

Are you concerned about how the project is affecting the community and the environment?

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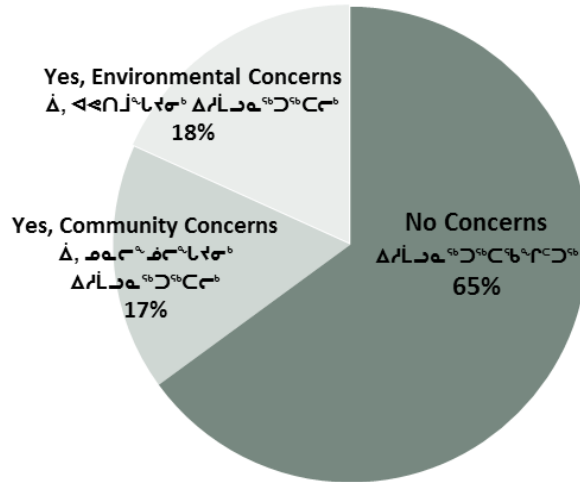


Fig. 4 Community Perceptions on the Project’s Contributions to North Baffin Communities

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Has the Project made a difference in your community?

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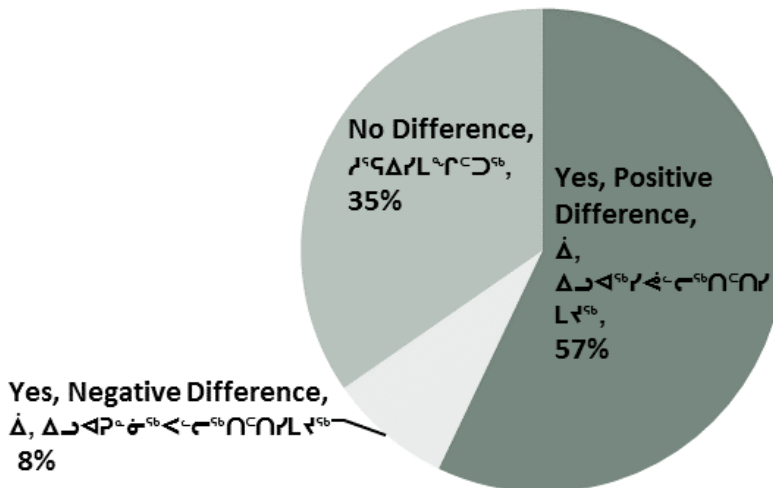


Fig. 5 Nature of North Baffin Community Respondent Concerns

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ABBREVIATIONS

Baffinland Iron Mines Corporation	Baffinland
Mary River Project.....	the Project
AAQS	Ambient Air Quality Standards
AIS	Automatic Identification System
AED.....	automatic external defibrillator
AEMP.....	Aquatic Effects Monitoring Plan
ARD.....	acid rock drainage
ASR	annual security review
BCLO.....	Baffinland Community Liaison Officer
CAG.....	community advisory group
CCG.....	Canadian Coast Guard
CEGEP.....	Collège d'Enseignement Général et Professionnel (General Vocational College)
CLA	Courteous Leadership Action
CO.....	carbon monoxide
CO ₂	carbon dioxide
CO ₂ eq.....	carbon dioxide equivalent
CORI.....	Coastal and Ocean Resources
CPR	Cardiopulmonary Resuscitation
CREMP.....	Core Receiving Environment Monitoring Program
CTA	Canadian Transportation Agency
dBA.....	decibels
DFO.....	Fisheries and Oceans Canada
DPA.....	Development Partnership Agreement
ECCC	Environment and Climate Change Canada
EEM	environmental effects monitoring
EFAP	Employee Family Assistance Program
EIS.....	environmental impact statement
EPCM.....	engineering, procurement and construction management
ERP	Early Revenue Phase
ESDC.....	Employment and Social Development Canada
FAD	Fisheries Act Directive
FEIS.....	Final Environmental Impact Statement
FNBC.....	First Nations Bank of Canada
GDP.....	Gross Domestic Product
GED.....	General Education Development
GHG	Greenhouse Gas
HTOs.....	Hunter and Trapper Organization
ICPS.....	Inuit Contracting and Procurement Strategy
ICRP	Interim Closure and Reclamation Plan
IHRS.....	Inuit Human Resources Strategy
IIBA.....	Inuit Impact and Benefit Agreement

INAC..... Indigenous and Northern Affairs Canada

IOL Inuit-Owned Land

IPS..... Inuit Procurement Strategy

IT..... Information Technology

JEC Joint Executive Committee (Baffinland and the QIA)

JMC..... Joint Management Committee (Baffinland and the QIA)

JPCSL..... Jason Prno Consulting Services Ltd.

kt kilotonne

LNC Letter of Non-Compliance

LSA..... local study area

MEWG Marine Environment Working Group

MHTO Mittimatalik Hunters and Trappers Organization

MIEG..... Minimum Inuit Employment Goal

MRCG Mary River Community Group

Mtpa..... million tonnes per annum

SEMWG Mary River Socio-economic Monitoring Working Group

NBRLUP North Baffin Regional Land Use Plan

NHC Nunavut Housing Corporation

NIRB..... Nunavut Impact Review Board

NLCA..... Nunavut Land Claims Agreement

NPC..... Nunavut Planning Commission

NO₂..... nitrogen dioxide

NRCan..... Natural Resources Canada

NT Northwest Territories

NTI Nunavut Tunngavik Inc.

NU Nunavut

NWB Nunavut Water Board

OHS..... Occupational Health & Safety

OPEP..... Oil Pollution Emergency Plan

QA/QC Quality Assurance / Quality Control

QIA..... Qikiqtani Inuit Association

QSEMC..... Qikiqtani Socio-economic Monitoring Committee

PAI Potential Acid Input

PC Project Certificate

PM particulate matter

ppb parts per billion

RCMP..... Royal Canadian Mounted Police

SAR Search and Rescue

SEP..... Stakeholder Engagement Plan

SMWMP Shipping and Marine Wildlife Management Plan

SO₂..... sulphur dioxide

TC Transport Canada

TEWG..... Terrestrial Environment Working Group

ToR	Terms of Reference
TREEP.....	Tote Road Earthworks Execution Plan
TSP.....	total suspended particulate
TSS.....	total suspended solids
VEC	valued ecosystem component
VSEC	Valued Socio-Economic Component
WHMIS	Workplace Hazardous Materials Information System
WRO	Water Resources Officer
WSCC.....	Workers' Safety and Compensation Commission
WWF.....	World Wildlife Fund

1 – INTRODUCTION

1.1 GENERAL

The Mary River Project (the Project) is an operating open pit iron ore mine that is owned and operated by Baffinland Iron Mines Corporation (Baffinland). The Project is located in the Qikiqtani Region of Nunavut on northern Baffin Island (Figure 1.1).

The Mine and associated deposits are large and high quality. The Project is currently mining and hauling ore over the Milne Inlet Tote Road in what has been termed the Early Revenue Phase (ERP). Mining from Deposit #1 has an expected lifespan of 20 years. If expansion to other deposits is allowed, the operation has the potential to last for generations, representing a long-term opportunity for economic development in the North Baffin region.

The Mine Site is located approximately 160 km south-southwest of the nearest community of Pond Inlet (Mittimatalik) and 1,000 km north-northwest of the territorial capital of Iqaluit. The Project consists of three currently active main project components (Figure 1.2):

- Mine Site
- Milne Inlet Tote Road
- Milne Port

The operation includes open pit mining, crushing and transportation of the ore to the port at Milne Inlet (Milne Port). The Tote Road from the Mine Site to Milne Port is used to transport ore 12 months a year. Ore in the form of lump and fines is shipped during the open water season to international markets. There are no concentrators, tailings, or tailings ponds associated with production.

The approved Project also includes a railway south from the Mine Site to a port facility at Steensby Inlet. These Project components will be constructed in the future.

