – Species at Risk	To prevent disturbance to birds and bird habitat.	The Proponent shall ensure all employees working at project sites receive awareness training regarding the importance of avoiding known nests and nesting areas and large concentrations of foraging and moulting birds.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
66	Birds – Project Infrastructure	To prevent impacts to sensitive bird species.	If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
67	Birds – Construction/Clearing Activities	To prevent impacts to sensitive bird species.	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the Project.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
68	Birds – Construction/Clearing Activities	To prevent potential injuries to birds.	The Proponent shall ensure flashing red, red strobe or white strobe lights and guy-wire deterrents are used on communications towers established for the Project. Consideration should also be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.	6 – Birds	Geotechnical/Engineering Monitoring Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.2 Section 13.3.5
69	Birds – Flight Altitude Requirements	To prevent nesting by birds in active Project areas.	Prior to bird migrations and commencement of nesting, the Proponent shall identify and install nesting deterrents (e.g. flagging) to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
70	Birds – Flight Altitude Requirements	To prevent impacts to birds and nesting areas.	The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-	6 – Birds	Geotechnical/Engineering Monitoring Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.2 Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			specific guidelines and procedures to ensure bird's nests and their young are protected.				
71	Birds – Monitoring	To mitigate aircraft disturbance to birds.	Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: a. 650 m during point to point travel when in areas likely to have migratory birds b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
72	Birds – Monitoring	To mitigate aircraft disturbance to birds.	The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and made available for regulatory authorities such as Transport	None.	None.	N/A	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			Canada to monitor adherence and to follow up on complaints.				
73	Birds – Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the Qikiqtani Inuit Organization and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.	6 – Birds	Post-Closure Flora and Fauna Monitoring Mine Closure Working Group	Both	Section 13.3.5 Section 2.3
74	Birds – Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include: peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5
75	Birds – Monitoring	To assess the extent of terrestrial habitat loss.	The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project to verify impact predictions and provide updated estimates of the total project footprint.	6 – Birds	Post-Closure Flora and Fauna Monitoring	Both	Section 13.3.5