This Annual Report to the Nunavut Impact Review Board (NIRB) is a requirement of Project Certificate (PC) No. 005. This Annual Report summarizes:

- The work undertaken during the year
- Reconciles Baffinland's performance against the conditions of the amended PC
- Presents an evaluation of the Project's effects in relation to those predicted in the Baffinland's Final Environmental Impact Statement (FEIS; Baffinland 2012); and the Addendum to the FEIS for the ERP (Baffinland; 2013)
- Provides a summary of the work that is proposed for the year ahead

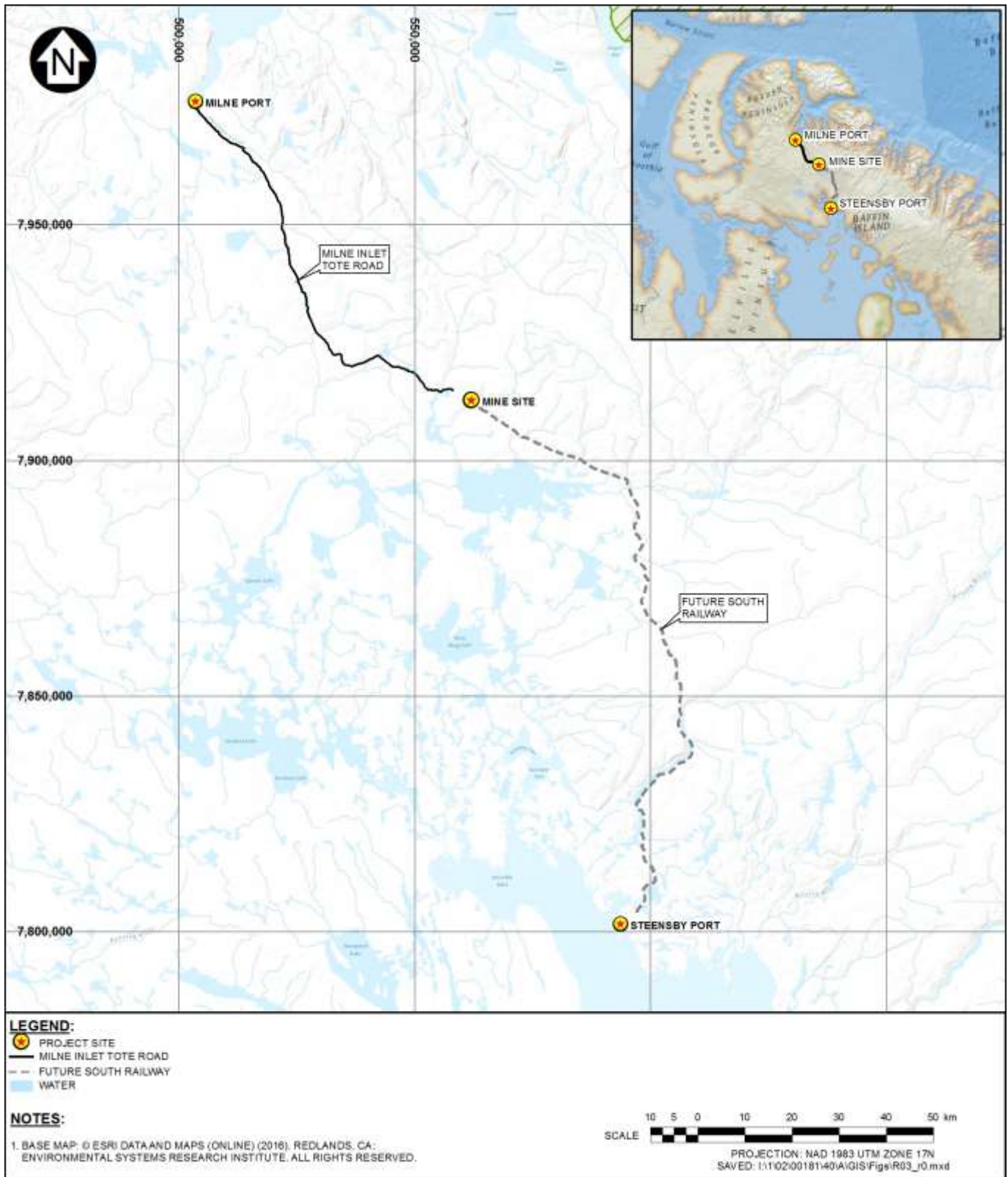
1.2 REGULATORY CONTEXT

On December 28, 2012, the NIRB issued Project Certificate No. 005 for the Project to Baffinland pursuant to Section 12.5.12 of Article 12 of the Nunavut Agreement (Indian and Northern Affairs Canada and Nunavut Tunngavik Inc., 2010). The basis for this Project Certificate is Baffinland's FEIS, which presented in-depth analyses and evaluation of potential environmental and socio-economic effects associated with mining the reserves of Deposit No. 1 at a nominal rate of 18 Million tonnes per annum (Mtpa).

Figure 1.1 Project Location Map



Figure 1.2 Location of Project Activities



Development of this project includes:

- The construction, operation, closure and post-closure activities associated with the Mine and its related infrastructure
- The development of a Southern Transportation Corridor (southern railway and Steensby Port)
- The construction of a 150-km railway from the Mine Site to a new port facility at Steensby Inlet (Figure 1.2)
- Year-round shipping along the Southern Shipping Route (Foxe Basin – Hudson Strait)

The FEIS for the approved Mary River Project was prepared in adherence to Guidelines for the Preparation of an Environmental Impact Statement for the Baffinland Iron Mines Corporation’s Mary River Project (the Guidelines; NIRB, 2009); and the NIRB’s Preliminary Hearing Conference Decision (NIRB, 2011).

Following the issuance of the Project Certificate, Baffinland requested an amendment to its Project Certificate to undertake the 4.2 Mtpa ERP, and consequently NIRB conducted a reconsideration of the terms and conditions in the Project Certificate considering the scope of the ERP. The Minister of Aboriginal Affairs and Northern Development Canada (AANDC; now Indigenous and Northern Affairs Canada – INAC) approved the ERP on April 28, 2014 (Minister of Aboriginal Affairs and Northern Development, 2014), and NIRB subsequently issued an amended Project Certificate in May 2014 (NIRB, 2014).

Baffinland currently operates the ERP in accordance with the permits, licences, approvals, authorizations and agreements identified in Table 1.1. In addition, Baffinland’s contractors and consultants undertake various activities on the Project under additional permits in the areas of scientific research, archaeology, and explosives manufacture, storage and use.

1.3 PERMITTING OF THE PHASE 2 PROJECT PROPOSAL

In addition to the current Project, Baffinland is pursuing approvals for an expansion to the Project (the Phase 2 Project Proposal), which will involve construction of a railway between the Mine Site and Milne Port, and shipping of 12 Mtpa of ore from Milne Port. As with the current ERP, the expectation is that Baffinland will subsequently construct the 18 Mtpa “south rail” project to Steensby Inlet that was approved by the NIRB in 2012. Baffinland submitted a Project Proposal for its Phase 2 Expansion Project (Phase 2 Project Proposal) to the Nunavut Planning Commission (NPC), the NIRB and other agencies and stakeholders in October 2014 (Baffinland, 2014). Public consultation, the collection of traditional knowledge and scientific baseline data, as well as engineering studies have been ongoing since that time.

In February 2016, Baffinland announced its intention to switch the mode of overland ore transportation from road haulage to the use of a railway (Baffinland, 2016a). The NIRB subsequently sought feedback from regulatory agencies, stakeholders and the Federal Minister of Indigenous and Northern Affairs (INAC) as to whether this constituted a significant modification to the October 2014 Project Proposal. On October 28, 2016, the NIRB asked Baffinland for further information and clarification regarding the current nature and scope of its Phase 2 proposal for the Mary River Project (NIRB, 2016a). In response, Baffinland submitted a Project Update on the Phase 2 Proposal to the NIRB on November 30, 2016 (Baffinland, 2016b). On December 19, 2016, the NIRB indicated to Baffinland that the switch from road to rail constituted a significant modification to the original Phase 2 Project Proposal (NIRB, 2016b), and that Baffinland would require a new conformity determination to the North Baffin Regional Land Use Plan (NBRLUP; NPC, 2000).

A revised Phase 2 Proposal was submitted on February 3, 2017 to the NPC for a decision of conformity to the North Baffin Land Use Plan (Baffinland, 2017a). The Revised Phase 2 Proposal proposed a significant reduction in the duration of shipping in ice covered conditions. Baffinland has not received a conformity decision by at the time this report was submitted.

Table 1.1 Permit Registry

Approval	Project Activity	Expiry
Nunavut Impact Review Board <i>Nunavut Agreement, and the Nunavut Planning and Project Assessment Act as of July 9, 2015</i>		
Project Certificate No. 005 <i>Nunavut Agreement (Article 12)</i>	Required to obtain the requisite permits and approvals to proceed with Project	No Expiry
Qikiqtani Inuit Association (QIA) <i>Agreements issued under Articles 6, 20 and 26 of the Nunavut Agreement</i>		
Inuit Impact and Benefits Agreement (IIBA) <i>Nunavut Agreement, Article 26</i>	Required under Article 26 of the <i>Nunavut Agreement</i> to proceed with Project - concluded September, 2013	No Expiry
Wildlife Compensation Agreement <i>Nunavut Agreement, Article 6</i>	Wildlife Compensation regime set out in IIBA	
Water Compensation Agreement <i>Nunavut Agreement, Article 20</i>	Compensation should the Project substantially affect the quality, quantity, or flow of water on Inuit-owned land	June 10, 2025
Commercial Lease Q13C301	Mine development activities on Inuit Owned Land	December 31, 2043
Quarry Concession Agreement	Required to extract aggregate (quarried rock and borrow sand and gravel) on Inuit Owned Land	N/A
Nunavut Water Board <i>Water Licences issued under the Nunavut Agreement (Article 13), the Nunavut Waters and Nunavut Surface Rights Tribunal Act, and the Northwest Territories Water Regulations</i>		
Type A Water Licence 2AM-MRY1325	Water use and waste disposal associated with the mine	June 10, 2025
Type B Water licence 2BE-MRY1421	Regional exploration activities, including exploration drilling	April 16, 2021
Indigenous and Northern Affairs Canada (INAC) <i>Mineral Leases and Land Leases, Land Use Permits, and Quarry Permits on Crown Land, issued under the Territorial Lands Act and associated Canadian Mining Regulations and Territorial Land Use Regulations</i>		
Mineral Leases #2483, #2484 and #2485	Rights to extract minerals; Lease #2484 covers Deposit No. 1.	August 27, 2034
Land Use Permit N2014C0013	Infrastructure and activities on Crown Land at Steensby Port	June 30, 2017
Land Use and Quarry Permit N2014Q0016	Extraction of sand and gravel from Borrow P1 at Km 63 along the Tote Road	June 30, 2017
Land Use Permit N2014J0011	Summer narwhal monitoring camp at Bruce Head, in Milne Inlet	June 30, 2017
Class A Land Use Permit N2014X0012	Port operation on Crown Land (ore dock operation)	June 30, 2017
Foreshore Lease 47H/16-1-2	Use of seabed by current ore dock at Milne Port	June 30, 2035
Department of Fisheries and Oceans <i>Authorizations and Letters of Advice issued under the Fisheries Act</i>		
Fisheries Authorization 14-HCAA-00525	Authorization to construct the ore dock in fish habitat	December 31, 2020
Fisheries Authorization NU-06-0084	Authorization to construct water crossings in fish habitat along the Tote Road	August 30, 2008; monitoring ongoing
Letters of Advice (various)	DFO issued Baffinland various letters of advice in regard to culvert extensions and replacements along the Tote Road	No Expiry
Transport Canada <i>Approvals of in-water works under the Navigable Waters Protection Act (NWPAct; now the Navigation Protection Act); and Marine Facility Approval under the Marine Transportation Security Act and Regulations</i>		
Approvals: 8200-07-10273, 8200-07-10267, 8200-07-10269, 8200-07-10268, 8200-07-10274, 8200-07-10272 8200-07-10266. 8200-07-10271	Approvals to interfere with navigation within navigable waters along the Tote Road at crossings: CV040, BG50, CV128, CV223, CV072, BG17, CV217, and CV099	No Expiry
Statement of Compliance of a Marine Facility # 001743	Approval for the Milne Inlet Marine Facility to conduct iron ore operations	June 24, 2020
National Resources of Canada <i>Licensing of Explosives Manufacture and Storage Facilities under the Explosives Act</i>		
Factory Licence #F76068	Issued to Baffinland's explosives contractor, Dyno Nobel Baffin Island, to manufacture explosives for the mine	June 30, 2017
Nunavut Research Institute <i>Issues scientific licences for land and water research, or social and traditional knowledge research, under the Scientists Act</i>		
Scientific Research Licence 02 031 16R-M	Environmental monitoring of the land and water environments	December 31, 2017

1.4 REPORT STRUCTURE

This report clearly describes the methods, results and conclusions of the actions and monitoring programs implemented during 2016 with respect to the terms and conditions set out in PC No. 005. This year's report has been re-structured to allow reviewers to more easily find information and comment on the following:

- The regulatory context under which Baffinland operates and any active permitting initiatives that are underway
- Stakeholder engagement activities in the reporting year and a discussion of any significant outcomes
- An overview of the company's activities in the reporting year, including notable issues, challenges or milestones
- Status of the Project in respect to the PC conditions
- An evaluation of the ecosystemic and socioeconomic effects of the Project in the reporting year for those components and key indicators that are monitored
- The accuracy of predictions contained within the FEIS for the Project
- A recap and follow up on correspondence between the company and the NIRB in 2016
- Identification of updates to management plans prescribed by one or more PC conditions

Section 4 of this report presents both a status update on PC conditions and an evaluation of impacts. The section is organized according to the headings used by the NIRB. The PC conditions status update identifies each condition as being either Complete, In Progress, Deferred or Not Applicable (in the current year), and where applicable monitoring results have been presented demonstrate the status of each PC condition. The approach to reporting on Baffinland's performance on the PC conditions is further described in Section 4.1. A summary of each of the conditions and the Project status with respect to the conditions in 2016 is presented in Appendix A.

1.5 BAFFINLAND'S DOCUMENT WEB PORTAL

Beginning in 2016, Baffinland has been developing a web-based portal on its existing corporate website for the purposes of uploading documents to make them publicly available. It is Baffinland's intent to present a number of reports included in previous NIRB annual reports on the document portal. Many of the documents previously provided were not explicitly required to be provided to NIRB under the PC conditions, but were provided to NIRB for transparency since the reports were not publicly available elsewhere. All reports which PC conditions prescribe Baffinland to provide to the NIRB annually have been appended to this report. As and when needed, Baffinland may choose to include other reports that highlight project activities that may be of interest to the NIRB and provide context to the Project.

The web portal was available as of March 31, 2017, and is located at: <http://www.baffinland.com/shareddocuments/>.

2 – ENGAGEMENT WITH STAKEHOLDERS

2.1 ENGAGEMENT WITH COMMUNITIES

Baffinland is committed to meaningful engagement with stakeholders potentially affected by the Mary River Project, including the five (5) North Baffin Inuit Communities (Pond Inlet, Clyde River, Hall Beach, Arctic Bay and Igloolik), the Qikiqtani Inuit Association (QIA), applicable regulatory agencies and the general public. Baffinland's engagement efforts are guided by a Stakeholder Engagement Plan (SEP). An active and vigorous approach to stakeholder engagement has allowed Baffinland to identify Project related concerns and to develop appropriate mitigation measures to address them.

Baffinland's approach to meaningful stakeholder engagement is integrally related to its commitment to corporate responsibility and sustainable development. It is intended to ensure that stakeholder engagement:

- Complies with all applicable local laws and regulations on stakeholder engagement
- Promotes an understanding of and mapping stakeholder categories and their issues
- Is planned, systemic and principled
- Disseminates information on company activities in a language and format that are culturally appropriate and accessible

All engagement initiatives have been designed and implemented to achieve consistency with relevant corporate policies and regulatory authorizations, including the IIBA as well as the conditions of PC No. 005 and other regulatory instruments relating to consultation.

Meaningful stakeholder engagement not only fulfills regulatory and policy requirements, but is valued as a means of building and maintaining community partnership and helping to ensure that local communities become the principal beneficiaries of the Project. Baffinland's approach to stakeholder engagement emphasizes the importance of informing stakeholders, establishing effective communication strategies, and collecting feedback from stakeholders on potential issues and concerns. It encompasses a range of activities spanning all Project phases, and is strongly dependent on meaningful multi-directional communication.

The objectives of Baffinland's engagement activities are to:

- Provide stakeholders with relevant Project information in a timely, accessible and culturally appropriate manner in order to enable stakeholders to identify issues and concerns and provide input into the development of appropriate mitigation measures
- Ensure that stakeholders have the opportunity to understand and meaningfully engage in the processes initiated by the Project
- Reduce the potential for disputes through improved understanding and awareness
- Build constructive and positive relationships with those communities most likely to be affected by the project, reducing business and reputational risks and contributing to the 'social licence'
- Allow traditional and local knowledge as well as scientific expertise to be taken into consideration to improve internal decision-making processes
- Facilitate effective implementation of and compliance with commitments contained in the IIBA
- Focus priorities so that potential adverse effects are mitigated and Project benefits are enhanced

To achieve these objectives, Baffinland has, since its establishment, conducted extensive engagement with interested and potentially affected stakeholders. This engagement has been implemented through a variety of mechanisms which are intended to ensure that a broad and comprehensive approach to the identification of stakeholders and the creation of opportunities for dialogue and input. To this end, Baffinland has:

- Provided regular and ongoing opportunities for the dissemination of Project-related information and receipt of stakeholder input through Baffinland Community Liaison Officers stationed in each of the 5 North Baffin communities
- Hosted public meetings and open houses in each community
- Conducted community and employee surveys
- Participated in multi-stakeholder forums
- Held focus groups, workshops and meetings with individual community groups and hamlet Councils
- Hosted site meetings for interested observers
- Distributed Project-related information through websites, newsletters, advertisements and other means

Baffinland’s 2016 stakeholder engagement activities and outcomes are described below.