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
76	Marine Environment – Ice Breaking and Shipping	To mitigate potential impacts to the marine environment.	The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and indentify potential impacts of the Project on the marine environment.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
77	Marine Environment – Ice Breaking and Shipping	The MEWG will consult with, and provide advice and recommendations to the Proponent in connection with mitigation measures for the protection of the marine environment, monitoring of effects on the marine environment and the consideration of adaptive management plans. The role of the MEWG is not intended to either duplicate or to affect the exercise of regulatory	A Marine Environment Working Group ("MEWG") shall be established to serve as an advisory group in connection with mitigation measures for the protection of the marine environment, and in connection with the Project Environmental Effects Monitoring program, as it pertains to the marine environment. Membership on the MEWG will include the Proponent, Environment Canada, Fisheries and Oceans Canada, Parks Canada, the Government of Nunavut, the Qikiqtani Inuit Association, the Mittimatilik Hunters and Trappers Organization, and other agencies or interested parties as determined to be appropriate by these key members. Makivik Corporation shall also be entitled to membership on the MEWG at its election. The MEWG members may consider the draft terms of reference	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		authority by appropriate government agencies and departments.					
78	Marine Environment – Ice Breaking and Shipping	To obtain accurate and current ice information.	The Proponent shall update the baseline information for landfast ice using a long-term dataset (28 years), and with information on inter-annual variation. The analysis for pack and landfast ice shall be updated annually using annual sea ice data (floe size, cover, concentration) and synthesized and reported in the most appropriate management plan.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
79	Marine Environment – Shoreline Effects and Sediment Redistribution	To assist in the development of nautical charts for Canadian waters.	The Proponent shall provide the Canadian Hydrographic Services with bathymetric data and other relevant information collected in support of Project shipping where possible, to assist in the development of nautical charts for Canadian waters.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
87	Marine Environment – Ballast Water	To prevent invasive species introductions resulting from Project shipping.	The Proponent shall develop a detailed monitoring program at a number of sites over the long term to evaluate changes to marine habitat and organisms and to monitor for non-native introductions resulting from Project-related shipping. This program needs to be able to detect changes that may have biological consequences and should be initiated several years prior to any ballast water discharge into Steensby Inlet and Milne Inlet to collect sufficient baseline data and should continue over the life of the Project.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
89	Marine Environment – Ballast Water	To prevent impacts to marine water quality resulting from ballast water exchange.	The Proponent shall develop and implement an effective ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with applicable regulations and/or exceed those regulations if they are determined to be ineffective for providing the desired and predicted results. The ballast water	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			management program shall include, without limitation, a provision that requires ship owners to test their ballast water to confirm that it meets the salinity requirements of the applicable regulations prior to discharge at the Milne Port, and a requirement noting that the Proponent, in choosing shipping contractors will, whenever feasible, give preference to contractors that use ballast water treatment in addition to ballast water exchange.				
92	Marine Environment – Spill Prevention	To ensure adequate spill response capacity.	The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self sufficient manner.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
103	Marine Environment – Traffic Log and Shipping Information	To monitor effectiveness of mitigation of shipping impacts to marine wildlife.	The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including: a. A record of all ship tracks taken along both shipping routes covering the entire shipping season; b. When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; c. A comparison of recorded ship tracks to	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; d. An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and e. When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.				
106	Marine Environment – Shipboard Observers	To ensure that interactions with marine mammals and Project shipping activities are effectively monitored.	The Proponent shall ensure that shipboard observers are employed during seasons where shipping occurs and provided with the means to effectively carry out assigned duties. The role of shipboard observers in shipping operations should be taken into consideration during the design of any ore carriers purpose-built for the Project, with climate controlled stations and shipboard lighting incorporated to permit visual sightings by shipboard observers during all seasons and conditions. Any shipboard lighting incorporated should be in accordance with the *Canada Shipping Act, 2001's Collision Regulations*, and should not interfere with safe navigation of the vessel.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
113	Marine Environment – Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet	The Proponent shall conduct monitoring of marine fish and fish habitat, which includes but is not limited to, monitoring for Arctic Char stock size and health condition in Steensby Inlet and Milne Inlet, as recommended by the Marine Environment Working Group.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
114	Marine Environment – Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.	In the event of the development of a commercial fishery in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas, the Proponent, in conjunction with the Marine Environment Working Group, shall update its monitoring program for marine fish and fish habitat to ensure that the ability to identify Arctic Char stock(s) potentially affected by Project activities and monitor for changes in stock size and structure of affected stocks and fish health (condition, taste) is maintained to address any additional monitoring issues identified by the MEWG relating to the commercial fishery.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
120	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals associated with Project shipping.	The Proponent shall ensure that, subject to vessel and human safety considerations, all project shipping adhere to the following mitigation procedures while in the vicinity of marine mammals: a. Wildlife will be given right of way; b. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior; and c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
121	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall immediately report any accidental contact by project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada respectively, by notifying the appropriate regional office of the: a. Date, time and location of the incident; b. Species of marine mammal or seabird involved; c. Circumstances of the incident; d. Weather and sea conditions at the time; e. Observed state of the marine mammal or sea bird colony after the incident; and, f. Direction of travel of the marine	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			mammal after the incident, to the extent that it can be determined				
122	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall summarize and report annually to the NIRB regarding accidental contact by project vessels with marine mammals or seabird colonies through the applicable monitoring report.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
123	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall provide sufficient marine mammal observer coverage on project vessels to ensure that collisions with marine mammals and seabird colonies are observed and reported through the life of the Project. The marine wildlife observer protocol shall include, but not be limited to, protocols for marine mammals, seabirds, and environmental conditions and immediate reporting of significant observations to the ship masters of other vessels along the shipping route, as part of the adaptive management program to address any items that require immediate action.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
124	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and marine fish populations from increased harvesting pressures in Project areas.	The Proponent shall prohibit project employees from recreational boating, fishing, and harvesting of marine wildlife in project areas, including Steensby Inlet and Milne Inlet. The Proponent is not directed to interfere with harvesting by the public in or near project areas, however, enforcement of a general prohibition on harvesting in project areas by project employees during periods of active employment (i.e. while on site and between work shifts) is required.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
125	Marine Environment – Public Engagement	To assess acceptability of acoustic deterrent devices for the general public.	Prior to use of acoustic deterrent devices, the Proponent shall carry out consultations with communities along the shipping routes and nearest to Steensby Inlet and Milne Inlet ports to assess the acceptability of these devices. Feedback received from community consultations shall be incorporated into the appropriate mitigation plan.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
125 a	Marine Environment – Public Engagement	To ensure public acceptability of project vessel anchor sites and reduce potential conflicts between project marine shipping and local harvesting.	The Proponent shall consult with potentially-affected communities and groups, particularly Hunters' and Trappers' Organizations regarding the identification of project vessel anchor sites and potential areas of temporary refuge for project vessels along the shipping routes within the Nunavut Settlement Area. Feedback received from community consultations shall be incorporated into the most appropriate mitigation or management plans.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
127	Marine Environment – Public Engagement	To promote public awareness and engagement with Project shipping activities.	The Proponent shall ensure that communities and groups in Nunavik are kept informed of project shipping activities and are provided with opportunity to participate in the continued development and refinement of shipping related monitoring and mitigation plans.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
128	Marine Environment – Public Engagement	To ensure habitat compensation is acceptable to local communities.	The Proponent shall consult with local communities as fish habitat off-setting options are being considered and demonstrate its incorporation of input received into the design of the Fish Habitat Off-Setting Plan required to offset the Harmful Alteration, Disruption or Destruction of Fish and Fish Habitat (HADD).	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
129	Population Demographics – Qikiqtaaluk Socio-Economic Monitoring Committee	Description of the general monitoring framework to be developed in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee.	The Proponent is strongly encouraged to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee along with other agencies and affected communities, and it should endeavor to identify areas of mutual interest and priorities for inclusion into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities, and the North Baffin region as a whole.	N/A - Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8
130	Population Demographics – Project-specific monitoring	Recognizing that some Project-specific socio-economic monitoring initiatives may be best addressed in smaller more focused working groups, this is encouraged where	The Proponent should consider establishing and coordinating with smaller socio-economic working groups to meet Project specific monitoring requirements throughout the life of the Project.	N/A - Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		possible.					
131	Population Demographics – Monitoring demographic changes	To monitor demographic changes affecting the North Baffin communities and the territory as a whole in order to understand changes and to evaluate the Proponent's predictions as related to population demographics.	The Qikiqtaaluk Socio-Economic Monitoring Committee is encouraged to engage in the monitoring of demographic changes including the movement of people into and out of the North Baffin communities and the territory as a whole. This information may be used in conjunction with monitoring data obtained by the Proponent from recent hires and/or out-going employees in order to assess the potential effect the Project has on migration.	N/A - Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
132	Population Demographics – Training programs	To develop training programs in ways which contribute to limiting the potential for migration to occur as North Baffin residents seek training and employment opportunities in the larger centre of Iqaluit.	The Proponent is encouraged to partner with other agencies such as Hamlet organizations in the North Baffin region, the Municipal Training Organization, and the Government of Nunavut in order to adapt pre-existing, or to develop new programs which encourage Inuit to continue living in their home communities while seeking ongoing and progressive training and development. Programs may include driver training programs offered within Hamlets, providing upgraded equipment to communities for use in municipal works, providing incentives for small businesses to remain operating out of their community of origin, or supplementing existing recreational facilities and programming in North Baffin communities.	N/A - Related to Education and Training	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8