2.1.1 2016 Community Survey

Baffinland is focused on an engagement process that promotes dialogue with the five North Baffin communities. Ongoing engagement efforts related to these communities has generated broad-based support for the Project as evidenced by the results of a September 2016 community survey. The survey and a summary report of the results can be found in Appendix A. The survey was conducted by Baffinland in each of the five communities in order to gain an understanding of the potential impacts of the Project upon communities, the environment (biophysical and socio-economic) and the overall way of life in North Baffin Island, as well as the state of the relationship between Baffinland and the communities. To that end, survey participants were asked a range of questions addressing the perceived impacts of the Project. A total of 205 surveys were completed and the results indicate a general level of satisfaction with the Project. The majority of respondents (57%) indicated that the Project has had a positive impact on their community and another 35% indicated that the Project has made no difference on their community (Figure 2.1). Only 8% of respondents suggested the Project has had a negative impact on their community.

Has the Project made a difference in your community?

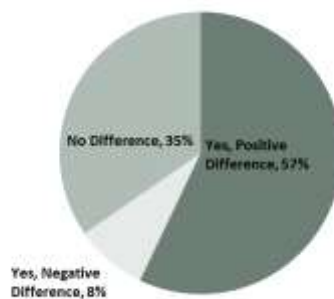


Figure 2.1 Perceptions on the Project’s Contributions to North Baffin Communities

Generally, survey respondents indicated that the positive impacts of the Project were largely related to economic development opportunities and the impact upon the well-being of residents. Further, the majority of respondents noted that the frequency, relevance and method of communication used by Baffinland with the communities was positive.

When asked about concerns, survey responses were equally divided between socio-economic matters and the bio-physical environment (Figure 2.2).

Are you concerned about how the project is affecting the community and the environment?

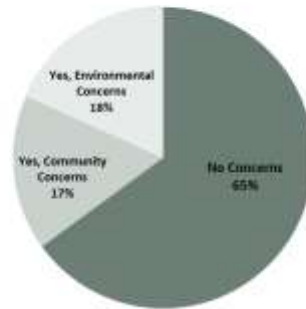


Figure 2.2 Nature of North Baffin Community Respondent Concerns

While the majority of respondents (65%) did not have concerns about the Project, 18% of respondents expressed a concern for the bio-physical environment, specifically the potential effects of the mine upon terrestrial and marine wildlife and wildlife habitat due to dust; changes in water quality; shipping; and mine blasting noises (Table 2.1). Approximately 17% of respondents identified concerns relating to effects on harvesting activities, the need for more Inuit employment, substance abuse in communities, and the difficulties due to family separation from employees.

Table 2.1 Key Topics Raised during Baffinland’s September 2016 Community Survey

Positive Impacts	Concerns
<ul style="list-style-type: none"> Jobs for local residents Income and work benefits for families Increased social benefits and well-being Providing local residents with life skills Good communication between the communities and Baffinland 	<ul style="list-style-type: none"> Potential effects of the mine upon terrestrial and marine wildlife and wildlife habitat Potential effects on harvesting activities Need for more Inuit employment Substance abuse in communities Difficulties due to family separation from employees

Overall, the survey supports the conclusion that communities are responding positively towards the Project and the associated business and employment opportunities that it brings to North Baffin residents, which has increased regional prosperity and improved the overall quality of life.

2.1.2 Community Tour

The survey results were reinforced by the comments received during Baffinland’s tour of the five North Baffin communities in late 2016. Between November 21 and 25, 2016, Baffinland undertook a tour of Pond Inlet, Clyde River, Hall Beach, Igloolik and Arctic Bay. The tour consisted of public meetings, open houses, and face-to-face meetings with community leaders. In each community, a meeting was held with the Hamlet Council and in Pond Inlet and Arctic Bay separate meetings were held with the Hunter and Trapper Organizations (HTOs). The purpose of the meetings was to:

- Present an update on the current operations and plans for future expansion
- Provide residents an opportunity to ask questions and voice any concerns they may have
- Support ongoing engagement and relationship building between Baffinland and the North Baffin communities
- Understand what changes the communities have observed, since the start of mine operations

The format of the public meetings included a 30-minute presentation, providing an update on Baffinland, which generally followed the content of five Open House stations:

- Current Operations and Camp Life
- Community Survey Results
- Environmental Monitoring
- Recruitment and Employment
- The Phase 2 Expansion Project

A question and answer session followed the presentation to respond to resident questions and concerns. During the event, community members were provided with comment forms, which provided an opportunity to give anonymous written feedback to Baffinland. All concerns or issues that required follow-up were documented and the names of residents were noted as appropriate. The public meeting presentation was made in Inuktitut, and all written materials (presentations, comment forms, posters, etc.) were presented in both Inuktitut and English. Translation equipment was available to all community residents, and simultaneous translation was available between English and Inuktitut for all events.

Residents were asked to sign in upon entry. At least 332 North Baffin residents attended the public meetings and open house events (Table 2.2).

Table 2.2 November 2016 Community Meeting Attendance Based on Sign-in Records

Arctic Bay	Clyde River	Hall Beach	Igloolik	Pond Inlet
85	67	64	31	85

The most common questions coming from the communities were related to Inuit employment, including issues associated with job stability and progression, improving Inuit recruitment and retention, ensuring a positive working environment at the mine, and training and capacity building. A second focus of discussion was around the potential effects of shipping, particularly with reference to the proposed expansion project. A number of questions were asked about the shipping process and specific plans for the expansion project, such as the routes used, the fleet size, environmental emergency plans and management procedures, interactions with ships during the harvesting season, duration of the shipping season and ideas for improving communications regarding the shipping program. A summary report of the community tour and the key issues raised is provided in Appendix B.

2.1.3 Moving Forward

Baffinland has committed to ongoing engagement with communities to provide regulator Project related information and to address issues identified during the community survey and community tour, particularly those issues associated with socio-economic benefits, employment and business opportunities. In this regard, Baffinland, together with the QIA, conducted a series of procurement workshops in Iqaluit and Pond Inlet in early 2017 with plans to return to the remaining communities later this year. Plans are underway to hold Career Information and Training Workshops (together with the QIA) in each of the five communities in late winter and Iqaluit in late spring.

In addition, in November 2016, Baffinland hired an Inuit Training and Education Specialist with responsibilities for the development of a revised Work Readiness Program (scheduled to roll-out for late summer/early fall 2017) and the exploration of on-site apprenticeship and training programs. A draft Inuit Human Resources Strategy and a draft Contracting and Procurement Strategy have been developed and are currently under review by the QIA. A major emphasis in the upcoming year will be upon students and youth. In 2016, Baffinland donated 46 laptops to high school students, and awarded scholarships worth \$5,000 each to seven post-secondary students. The purpose of these and similar initiatives is to encourage consideration of careers in the mining industry, enhance Inuit participation in the Project workforce and improve access of Inuit businesses to contracting opportunities.

2.1.4 Community Engagement Specific to the Phase 2 Proposal

For the past two years, Baffinland's engagement program has included considerable consultation related to the Phase 2 Expansion Project, including the associated identification and discussion of any questions or concerns on the part of consultation participants regarding the proposal and its potential effects. Baffinland first presented its Phase 2 Proposal in October 2014. Since that time, the Phase 2 Proposal has continued to evolve, guided by the views and perspectives raised during Baffinland's on-going regulatory, community and stakeholder engagement initiatives, and reflect its desire to address the various questions and concerns raised in a proactive manner. These engagement activities are summarized in Table 2.3.

Table 2.3 Community Engagement Activities Regarding the Phase 2 Proposal

Date	Community	Activity
Jan 2015	Pond Inlet	Open House
Feb 2015	Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet	Community Tour
Mar 2015 to May 2016	Pond Inlet	Workshops on contemporary Inuit land use of the Eclipse Sound and Navy Board Inlet Areas; shipping through ice; open water shipping; and caribou
Apr 2015	Pond Inlet Community Representatives	Tour of the Voisey's Bay winter shipping route by community representatives from Pond Inlet to observe shipping through ice
May 2016	Arctic Bay	Workshop on Phase 2
May 2016	Pond Inlet	Meeting with the Mary River Community Group and the Pond Inlet Youth Council
July 2016	Pond Inlet	Shipping update
Sept 2016	Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet	Community survey
Nov 2016	Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet	Community tour: public meetings; Hamlet Council meetings; meetings with Hunter and Trapper Organizations (Pond Inlet and Arctic Bay)
Dec 2016	Pond Inlet	Meetings with the MLA, Hamlet Council, HTO and a public meeting regarding the Phase 2 Proposal and a proposed 2017 winter sealift

Through these initiatives, Baffinland has become aware of a number of issues, which are relevant to the planning and eventual implementation of this next stage of the Project. In direct response to concerns that have been raised in the communities, Baffinland has made a number of operational changes. Negative concerns related to shipping through sea-ice (specifically at certain times of the year (March-June) led Baffinland to maximize the operational shipping season in the Phase 2 Expansion Proposal to the open water season. In addition, Baffinland retracted a proposal for a 2017 winter sealift required for operations. Baffinland will continue to consider and attempt to address issues as it moves forward.

To ensure that community views continue to be taken into account, Baffinland will continue to undertake an active and ongoing approach to engagement on the Phase 2 Proposal with the communities and other stakeholders. Baffinland has specifically committed to return to the five North Baffin communities in early 2017 to provide further and more detailed information respecting the Project update and associated regulatory processes. Relevant documentation will be provided in advance of any community, Hamlet and HTO meetings to ensure that stakeholders have a meaningful opportunity to identify and discuss issues of concern. All stakeholder engagement activities will be documented through 'Staketracker' consultation software and issues will be addressed and reported as required. Baffinland will continue to ensure that its engagement activities comply with the terms and conditions of all relevant standards, regulations, Project authorizations and the IIBA.

2.2 ENGAGEMENT WITH THE QIA

Baffinland is committed to establishing and maintaining a positive relationship with the QIA through ongoing engagement and collaboration. Such engagement takes place on two levels:

- Engagement associated with implementation of the IIBA
- Engagement related to the Commercial Lease (Q13C301), associated Agreements and other regulatory authorizations

These aspects are described below.

2.2.1 Engagement on IIBA Implementation

Implementation of the IIBA is managed by two committees: a Joint Executive Committee (JEC) and a Joint Management Committee (JMC), each of which consists of an equal number of representatives from Baffinland and the QIA. The JEC is responsible for oversight of the implementation of the IIBA through the setting of annual goals, objectives and priorities, the establishment of a supporting annual implementation budget, the review of reports and the provision of strategic advice. The JMC monitors the ongoing operations and management of the Project as it relates to the IIBA and shares information regarding the progress of training initiatives, employment targets and contract awards. Issues arising from the JMC are referred to the JEC for resolution. Both the JEC and the JMC meet on a regular basis in 2016, by phone or face-to-face to discuss and resolve issues related to IIBA implementation (Table 2.4).

Table 2.4 2016 Meetings on IIBA Implementation

JEC Meetings		JMC Meetings	
Date	Location	Date	Location
Apr 5-6	Oakville	May 16	Teleconference
May 27	Teleconference	July 8	Teleconference
June 15-16	Mary River Mine Site	Aug 11	Teleconference
Aug 19	Teleconference	Oct 17-20	Oakville
Sept 7-8	Oakville	Nov 8-10	Ottawa
Oct 20	Teleconference	Nov 25	Teleconference
Nov 8-9	Ottawa	Dec 5	Teleconference
		Dec 15-16	Oakville
		Dec 21	Teleconference

In 2016 the JMC focused on the development of various strategy documents including the Inuit Human Resources Strategy, Inuit Procurement and Contracting strategy and Annual IIBA Implementation Plan. The JMC furthered its communication and collaborative work in 2016 through frequent face-to-face working sessions which allowed the JMC to establish new contractor requirements and processes to better align with the terms of the IIBA. Specifically, an incentive/penalty model was created to aid in the achievement of contractor Minimum Inuit Employment Goals (MIEG). A Procurement and Contracting Workshop was developed by the JMC to be delivered to the communities of Iqaluit, Pond Inlet and Igloodik in January of Q1-2017 and to be repeated throughout 2017. In 2016, the JMC was also tasked with developing and completing the Skills Partnership Fund Application for submittal to Employment and Social Development Canada (ESDC) which, if accepted, will be implemented in 2017.

The JEC meetings which occurred during 2016 provided the JMC with additional direction and priority actions including the development of:

- Skills Partnership Fund Application
- Inuit Human Resources Strategy
- Inuit Procurement & Contracting Strategy
- Annual IIBA Work Plan

These tasks reflected the JEC priorities for 2016 which included the alignment of QIA and Baffinland's JMC resources; implementing contracting processes; MIEG implementation; and fund administration and reporting.

In addition to the work of the two Joint Committees, an IIBA Report is produced annually which describes implementation for the preceding calendar year. As well, the QIA and Baffinland host an IIBA Forum at which both parties provide Project updates

and progress reports to representatives of the five North Baffin communities. The 2016 IIBA Annual Report will be produced by the end of the first quarter of 2017. While no IIBA Forum was held in 2016, the next forum will be held in Arctic Bay in May 2017.

2.2.2 Engagement on the Commercial Lease and Associated Agreements

In addition to engagement related to the implementation of the IIBA, Baffinland and the QIA also engage on a regular basis with respect to the Commercial Lease, associated Agreements and a range of management plans including the Interim Closure and Reclamation Plan, the Roads Management Plan and the Snow Management Plan. Such engagement has been ongoing for the past several years, and while prior contacts have been ad hoc, during the latter half of 2016 engagement has been regularized and formalized coincident with the staffing up of the Sustainable Development Department of Baffinland. Monthly calls with QIA are now held, with additional engagement occurring on an as-needed basis as issues arise. Table 2.5 lists the meetings Baffinland held in 2016 with the QIA regarding the Commercial Lease and associated agreements.

Table 2.5 2016 Meetings on the Commercial Lease and Associated Agreements

Date	Participants	Location	Purpose
July 21	QIA, Baffinland	Teleconference	Lease, closure and security
July 22	QIA, Baffinland	Teleconference	Marine monitoring
Sept 14-21	QIA, Baffinland	Mary River Mine Site	Annual Security Audit - review and reconciliation of project activities and components for the purpose of consideration in the Annual Security Review (ASR) process
Oct 21	QIA, Baffinland	Teleconference	Review and discussion of draft 2017 Work Plan
Nov 10	QIA	Call	
Nov 16	QIA, Baffinland	Teleconference	Winter Sealift
Dec 9	QIA, Baffinland, INAC, NWB	Teleconference	Monthly call to review ongoing lease items: (e.g., Internal Closure and Reclamation Plan, Work Plan, rent, operational control, inspections, etc.)
Dec 16	QIA, Baffinland	Oakville	Annual Security Review Teleconference
Dec 21	QIA, Baffinland	Teleconference	QIA, Baffinland relationship

2.3 ENGAGEMENT WITH REGULATORY AGENCIES

During 2016, Baffinland participated in a number of meetings with the relevant regulatory agencies as noted in Table 2.6 (excludes meetings with the QIA, listed above). The purpose of such engagement is to ensure that regulators are provided with the full range of relevant Project-related information and Project progress.

Table 2.6 2016 Meetings with Regulatory Agencies

Date	Participants	Location	Purpose
July 22, 2016	NIRB	Call	NIRB annual report comments
Aug 16, 2016	NIRB	Call	NIRB annual report comments
Oct 18, 2016	NIRB	Meeting	Project and Phase 2 Update
Oct 31, 2016	NWB	Call	Closure Security
Nov 3, 2016	WWF	Call	MEWG meeting and marine monitoring
Nov 29, 2016	CTA	Meeting	Overview of Phase 2 proposal and permitting process
Dec 1, 2016	INAC	Meeting	Project Update and Phase 2
Dec 13, 2016	NIRB	Call	Winter Resupply

In addition, various site inspections were undertaken by regulatory agencies in 2016 (Table 2.7).