133	Population Demographics – Monitoring demographic changes	Training programs may be developed with the goal of limiting the potential for migration to occur as North Baffin residents may choose to seek employment and therefore move from smaller North	The Proponent is encouraged to work with the Qikiqtaaluk Socio-Economic Monitoring Committee and in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders, design and implement a voluntary survey to be completed by its employees on an annual basis in order to identify changes of address, housing status (i.e. public/social, privately	N/A - Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		Baffin communities to the larger centre of Iqaluit.	owned/rented, government, etc.), and migration intentions while respecting confidentiality of all persons involved. The survey should be designed in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders. Non-confidential results of the survey are to be reported to the Government of Nunavut and the NIRB.				
134	Population Demographics – Employee origin	Project-specific information regarding employee origin is important to comparing predictions of labour availability and employment opportunities with actual levels of employment from various demographic segments over different geographic areas.	The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows: a. The number of Inuit and non-Inuit employees hired from each of the North Baffin communities, specifying the number from each; b. The number of Inuit and non-Inuit employees hired from each of the Kitikmeot and Kivalliq regions, specifying the number from each; c. The number of Inuit and non-Inuit employees hired from a southern location or other province/territory outside of Nunavut, specifying the locations and the number from each; and d. The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire.	N/A - Related to Population demographics	Included in Annual Report to NIRB and the Annual IIBA Implementation Report	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
145	Livelihood and Employment – Barriers to employment for women	To monitor and understand the existence of barriers to employment for women specifically relating to childcare availability and costs.	The Proponent is encouraged to work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor the barriers to employment for women, specifically with respect to childcare availability and costs.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8
146	Livelihood and Employment – Availability of childcare for Project employees	To lessen the barriers to employment as relating to the availability of childcare.	The Government of Nunavut and the Qikiqtani Inuit Association are strongly encouraged to investigate the possibility for Project revenue streams to support initiatives or programs which offset or subsidize childcare for Project employees.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8
147	Livelihood and Employment – Affordability of housing	To lessen the barriers to maintaining employment as relating to the availability and costs of housing.	The Proponent is encouraged to work with the Government of Nunavut and the Nunavut Housing Corporation to investigate options and incentives which might enable and provide incentive for employees living in social housing to maintain employment as well as to negotiate for and obtain manageable rental rates.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
152	Economic Development and Self-Reliance, and Contracting and Business Opportunities – IIBA contract requirements	To improve ability of small businesses to access Project contract and sub-contract opportunities.	The Qikiqtani Inuit Association is encouraged to provide the Board and the Qikiqtaaluk Socio-Economic Monitoring Committee with information regarding the effectiveness of any provisions within the Inuit Impact and Benefit Agreement which may require that larger contracts be broken down into smaller size in order that they are reasonably managed by smaller businesses in the North Baffin region, while respecting any confidential or privileged information.	N/A – Related to Economic Development and Self-Reliance	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure.	Both	Section 13.3.8
153	Human Health and Well-Being – Employee and family health and well-being	To provide adequate medical services on site, including those that contribute to the mental health and well-being of all employees.	The Proponent is encouraged to employ a mental health professional to provide counseling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being.	N/A – Related to Human health and well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Closure Working Group closer to mine Closure	Crown	Section 13.3.8
154	Human Health and Well-being – Indirect impacts to health and well-being	To understand the indirect impacts of the Project upon health and well-being.	The Proponent shall work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor potential indirect effects of the Project, including indicators such as the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates,	N/A – Related to Human health and well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
			and others as deemed appropriate.				
156	Human Health and Well-Being – Support initiatives	To assist with fostering well-being within point-of-hire communties.	The Proponent is encouraged to assist with the provision and/or support of recreation programs and opportunities within the potentially affected communities in order to mitigate potential impacts of employees' absences from home and community life.	N/A – Related to Human health and well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8
157	Human Health and Well-Being – Counseling and treatment programs	To make available, necessary treatment and counseling services for employee and family well-being.	The Proponent should consider providing counseling and access to treatment programs for substance and gambling addictions as well as which address domestic, parenting, and marital issues that affect employees and/or their families.	N/A – Related to Human health and well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
158	Community Infrastructure and Public Services – Impacts to health services	To monitor indirect Project impacts to health and social services provided by the Government of Nunavut.	The Proponent is encouraged to work with the Government of Nunavut and other parties as deemed relevant in order to develop a Human Health Working Group which addresses and establishes monitoring functions relating to pressures upon existing services and costs to the health and social services provided by the Government of Nunavut as such may be impacted by Project-related in-migration of employees, to both the North Baffin region in general, and to the City of Iqaluit in particular.	N/A - Related to Community infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 13.3.8
159	Community Infrastructure and Public Services – Impacts to infrastructure	To monitor Project-related impacts to infrastructure within the Local Study Area communities.	The Proponent is encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increased Project-related pressures to community infrastructure in the Local Study Area communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit.	N/A - Related to Community infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 13.3.8
160	Community Infrastructure and Public Services – Distribution of benefits	To ensure the distribution of benefits is done in a way that off-sets Project-related impacts to infrastructure or services.	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure in a broad sense, that Project benefits	N/A - Related to Community infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
161	Community Infrastructure and Public Services – Policing	To ensure the territorial government and its policing service are adequately prepared to handle any Project-related increases to the need for service and associated impacts.	The Government of Nunavut should be prepared for any potential increased need for policing, and ensure that the Royal Canadian Mounted Police is prepared to handle ongoing Project-related demographic changes and subsequent crime prevention that may be needed as a result of the development, operation, and closure of the Project.	N/A - Related to Community infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 13.3.8
162	Culture, Resources and Land Use – Public consultation	To ensure the ongoing and consistent involvement of Elders and community members in developing and revising monitoring and mitigation plans.	The Proponent should make all reasonable efforts to engage Elders and community members of the North Baffin communities in order to have community level input into its monitoring programs and mitigative measures, to ensure that these programs and measures have been informed by traditional activities, cultural resources, and land use as such may be implicated or impacted by ongoing Project activities.	N/A - Related to Cultural resources and Land use	Will be addressed by the Community Working Group and the Closure Working Group closer to mine Closure	Both	Section 13.3.8
163	Culture, Resources and Land Use – Public consultation	To involve communities in the development and evolution of management and monitoring plans.	The Proponent shall continue to engage and consult with the communities of the North Baffin region in order to ensure that Nunavummiut are kept informed about the Project activities, and more importantly, in order that the Proponent's management and monitoring plans continue to evolve in an informed manner.	N/A - Related to Cultural resources and Land use	Will be addressed by the Community Working Group and the Socio-Economic Monitoring Committee and the Closure Working Group loser to mine Closure	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
164	Socio-Economic Impacts – Shipping notification	In order to inform members of North Baffin communities of planned Project shipping transits such that community members' planned travel routing may be adjusted to avoid interaction with Project ships and/or ship tracks.	The Proponent is required to provide notification to communities regarding scheduled ship transits throughout the regional study area including Eclipse Sound and Milne Inlet, real-time data regarding ships in transit and any changes to the proposed shipping schedule to the MEWG and agencies within Pond Inlet on a weekly basis during open water shipping, and to the RSA communities on a monthly basis.	N/A - Related to Cultural resources and Land use	Part of already established Marine safety protocols on site and though IIBA Implementation.	Both	Section 13.3.8
165	Socio-Economic Impacts – Emergency shelters	In order to provide for human safety precautions in the event of adverse weather or other emergency situations along segments of linear transportation infrastructure.	The Proponent is strongly encouraged to provide buildings along the rail line and Milne Inlet Tote Road for emergency shelter purposes, and shall make these available for all employees and any land users travelling through the Project area. In the event that these buildings cannot, for safety or other reasons be open to the public, the Proponent is encouraged to set up another form of emergency shelters (e.g. seacans outfitted for survival purposes) every 1 kilometre along the rail line and Milne Inlet Tote Road. These shelters must be placed along Tote Road and rail routing prior to operation of either piece of infrastructure, and must be maintained for the duration of project activities, including the closure phase.	n/a	Part of already established Marine safety protocols on site. Will be addressed by the Community Working Group	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
166	Socio-Economic Impacts – Public Consultation	To ensure members of the public are able to access shipping information on an as-required basis in order to inform potential users of the scheduled Project activities which could require deviations to land users' schedules or routing.	The Proponent should ensure through its consultation efforts and public awareness campaigns that the public have access to shipping operations personnel for transits into and out of both Steensby Inlet port and Milne Inlet port either via telephone or internet contact, in order that any questions regarding ice conditions or ship movements that could assist ice users in preparing for travel may be answered by Project staff in a timely fashion.		Part of already established Marine safety protocols on site	Both	Section 13.3.8
168	Governance and Leadership – Monitoring program	Outline variables that are relevant to the Project and which should be adopted by the QSEMC's monitoring program.	The specific socioeconomic variables as set out in Section 8 of the Board's Report, including data regarding population movement into and out of the North Baffin Communities and Nunavut as a whole, barriers to employment for women, project harvesting interactions and food security, and indirect Project effects such as substance abuse, gambling, rates of domestic violence, and education rates that are relevant to the Project, be included in the monitoring program adopted by the Qikiqtani Socio-Economic Monitoring Committee.	N/A – Related to Governanc e and leadership	Will be addressed by the Socio-Economic Monitoring Committee closer to mine Closure	Both	Section 13.3.8
169	Governance and Leadership – Monitoring	To maintain transparency inform communities in	The Proponent provide an annual monitoring summary to the NIRB on the monitoring data related to the regional	N/A – Related to Governanc	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 13.3.8

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
	economic effects	relation to economic benefits associated with the Project.	and cumulative economic effects (positive and negative) associated with the Project and any proposed mitigation measures being considered necessary to mitigate the negative effects identified.	e and leadership	closer to mine Closure		
175	Accidents and Malfunctions – Ship track markers in ice cover	To ensure that measures taken to mark the shipping track(s) during periods of ice cover are effective in advising ice-based travelers, and that, where necessary, revisions to this practice can be made to ensure public safety.	The Proponent shall, in coordination and consultation with the Qikiqtani Inuit Association and the Hunters and Trappers Organizations of the North Baffin communities and Coral Harbour, provide updates to its Shipping and Marine Mammals Management Plan to include adaptive management measures it proposes to take should the placement of reflective markers along the ship track in winter months not prove to be a feasible method of marking the track to ensure the safety of ice-based travelers.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
177	Accidents and Malfunctions – Foreign flagged vessels	To ensure foreign flagged ships operating in Canadian waters are held to the same standard as domestic ships with regard to emergency response planning.	The Proponent shall enroll any foreign flagged vessels commissioned for Project-related shipping within Canadian waters into the relevant foreign program equivalent to Transport Canada's Marine Safety Delegated Statutory Inspection Program.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
180	Transboundary Effects – Makivik Corporation involvement in the Marine Environment Working Group	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	The Marine Environment Working Group established for this Project shall invite a representative from Makivik Corporation to be a member of the Group	N/A - Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A
181	Transboundary Effects – Marine Environment Working Group reporting	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	Regardless of whether Makivik Corporation participates as a member of the Marine Environment Working Group, the Marine Environment Working Group will provide Makivik Corporation with regular updates regarding the activities of the Marine Environment Working Group throughout the Project life cycle.	N/A - Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
182	Transboundary Effects – Reporting to Marine Environment Working Group (MEWG)	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	Baffinland shall make available to Makivik Corporation any ship route deviation reports provided to the NIRB in accordance with the terms and conditions set out in Section 4.12.4 of the Final Hearing Report.	N/A - Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A