Table 2.7 2016 Regulatory Inspections

Date	Regulatory Agency
Jan 5 - 7	ECCC - Environmental Inspector
Jan 15 - 21	WSCC Mines Inspector
May 4 - 10	WSCC Mines Inspector
May 18 - 20	ECCC and INAC - Environmental Inspectors and Water Resources Officers
June 24 - 28	QIA - Environmental Inspectors
July 6 - 8	INAC - Water Resources Officer
July 12 - 16	WSCC Mines Inspectors
July 13 - 16	NIRB - Environmental Inspectors
July 27 - Aug 3	INAC - Water Resources Officers
Aug 11 - 15	QIA - Environmental Inspector
Sept 7 - 14	WSCC Mines Inspector
Sept 15 - 21	QIA - Auditors
Sept 28 - 30	INAC - Water Resources Officers
Oct 5 - 7	ECCC - Environmental Inspector

2.4 ENGAGEMENT WITH WORKING GROUPS

Project Conditions 49 and 77 mandate the establishment of working groups related to the terrestrial and marine environments. The Terrestrial Environment Working Group (TEWG) and the Marine Environment Working Group (MEWG) are intended to function for ongoing cooperation, communication, reporting and review between Baffinland and other interested parties, and to act as an advisory group to provide recommendations on appropriate mitigation and management approaches related to the Project. The working groups have both member and observer parties participating. Members for each group include the Government of Nunavut, the QIA, Environment and Climate Change Canada and Baffinland. Fisheries and Oceans Canada and Parks Canada are also members of the Marine Environment Working Group. In 2016, the Mittimatalik Hunters and Trappers Organization was added as a member of both groups. World Wildlife Foundation - Canada participates as an observer on both groups, and Oceans North participates as an observer with the MEWG.

In November 2016, the members of the working groups began revisions to the Terms of Reference to re-visit the mandate of the group, outline the roles and responsibilities of the parties, and the documentation review process. Prior to 2016, each working group met in-person twice a year to review and advise on all monitoring programs. In 2016, the group decided to add conference calls in between meetings to increase communication between participants and allow for more regular feedback and updates. In addition, the groups decided to initiate the use of smaller sub-groups with technical expertise related to a specific subject to discuss monitoring plans and mitigate measures, where appropriate. A focus of both environmental working groups beginning in 2016 and moving into 2017 will be the advancement of robust monitoring frameworks outlining all monitoring plans, mitigation measures and the frequency for the implementation of the programs. The meetings are structured to enable participants to have the opportunity to provide input on monitoring program implementation and follow-up at the conclusion of the field programs prior to finalization of reports. The group receives presentations on the implementation of field programs and the subsequent results in order to prioritize monitoring plans and suggest measures for mitigation where required. The groups are also established to provide a platform for the discussion of collaborative research opportunities between parties and to identify monitoring programs suited for community based monitoring and Inuit participation.

With PC Condition 129, NIRB strongly encouraged Baffinland to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) along with other agencies and affected communities, and 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. To this end, the Mary River Socio-Economic Monitoring Working Group (MRSEMWG) was established in 2013 as a sub-group of the regional QSEMC, and the Mary River Community Group.

Updates on 2016 activities specific to each working group are provided below.

2.4.1 Terrestrial Environment Working Group

The TEWG met twice in 2016 - on April 28 (Ottawa) and November 30 (Iqaluit). The Draft Terrestrial Environment Monitoring Annual Report was presented to the group for comments and review before finalization of the report in March 2017 (EDI, 2017).

Revision to the Terms of Reference for the TEWG was discussed at the November 2016 in-person meeting, along with confirming the current membership of the working group. The November 2016 meeting notes are included as Appendix C1. Meeting minutes from the April meeting, although distributed to the working group participants for comment, were not finalized and therefore have not been included in this report.

2.4.2 Marine Environment Working Group

The MEWG met twice in 2016 - on April 27 (Ottawa) and on November 29 (Iqaluit). In addition, parties participated in a conference call on August 4, 2016.

The group reviewed and commented on a number of marine monitoring reports drafted in 2016 for finalization in 2017. A key focus of the MEWG beginning in 2016 is the development of a robust monitoring framework for the marine environment. These efforts will continue throughout 2017.

An example of a collaborative opportunity that has been established within the working group is the Environment Canada Seabird monitoring program that Baffinland has provided support for from 2012 to 2016. This partnership between Baffinland and Environment Canada, whose research has in part focused on Common Eider's (a valued ecosystem component - VEC - for the Mary River Project) in Hudson Strait, is contributing to knowledge of Eider Ducks along the southern shipping route. In 2014, research shifted to areas in proximity to the Northern shipping route, partly due to the shift in project focus to the ERP. This collaboration continues to be an excellent example of mutually beneficial work and provides useful information for environmental effects monitoring for the Mary River Project.

Revision to the Terms of Reference for the MEWG was discussed at the November 2016 in-person meeting, along with confirming the current membership of the working group. MEWG meeting notes from the November 2016 meetings and the August conference call are included as Appendix C2. Meeting minutes from the April meeting, though distributed to the working group participants for comment, were not finalized so have not been included in this report.

2.4.3 Mary River Socio-Economic Monitoring Working Group

The project specific Mary River Socio-Economic Monitoring Working Group (SEMWG) is a sub-group of the regional Qikiqtani Socio-Economic Monitoring Committee (QSEMC) and is intended to provide a forum for members to engage in the work of the QSEMC through identification of areas of mutual interest and socio-economic monitoring priorities related to the Mary River Project, communities, and the Baffin region as a whole.

Baffinland met with the QSEMC on July 20-21, 2016 to provide a review of its 2015 Socio-Economic Monitoring Report and to discuss the scope of the proposed 2016 report. The group also discussed regional socio-economic monitoring initiatives and findings. Meeting notes from this meeting are included in Appendix C3.

A meeting of the SEMWG was held on July 19, 2016. The focus of the meeting was to review Baffinland's 2015 Socio-Economic Monitoring Report (Jason Prno Consulting Services Ltd. 2015) and to discuss the scope of the proposed 2016 report.

2.4.4 Mary River Community Group

In 2014, the Pond Inlet Community Advisory Group (CAG) was established in Pond Inlet, working from the remaining membership of an Inuit Knowledge working group in Pond Inlet called Pisiksik which had worked under the direction of Baffinland consultants on the Inuit Knowledge Study. The purpose of the CAG was to create a direct line of communication and dialogue between the residents of Pond Inlet and Baffinland. Early in 2015, QIA proposed the creation of a new group supported by both the QIA and Baffinland. CAG supported this initiative and in 2015 the Mary River Community Group (MRCG) was established.

According to the Terms of Reference, the MRCG will:

- Provide a means for the exchange of ideas and topics related to the Mary River Project, including topics such as: environmental aspects and monitoring; cultural considerations; local economic development; employment; education and training; engagement of youth; public safety; and other socio-economic matters
- Provide a venue for the exchange of information related to the implementation of PC No. 005 conditions
- Provide updates on IIBA implementation and understand community perspectives
- Provide the opportunity for the community to present questions and seek information related to the Project
- Provide any other updates on the Project related to the community of Pond Inlet

The MRCG is not intended to duplicate requirements already in place for the project such as the Marine Environment Working Group, the Terrestrial Environment Working Group, the Socio-Economic Working Group, or the Executive Committee of QIA.

The MRCG met on May 11, 2016 to discuss the progress of Phase 2, Baffinland's approach to community engagement and shipping issues. Meeting notes are included in Appendix C4.

2.4.5 Pond Inlet Youth Council

Baffinland met with the Pond Inlet Youth Council for the first time on May 10, 2016. Meeting notes are included in Appendix C5.

2.4.6 Looking Ahead

Throughout 2016 Baffinland had numerous engagements with outside parties to advise on and guide Project related monitoring and mitigation measures. These working groups provide a beneficial platform to engage with multiple technical experts, regulatory agencies and advisory groups at one time. Baffinland will continue to engage with these parties and strengthen the relationships within the working groups.

Representative photographs of some of the engagement activities throughout 2016 are presented in Appendix D.

3 – OPERATIONS OVERVIEW

3.1 SITE ACTIVITIES COMPLETED IN 2016

Baffinland focused on mine production from Deposit No. 1 in 2016. Mine construction was largely completed by 2015, so construction activities were mostly limited to improvements to address erosion and sediment control issues. Key activities undertaken in 2016 were at the active Project component areas including Milne Port, the Milne Inlet Tote Road, and the Mine Site. No project activities were undertaken along the south railway or at the Steensby Port site in 2016.

Mining and hauling activities from the Mine Site to Milne Port continued throughout 2016, with 3.2 million tonnes mined and hauled using the Tote Road. 2016 marked the second season of open water shipping of iron ore with a total of 2.75 million tonnes of iron ore shipped between July and October. This is a significant increase over the 0.9 million tonnes shipped in 2015.