TABLE 16-3 has been prepared to show concordance with Part J, Number 2 of the Type 'A' Water Licence, 2AM-MRY1325.

TABLE 16-3: TYPE 'A' WATER LICENCE 2AM-MRY1325 AMENDMENT NO.1, PART J, ITEM 2

TYPE 'A' WATER LICENCE 2AM-MRY1325, Schedule J	ICRP Section
a. Detailed description, including maps and other visual representations, of the preconstruction conditions for each site, accompanied by a detailed description of the proposed final landscape, with emphasis on the reclamation of surface drainage over the restored area;	4 & 12
b. A description of how progressive reclamation will be employed and monitored throughout the life of the mine, plus reclamation scheduling and coordination of activities with the overall sequence of the project; details of reclamation scheduling and procedures for coordinating reclamation activities within the overall mining sequence and materials balance;	5
c. Implications of any updated water balance and water quality model prediction results and any adaptive management measures that may be required;	9.2, 9.11.3, & 9.13
d. An evaluation of closure and reclamation measures for each mine component, including the goals, objectives, closure criteria and the rationale for selection of the preferred measures;	TABLE 6-1
e. A comprehensive assessment of materials suitability, including geochemical and physical characterization and a schedule of availability for reclamation needs. Particular attention shall be given to cover materials, including maps showing sources and stockpile locations of all reclamation construction materials;	9.10.1
f. An assessment and description of any required post-closure treatment for pit water that is not acceptable for discharge, taking into consideration further studies completed and updated modeling information;	9.2
g. Contingency measures for all reclamation components including action thresholds that are linked to the monitoring programs;	9
h. Monitoring programs to assess reclamation performance and environmental conditions including monitoring locations for surface water and Ground Water, parameters;	13
i. Monitoring schedules and overall timeframes;	13
j. QA/QC procedures for managing the demolition landfill and other waste disposal areas;	9.9.1
k. A list of non-salvageable materials and disposal locations;	9.3, 9.5, & 9.9
l. Rock storage facility closure design plans and sections including the types of material placed and volumes;	9.11

TYPE 'A' WATER LICENCE 2AM-MRY1325, Schedule J	ICRP Section
m. Protocol for the disposal of any contaminated soil;	9.10
n. An assessment of the Long-term physical stability of all remaining project components;	TABLE 6-1
o. A revised closure and reclamation cost estimate; and	14
p. A detailed implementation schedule for completion of reclamation work	TABLE 6-1

17 GLOSSARY OF TERMS, ACRONYMS, OR ABBREVIATIONS

17.1 GLOSSARY OF TERMS

Term	Meaning
Abandonment	The permanent dismantlement of a facility so it is permanently incapable of its intended use. This includes the removal of associated equipment and structures.
Acid-Base Accounting (ABA)	Acid-Base Accounting (ABA) is a screening procedure whereby the acid-neutralizing potential and acid-generating potential of rock samples are determined.
Acid generating (AG)	Production of acidity irrespective of its effect on the adjacent pore water or whether the material is net acid producing or neutralizing.
Acid rock drainage (ARD)	Acidic drainage stemming from open pit, underground mining operations, waste-rock or tailings facilities that contains free sulphuric acid and dissolved metals sulphate salts, resulting from the oxidation of contained sulphide minerals or additives to the process. The acid dissolves minerals in the rocks, further changing the quality of the drainage water.
Acid Potential (AP)	Maximum potential acid generation from a sample. The calculation of AP (or MPA) is an integral part of acid/base accounting.
Acidity	Measure of the capacity of a solution to neutralize a strong base.
Active layer	The layer of ground above the permafrost which thaws and freezes annually.
Alkalinity	Measure of the capacity of a solution to neutralize a strong acid.
Backfill	Material excavated from a site and reused for filling the surface or underground void created by mining. Reinsertion of materials in extracted part(s) of the ore body. Materials used for backfilling can be waste-rock or overburden. In most cases backfill is used to refill mined-out areas in order to: • Assure ground stability. • Prevent or reduce underground and surface subsidence. • Provide roof support so that further parts of the ore body can be extracted and to increase safety. • Provide an alternative to surface disposal. and • Improve ventilation.
Background	An area near the site under evaluation not influenced by chemicals released from the site, or other impacts created by onsite activity.
Baseline	A surveyed condition and reference used for future surveys.
Benign	Having little or no detrimental effect.
Berm	A mound or wall, usually of earth, used to retain substances or to prevent substances from entering an area.
Best Management Practices	Any program, technology, process, operating method, measure, or device that controls, prevents, removes, or reduces pollution and impact on the environment.
Biodiversity	The variety of plants and animals that live in a specific area.

Term	Meaning
Bioremediation	The use of microorganisms or vegetation to reduce contaminant levels in soil or water.
Borrow Pit	A source of fill or embanking material.
Care and Maintenance	A term to describe the status of a mine when it undergoes a temporary closure.
Closure	When a mine ceases operations without the intent to resume mining activities in the future.
Closure Criteria	Detail to set precise measures of when the objective has been satisfied.
Closure Goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens all closure objectives have been satisfied. By its nature, the closure goal is a broad, high-level statement and not directly measurable.
Closure Principles	A fundamental basis for the selection of closure objectives.
Closure Objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles.
Comminution	Size reduction of an ore by crushing and/or grinding to such a particle size that the product is a mixture of relatively clean particles of mineral and gangue. In order to produce a relatively pure concentrate, it is necessary to grind the ore fine enough to liberate the desired minerals.
Contaminant	Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.
Contouring	The process of shaping the land surface to fit the form of the surrounding land.
Cumulative Effects	The combined environmental impacts that accumulate over time and space as a result of a series of similar or related actions or activities.
Crushing	Comminution process that reduces the particle size of run-of-mine ore to such a level that grinding can be carried out. This is accomplished by compression of ore against rigid surfaces, or by impact against surfaces in rigidly constrained motion path.
Cryoconcentration	Concentration of solutes due to exclusion by ice.
Decommissioning	Process by which a mining operation is shut down i.e.: permanently closing a site. removing equipment, buildings and structures. Rehabilitation and plans for future maintenance of affected land and water are also included.
Dewatering	Process of removing water from an underground mine or open pit, or from the surrounding rock or non-lithified area. The term is also commonly used for the reduction of water content in concentrates, tailings and treatment sludges.
Disposal	The relocation, containment, treatment or processing of unwanted materials or materials that are not reusable. This may involve the removal of contaminants or their conversion to less harmful forms.
Drainage	Manner in which the waters of an area exist and move, including surface streams and groundwater pathways. A collective term for all concentrated and diffuse water flow.