Construction activities in 2016 included installation of IT infrastructure, completion of the Waste Rock Sedimentation Pond and associated ditching, and completion of ditching the perimeter of the Mine Site Crusher Pad and the Ore Stockpile in Milne. Construction activities also included conversion of the concrete batch plant to a maintenance building. Standard maintenance of the Tote Road continued throughout the year.

In addition to mining and construction, other activities undertaken in 2016 included:

- Management of hydrocarbon impacted soils within the existing landfarm
- Removal of sea-can bridges along the Tote Road
- A regional mineral exploration field program
- Environmental monitoring programs
- Completion of various engineering and environmental baseline studies to support the Phase 2 Expansion Project
- Removal of components from the inactive Steensby Port camp
- A drill program to characterize the geology along the proposed rail line to Milne Port
- Operation of helicopter and fixed wing aircraft to service regional exploration, environmental baseline studies, environmental monitoring, and other general site activities

Representative photographs showing major 2016 site activities are included in Appendix D.

3.2 HIGHLIGHTS AND CHALLENGES

The Project has been in operation since September 2014 and the operational experience gained proved high volume, bulk commodity mining in the Canadian Arctic is feasible. Despite harsh environmental and economic conditions, Baffinland has continued to invest in the Project with the goal of increasing production to reach an economically sustainable operation.

Operations

Early in 2016, the low iron ore prices continued to place a strain on the sustainability of the Mary River Project. Throughout the year, market prices began to move upward, from a low of USD \$41/t in January reaching a peak of \$80 US/t in December 2016. This improvement in market conditions and increased production allowed Baffinland to re-instate the employee salary cuts that were required in 2015 to maintain operations.

Even with rebounding market conditions, Baffinland faced a number of operational challenges throughout 2016. The spring of 2016 marked an early and intense freshet which resulted in a Letter of Non-Compliance (LNC) from INAC (2016) relating to Part D of Type A Water Licence 2AM-MRY1325 (Nunavut Water Board, 2014).

Baffinland was also issued a *Fisheries Act* Directive (FAD) in June by Environment and Climate Change Canada (ECCC, 2016a). The *Fisheries Act* Directive was a result of the release of sediment above applicable regulatory guidelines in run-off during freshet, as noted by INAC and ECCC during their joint site inspection on May 18 and 19, 2016. In response, Baffinland completed a number of construction projects designed to reduce sediment release and prepared a completion report outlining the measures to be taken to address dust and sediment issues (Baffinland, 2016c), including a schedule of actions outlined in the Sediment and Dust Mitigation Action Plans, to reduce future impacts (Golder, 2016a,b).

Employment and Skills Development

Baffinland conducted surveys in 2016 with the North Baffin communities and Baffinland Mine site employees which provided valuable feedback on the impacts and views of the Project from those who are affected most.

With the growth from construction in 2013 to an operational Project in late 2014 and 2015, 2016 efforts were focused on ensuring that the Baffinland corporate and site environment were set for success. A number of staffing changes occurred in 2016 including the re-establishment of a robust Sustainable Development department which includes a division dedicated to Inuit, Government and Stakeholder Relations. Under the Director of Inuit, Government and Stakeholder Relations there are Inuit-held corporate positions of a Senior Northern Affairs Manager, an Inuit Education and Training Specialist, an Inuit Impact and Benefit Agreement Coordination Manager and Community Liaison Officers in each of the five North Baffin communities of Pond Inlet, Clyde River, Arctic Bay, Igloolik and Hall Beach.

Baffinland has continued to struggle with the retention of Inuit employees on the Project and has fallen short of their target goal of 25% Inuit employment in 2016. In response, Baffinland is developing a revised Work Ready Program which is scheduled to be delivered to the five North Baffin communities and Iqaluit in the third quarter of 2017. The revised program will focus on addressing identified barriers to Inuit employment and retention at Baffinland. In addition to this program, Baffinland and QIA will be holding a Career Information and Training Tour in the early second quarter of 2017. Representatives of Baffinland Human Resources and the QIA will visit the five North Baffin communities and Iqaluit to provide information respecting the recruitment process, the availability of training programs and support networks, and other employment-related information. Baffinland also plans to implement an 8-week check-in program, which will work with Inuit to resolve concerns identified during their probation period. Other initiatives will focus upon potential on-site apprenticeship and mentoring opportunities, enhanced cross-cultural awareness training and the re-evaluation of the application and interview process for Inuit.

Community

Baffinland re-invigorated its efforts towards community engagement throughout the year. In an effort to support students who are pursuing higher education, Baffinland donated 46 laptops to high school graduates, and awarded seven \$5,000.00 scholarships to students currently enrolled in post-secondary education. During the holiday season in 2016, Baffinland assisted with a country food exchange between Pond Inlet and Hall Beach; Pond Inlet sent five boxes of maktaaq to Hall Beach, while Hall Beach sent 11 bundles of caribou meat and four bundles of fermented walrus to Pond Inlet. Baffinland also assisted Sarvaq by delivering Christmas Hampers to Arctic Bay and Igloolik.

Baffinland assisted in a Search and Rescue (SAR) operation in the Bylot Island area in September 2016. There were four people stranded on Bylot Island near Pond Inlet. It was reported that they lost control of their boat in rough seas. The local officials requested to have Baffinland use their chartered helicopter to extract the four individuals, one of whom was ill. Baffinland was able to dispatch the helicopter and take the four individuals to Pond Inlet where they were received by local officials.

Relationship with QIA

On July 19, 2016, QIA issued a Notice of Arbitration claiming that Baffinland was in default of its Advance Payment obligations under the Inuit Impact and Benefit Agreement (IIBA) which had been entered into in September 2013 (QIA and Baffinland, 2013). The arbitration involves a disagreement as to the meaning of ‘commercial production’ and the ‘intended capacity’ of the Project. Hearings were originally scheduled for October 2016 but have been deferred until early 2017. Notwithstanding the ongoing arbitration proceedings, Baffinland is committed to maintaining a positive and constructive working relationship with the QIA in order to ensure effective implementation of the provisions of the IIBA and the continued progress of the Mary River Project.

3.3 LOOKING AHEAD

Baffinland will be focusing on increasing mine production in 2017 towards the approved maximum production rate for the ERP of 4.2 million tonnes per year. Further upgrades to the Milne Inlet Tote Road will continue, as well as additional geotechnical investigations along the proposed railway alignment between Milne Port and the Mine Site to support expansion opportunities.

The proposed 2017 work plan was submitted to the Nunavut Water Board (NWB) and the QIA on November 4, 2016 (Baffinland, 2016d). This submission is a requirement under Part J, Item 3 of Amendment No. 1 of Type ‘A’ Water Licence 2AM-MRY1325 and under Section 6.1 of Commercial Lease No. Q13C301 agreed between Baffinland Iron Mines Corporation and the QIA (QIA, 2013).

A summary of the planned 2017 activities are as follows:

1. Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore.
2. The continued development and construction of infrastructure required at Milne Port and the Mine Site, and along the Tote Road.
3. Mobilization of additional 49-person camp at Milne Port and continued operation of Mine Site and existing Milne Port camps to support ongoing operations and construction activities which will include the use of water and deposition of waste as authorized under existing permits.
4. On-going operation of permitted quarry and borrow sources; there are also additional planned quarries or borrow areas along the Tote Road that are identified and are to be utilized during 2017.
5. At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive during open water (approximately between mid-July and mid-October 2017). Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year round via the Tote Road.
6. Geotechnical drilling may be required to support engineering, design and construction activities of Project.
7. Ongoing environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements.
8. Continued environmental monitoring in accordance with the PC, licenses, authorizations, management plans and environmental effects monitoring plans.
9. On-going exploration activities including mapping, prospecting, sampling, and geophysics. There is the potential for a drilling and/or trenching program but these items are not yet finalized.

No activities are planned to be undertaken along the south railway or at Steensby Port in 2017.

4 – PERFORMANCE ON PC CONDITIONS

4.1 APPROACH TO REPORTING PERFORMANCE

The format of the annual report has been revised in an attempt to improve both the clarity and conciseness of the information presented. This revision includes a one to 3-page report for each PC condition providing a summary of Baffinland’s (the Proponent’s) progress with respect to meeting the commitments set out in NIRB Project Certificate No. 005, and Proponent Commitments set out in Appendix A of the Final Hearing Report.

Baffinland’s performance against the PC conditions are described in this section. Table 4.1 provides an outline of the summaries for each PC condition.