Term	Meaning
Drainage Chemistry	Concentrations of dissolved components in drainage, including element concentrations, chemical species and other aqueous chemical parameters.
Effluent	Treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant.
End Land Use	The allowable use of disturbed land following reclamation. Municipal zoning and/or approval may be required for specific land uses.
Environment	Interrelated physical, chemical, biological, social, spiritual and cultural components that affect the growth and development of living organisms.
Erosion	The wearing away of rock, soil or other surface material by water, rain, waves, wind or ice, the process may be accelerated by human activities.
Evaporation	Physical process by which a liquid is changed into a gas.
Existing Operation	An installation in operation or, in accordance with legislation existing before the date on which this Directive is brought into effect, an installation authorized or in the view of the competent authority the subject of a full request for authorization, provided that that installation is put into operation no later than one year after the date on which this Directive is brought into effect.
Frost Heave	Annual ground displacements and differential ground pressures due to the freezing of water within soils.
Geochemistry	Science of the chemistry of geological materials and the interaction between geological materials with the environment.
Geology	Study of the earth, its history and the changes that have occurred or are occurring, and the rocks and non-lithified materials of which it is composed and their mode of formation and transformation.
Grade	Dimensionless proportion of any constituent in an ore, expressed often as a percentage, grams per tonne (g/t) or parts per million (ppm).
Ground Thermal Regime	Temperature conditions below the ground surface. A condition of heat losses and gains from geothermal sources and the atmosphere.
Groundwater	All subsurface water that occurs beneath the water table in rocks and geologic formations that are fully saturated. Distinct from surface water.
Humidity Cell Test	Kinetic test procedure used primarily to measure rates of acid generation and neutralization in sulphide-bearing rock.
Hydrogeology	Science of the groundwater circuit (interrelationship of geologic materials and processes with water).
Hydrology	The science that deals with water, its properties, distribution and circulation over the Earth's surface.
Inert Waste	Material having insignificant leachability and pollution content which will not require laboratory analysis.
Infiltration	Entry of water into a porous substance.
Inukshuk	A stone representation of a person, used as a milestone or directional marker by the Inuit of the Canadian Arctic.

Term	Meaning
In Situ Treatment	A method of managing or treating contaminated soils, sludges and waters "in place" in a manner that does not require the contaminated material to be physically removed or excavated from where it originated.
Landfill	An engineered waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.
Leachate	Solution obtained by leaching e.g. water that has percolated through soil containing soluble substances and that contains certain amounts of these substances in solution.
Leaching	Passage of a solvent through porous or crushed material in order to extract components from the liquid phase. For example, gold can be extracted by heap leaching of a porous ore, or pulverized tailings. Other methods are tank leaching of ore, concentrates or tailings and in-situ leaching.
Lithology	Composition of rocks, including physical and chemical characteristics such as colour, mineralogical composition, hardness and grain size.
Migration	The movement of chemicals, bacteria, and gases in flowing water or vapour.
Mineral Resource	Concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.
Mining	Methods and techniques to extract ore from the ground, including support facilities (e.g. stockpiles, workshops, transport, ventilation) and supporting activities in the mine itself or in the vicinity.
Mining Operation	Any extraction of ore from which mineral substances are taken, where the corporate intent is to make an operating profit or build continuously toward a profitable enterprise.
Mitigation	The process of rectifying an impact by repairing, rehabilitating or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments.
Monitoring	Observing the change in geophysical, hydrogeological or geochemical measurements over time. Process intended to assess or to determine the actual value and the variations of an emission or another parameter, based on procedures of systematic, periodic or spot surveillance, inspection, sampling and measurement or another assessment methods intended to provide information about emitted quantities and/or trends for emitted pollutants.
Naturally Re-vegetate or Natural Re-vegetation	For the purposes of the Mary River Project natural re-vegetation will include 225 Hypersthenes and covering with overburden as required and allowing the surrounding natural vegetation to encroach and be re-established on the disturbed area.

Term	Meaning
Neutralization	Raising the pH of acidic solutions or lowering the pH of alkaline solutions to near-neutral pH (about pH 7) values through a reaction in which the hydrogen ion of an acid and the hydroxyl ion of a base combine to form water.
Neutralization Potential (NP)	General term for a sample's or a material's capacity to neutralize acidity.
Objectives	Objectives describe what the reclamation activities are aiming to achieve. The goal of mine closure is to achieve the Long-term objectives that are selected for the site.
Open Pit Mining	Mining operation takes place on the surface. Mining operation and environment are in contact over an extended area.
Operator	Any natural or legal person that is responsible for the control, operation, and maintenance of the mine, mineral processing plant, tailings dam and/or related facilities including the after-closure phases.
Ore	Mineral or variety of accumulated minerals of sufficient value as to quality and quantity that it/they may be mined at a profit. Most ores are mixtures of extractable minerals and extraneous rocky material.
Orebody (mineral deposit)	Naturally occurring geological structure consisting of an accumulation of a desired mineral and waste-rock, from which the mineral can be extracted, at a profit, or with a reasonable expectation thereof.
Overburden	Layer of natural grown soil or massive rock on top of an orebody. In case of open pit mining operations it has to be removed prior to extraction of the ore
P	Phosphate
Passive Treatment	Treatment technologies that can function with little or no maintenance over long periods of time.
Permafrost	Ground that remains at or below zero degrees Celsius for a minimum of two consecutive years.
Permafrost Aggradation	A naturally or artificially caused increase in the thickness and/or area extent of permafrost.
Permeability	The ease with which gases, liquids, or plant roots penetrate or pass through soil or a layer of soil. The rate of permeability depends upon the composition of the soil.
Phreatic Surface	The term phreatic is used in Earth sciences to refer to matters relating to ground water below the water table (the word originates from the Greek phrear, phreat- meaning "well" or "spring"). The term 'phreatic surface' indicates the location where the pore water pressure is under atmospheric conditions (i.e. the pressure head is zero). This surface normally coincides with the water table.
Potentially Acid Generating (PAG)	Rock or overburden material that has the potential to produce acidity irrespective of its effect on the adjacent pore water or whether the material is net acid producing or neutralizing.
Progressive Reclamation	Actions that can be taken during mining operations before permanent closure, to take advantage of cost and operating efficiencies by using the resources available from mine operations to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the reclamation objectives and goals.

Term	Meaning
Primary Crushing	Process of reducing ore into smaller fragments to prepare it for further processing and/or so that it can be transported to the processing plant. In underground mines, the primary crusher is often located underground, or at the entrance to the processing plant.
Quarry	Whole area under the control of an operator carrying out any activity involved in the prospecting, extraction, treatment and storage of minerals, including common related infrastructures and waste management activities, being not a mine. It is distinguished from a mine because it is usually open at the top and front, and used for the extraction of building stone, such as slate, limestone, gravel and sand.
Reclamation	The process of returning a disturbed site to its natural state or one for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
Rehabilitation	Activities to ensure that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.
Remediation	The removal, reduction, or neutralization of substances, wastes or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.
Restoration	The renewing, repairing, cleaning-up, remediation or other management of soil, groundwater or sediment so that its functions and qualities are comparable to those of its original, unaltered state.
Re-vegetation	Replacing original ground cover following a disturbance to the land.
Risk Assessment	Reviewing risk analysis and options for a given site, component or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.
Run-of-mine (ROM)	Run of mine. Unprocessed conveyed material (ore) from the mining operation.
Runoff	Part of precipitation and snowmelt that does not infiltrate but moves as overland flow and drains off the land into bodies of water.
Scarification	Seedbed preparation to make a site more amenable to plant growth.
Screening	Separating material into size fractions.
Security Deposit	Funds held by the Crown or designated owner of the land that can be used in the case of abandonment of an undertaking to reclaim the site, or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.
Sediment	Solid material, both mineral and organic, that has been moved by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.
Seismic	Relating to an earthquake or to other tremors of the Earth, such as those caused by large explosions.

Term	Meaning
Solubility	Quantity of solute that dissolves in a given volume and type of solvent, at given temperature and pressure, to form a saturated solution. The degree to which compounds are soluble depends on their ability, and that of the other dissolved species, to form ions and aqueous complexes in particular drainage chemistry.
Sump	An underground catch basin in a mine where water accumulates before being pumped to the surface.
Supernatant	The clear liquid that floats about the sediment or precipitate.
Surface Water	Natural water bodies such as river, streams, brooks, ponds and lakes, as well as artificial watercourses, such as irrigation, industrial and navigational canals, in direct contact with the atmosphere.
Sustainable Development	Industrial development that does not detract from the potential of the natural environment to ensure benefits for future generations.
Tailings	Material rejected from a mill after most of the recoverable valuable minerals have been extracted.
Taliks	Unfrozen zones that can exist within, below, or above permafrost layers. They are usually located below deep water bodies.
Temporary Closure	When a mine ceases operations with the intent to resume mining activities in the future. Temporary closures can last for a period of weeks, or for several years, based on economical, environmental, political, or social factors.
Thermokarst	A landscape characterized by shallow pits and depressions caused by selective thawing of ground ice, or permafrost.
Topsoil	Natural huminous layer on top of the orebody, which has to be stripped prior to start-up of ore extraction.
Traditional Knowledge	A cumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change.
Ultramafic	Igneous rock composed chiefly of mafic minerals, e.g. monomineralic rocks composed of 228 hypersthenes, augite, or olivine.
Waste-rock, Discard, or Spoil Material	All rock materials, except ore and tailings that are produced as a result of mining operations.
Watershed	A region or area bordered by ridges of higher ground that drains into a particular watercourse or body of water.
Water Table	The level below where the ground is saturated with water.
Weathering	Processes by which particles, rocks and minerals are altered on exposure to surface temperature and pressure, and atmospheric agents such as air, water and biological activity.

17.2 Acronyms and Abbreviations

The following are acronyms or abbreviations that may be used in this document.

Abbreviation	Description
General	
A&R	Abandonment and Reclamation
ARD	Acid Rock Drainage
Baffinland	Baffinland Iron Mines Corporation
CCME	Canadian Council of Ministers of the Environment
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EMMP	Environmental Mitigation and Monitoring Plans
ERP	Proposed Early Revenue Phase
ESA	Environmental Site Assessment
FEIS	Final Environmental Impact Statement
FOL	Federal Owned Lands
HADD	Harmful Alteration, Disruption, or Destruction
HTA/HTO	Hamlets, Hunters, and Trappers Association/Organization
HTO	Hunters and Trappers Organization
ICRP	Interim Closure and Reclamation Plan
IIBA	Inuit Impact and Benefits Agreement
IOL	Inuit Owned Lands
IQ	Inuit Qaujimajatuqangit (Inuit knowledge, or traditional knowledge)
KI	Key Indicator
LAC	Land Advisory Committee
LSA	Local Study Area
MASL	Metres above Sea Level
Mary River	Nuluujaak
MDAG	Mineral Development Advisory Group
MERA	Mineral and Energy Resource Assessment
ML	Metal Leaching
MOU	Memorandum of Understanding
Mt/a	Million Tonne-Per-Annum
NLCA	Nunavut Land Claims Agreement
NSA	Nunavut Settlement Area
NWT	North West Territories
PAG	Potential Acid Generating
PDA	Potential Development Area
PDW	Pre-Development Works
PLA	Production Lease Area
PPR	Personal Property Registry
RA(s)	Responsible Authority(ies)
RMO	Resource Management Officer
RSA	Regional Study Area
TC-NWPP	Transport Canada Navigable Waters Protection Program
the Project	Mary River Project
TK	Traditional Knowledge
VC	Valued Component

Abbreviation	Description
VEC	Valued Ecosystem Component
VSEC	Valued Socio-Economic Component
Federal And Territorial Acts	
AWPPA	Arctic Waters Pollution Prevention Act
BCANU	Business Corporations Act (Nunavut)
CEAA	Canadian Environmental Assessment Act
CEPA	Canadian Environmental Protection Act, 1999
CLA	Commissioner's Land Act
CNPA	Canada National Parks Act
CWA	Canada Wildlife Act
EG&GANU	Engineers, Geologists and Geophysicists Act (Nunavut)
EMAANU	Emergency Medical Aid Act (Nunavut)
EPANU	Environmental Protection Act (Nunavut)
EUANU	Explosives Use Act (Nunavut)
EXA	Explosives Act
FA	Fisheries Act
FPANU	Fire Prevention Act (Nunavut)
LSANU	Labour Standards Act (Nunavut)
MBCA	Migratory Birds Convention Act, 1994
MH&SANU	Mine Health and Safety Act (Nunavut)
NW&NSRTA	Nunavut Waters and Nunavut Surface Rights Tribunal Act
PHANU	Public Health Act (Nunavut)
TDGA	Transportation of Dangerous Goods Act, 1992
TDGANU	Transportation of Dangerous Goods Act (Nunavut)
TLA	Territorial Lands Act
TPANU	Territorial Parks Act (Nunavut)
WANU	Wildlife Act (Nunavut)
WCANU	Workers' Compensation Act (Nunavut)
Federal And Territorial Regulations	
AWPPR	Arctic Waters Pollution Prevention Regulations
CFAEAP&R	Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements
CLR	Commissioner's Land Regulations
CMR	Canada Mining Regulations
CRFR	AECB Cost Recovery Fees Regulations, 1996
CSLR	Comprehensive Study List Regulations
CSLRNU	Comprehensive Study List Regulations (Nunavut)
CSRNU	Camp Sanitation Regulations (Nunavut)
ELR	Exclusion List Regulations
EURNU	Explosives Use Regulations (Nunavut)
EXR	Explosives Regulations
FPRNU	Fire Prevention Regulations (Nunavut)
ILR	Inclusion List Regulations
LLR	Law List Regulations
MBSR	Migratory Bird Sanctuary Regulations
MH&SRNU	Mine Health and Safety Regulations (Nunavut)

Abbreviation	Description
MMER	Metal Mining Effluent Regulations
NA&PSR	Nunavut Archaeological and Palaeontological Sites Regulations
NBRLUP	North Baffin Regional Land Use Plan
NPWR	National Parks Wildlife Regulations
NWTFR	Northwest Territories Fishery Regulations
NWTWR	Northwest Territories Waters Regulations
PCSRNU	Propane Cylinder Storage Regulations (Nunavut)
SCP&RRNU	Spill Contingency Planning and Reporting Regulations (Nunavut)
TDGR	Transportation of Dangerous Goods Regulations
TDGRNU	Transportation of Dangerous Goods Regulations (Nunavut)
TDR	Territorial Dredging Regulations
TLR	Territorial Lands Regulations
TLUR	Territorial Land Use Regulations
TPRNU	Territorial Parks Regulations (Nunavut)
TQR	Territorial Quarrying Regulations
WAR	Wildlife Area Regulations
WCRNU	Workers' Compensation Regulations (Nunavut)
WSRNU	Wildlife Sanctuaries Regulations (Nunavut)
Federal Government Departments And Agencies	
AANDC	Aboriginal Affairs and Northern Development Canada
CTA	Canadian Transportation Agency
DFO	Fisheries and Oceans Canada
DOJ	Department of Justice Canada
EC	Environment Canada
INAC	Indian and Northern Affairs Canada (recently renamed Aboriginal Affairs and Northern Development Canada)
NRCan	Natural Resources Canada
PCH	Parks Canada Agency (Canadian Heritage)
TC	Transport Canada
Territorial Government Departments And Agencies	
CGSNU	Department of Community and Government Services
CLEYNU	Department of Culture, Language, Elders and Youth
DOJNU	Department of Justice
DOENU	Department of Environment
ED&TNU	Economic Development & Transportation
GN	Government of Nunavut
H&SSNU	Department of Health and Social Services
WCBNU	Workers' Compensation Board of the Northwest Territories and Nunavut
Institutions Of Public Government	
CLARC	Community Land and Resource Committee
CLO	Community Liaison Officer
IPGs	Institutions of Public Government
MVLWB	Mackenzie Valley Land and Water Board
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission

Abbreviation	Description
NSRT	Nunavut Surface Rights Tribunal
NWB	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
Inuit Organizations	
DIO	Designated Inuit Organizations
MHTO	Mittimatalik Hunters and Trappers Organization
NTI	Nunavut Tunngavik Incorporated
QIA	Qikiqtani Inuit Association
RIA	Regional Inuit Association
RWO	Regional Wildlife Organization

18 REFERENCES

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