Table 4.1 Outline of Inclusions in the Project Certificate Terms and Conditions Summary Sheets

Category	Summary of Content
PC Condition Details	<ul style="list-style-type: none"> PC condition category and description Responsible party(s) Applicable reference document, and a hyperlink to Baffinland’s website to view the applicable document
Reporting Requirement (PC)	<ul style="list-style-type: none"> The reporting requirement as outlined in PC No. 005
Status	<ul style="list-style-type: none"> An indication that the PC condition has been Completed, Deferred, or Not Applicable (in the current year), or In Progress
Methods	<ul style="list-style-type: none"> The methods employed to complete the monitoring required by /to ensure compliance to the PC condition and identifies any adaptive management measures employed that year
Results	<ul style="list-style-type: none"> Summary of the 2016 results of the work being done to fulfill the PC condition
Trends	<ul style="list-style-type: none"> Summary of notable trends from previous years
Recommendations/Lessons Learned	<ul style="list-style-type: none"> Conclusion on overall compliance. Discussion of any operational changes undertaken or recommended for the future to achieve compliance or improved environmental performance. Discussion of effectiveness of monitoring program and whether any changes to the monitoring are appropriate. Identification of any challenges, including challenges implementing mitigation measures, undertaking monitoring, or obtaining data from other sources.

4.2 OVERALL PERFORMANCE ON PROJECT CONDITIONS

Figure 4.1 presents the overall performance of Baffinland against the terms and conditions set out in the Mary River Project Certificate. The status of each condition is identified as one of the following:

- **Complete** - Condition requirements have been met.
- **In Progress** - Baffinland is in the process of meeting the condition requirement(s).
- **Not applicable in 2016** - Condition is tied to a certain phase or activity of the project which is not currently applicable (such as construction or closure and reclamation).
- **Deferred** - Condition is specific to an aspect of the Project which is not yet active (such as the Steensby Port, south railway, or shipping through sea ice); these conditions will be addressed when required.

Baffinland’s performance in fulfilling the PC conditions in 2016 is presented on Figure 4.1. A summary of each of the conditions and the Project status with respect to the conditions in 2016 is presented in Appendix A.

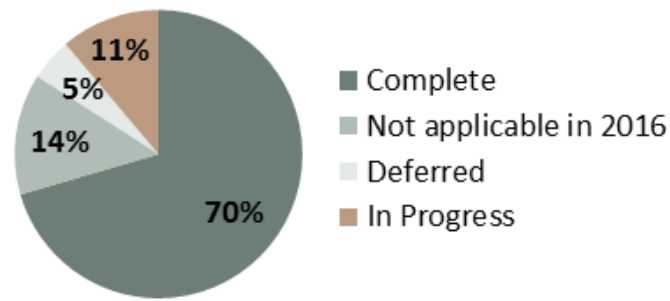


Figure 4.1 Baffinland's Overall Performance against Project Certificate Conditions in 2016

Overall, Baffinland is completing the required terms and conditions for the Project. In areas where improvement is required Baffinland will continue to make operational changes and work with its regulators and the communities to ensure the Project remains in compliance with Project Certificate No. 005.

4.3 PERFORMANCE ON GENERAL CONDITIONS

The following presents the performance on general conditions set out in Section 4.1 of the Project Certificate, and Baffinland's comment on the condition performance. Items one to four in this section of the Project Certificate speak to the NIRB's monitoring responsibilities. Baffinland has provided 2016 updates on the status of items five through 12 below.

5. The Proponent must obtain all required federal and territorial permits and other approvals, and shall comply with the requirements of such regulatory instruments.

Baffinland has approvals from NIRB to construct and operate the 18 Mtpa rail project and the 4.2 Mtpa ERP with Project Certificate No. 005, as well as the permits necessary to operate the 4.2 Mtpa ERP (Table 1.1). The company will obtain additional permits prior to initiating construction of the 18 Mtpa rail project.

These authorizations often include their own annual reporting requirements. Other major annual reports include the combined annual report pursuant to Baffinland's Type A Water Licence and Commercial Lease. The Annual Report to the NWB and QIA is substantial and, in comparison to the NIRB Annual Report, includes much greater detail on water, waste rock and waste management activities, as well as spill management and other topics related to water.

As required under the IIBA, a separate report on the status of implementation of the agreement will be issued to the Qikiqtani Inuit Association and Joint Executive Committee on March 31, 2017. The contents of the IIBA address or partly address many components of socio-economic monitoring and management. These reports can be found on Baffinland's Document Portal at: <http://www.baffinland.com/shareddocuments/>.

6. The Proponent shall take prompt and appropriate action to remedy any occasion of non-compliance with environmental laws and regulations and/or regulatory instruments, and shall report any non-compliance as required by law immediately. A description of all instances of non-compliance and associated follow up is to be reported annually to the NIRB.

The Company's performance on compliance with its regulatory instruments is described in Section 4.4

7. The Proponent shall meet with respective licensing authorities prior to the commencement of construction to discuss the posting of adequate performance bonding. Licensing authorities are encouraged to take every measure to require that sufficient security is posted before construction begins.

Closure and reclamation costs and resulting corresponding bonding requirements 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 License Amendment No. 1 2AM-MRY1325 and QIA Commercial Lease. Under the ASR process, Baffinland, the respective landowners (the QIA & the Crown), the Nunavut Water Board, and other interested parties meet and confer to determine the estimated closure and reclamation costs for an upcoming year. Publicly 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.

Items eight to twelve speak to conditions related to monitoring records. The condition and Baffinland's response are included below.

8. All monitoring information collected pursuant to the Project Certificate and various regulatory requirements for the Project shall contain the following information:

- a. The name of the person(s) who performed the sampling or took the measurements including any relevant accreditations;*
- b. The date, time and place of sampling or measurement, and weather conditions;*
- c. The date of analysis;*
- d. The name of the person(s) who performed the analysis including any relevant accreditations;*
- e. A description of the analytical methods or techniques used; and*
- f. A discussion of the results of any analysis.*

Baffinland ensures that the records for all monitoring programs includes the above information. Baffinland has included this requirement in all monitoring program outlines and notifies all external consultants of the requirements.

9. The Proponent shall make its monitoring results available, to the fullest extent possible, in English and Inuktitut.

From 2014 to 2016 Baffinland included a summary of all monitoring programs in the executive summary of the NIRB annual report which was translated into Inuktitut. In 2017, Baffinland will be implementing actions to ensure that Socio-economic, Terrestrial and Marine Annual Monitoring reports include a Popular Summary with translation into Inuktitut. Meeting minutes from the environmental working group meetings will also be translated into Inuktitut.

10. The Proponent shall keep and maintain the records, including results, of all Project-related monitoring data and analysis for the life of the Project, including closure and post-closure monitoring.

Baffinland keeps and maintains all Project-related monitoring data and will continue to do so.

11. The Proponent shall maintain the Final Environmental Impact Statement and the Environmental Effects Monitoring program developed for the Project, with predictions updated as new baseline data is collected.

The Environmental Effects Monitoring programs are reviewed on a regular basis through discussions with the Terrestrial and Marine Environmental Working groups. Monitoring programs that are not managed under one of the environmental working groups, are reviewed with applicable regulatory agencies.

12. The Proponent shall establish a Project-specific web portal or web page as a means of making all non-confidential monitoring and reporting information associated with the Project available to the general public. This does not limit what the Proponent may be required to submit to the NIRB or other regulatory authorities to meet reporting requirements.

In 2017 Baffinland launched a Project-specific Document Portal on its corporate website in order to provide non-confidential monitoring and reporting information to the public (www.baffinland.com/documents). The web portal was live as of March 31, 2017. Where possible the web portal will provide links to English and Inuktitut versions of the popular summary of reports as

well as the main body of the report or document. 2016 reports have not been produced in a way which allows this availability. It is anticipated that it will take one to two years to have reporting structures and the web portal developed in such a way to provide most documents with a bi-lingual component.

Baffinland will continue to provide all documentation required by regulatory agencies directly to the appropriate body.

4.4 PERFORMANCE ON COMPLIANCE WITH REGULATORY INSTRUMENTS

General regulatory requirements under the Project Certificate requires Baffinland to take prompt and appropriate action to remedy any occasion of non-compliance, and to report all instances of non-compliance and associated follow-up annually to the NIRB. Baffinland's compliance in 2016 with its applicable regulatory instruments is discussed below.

4.4.1 Agency Inspections and Site Visits

In 2016, Baffinland hosted numerous regulatory inspections from Indigenous and Northern Affairs Canada (INAC), Environment and Climate Change Canada (ECCC), Qikiqtani Inuit Association (INAC) and the Workers' Safety and Compensation Commission (WSCC). Documentation and correspondence associated with these inspections are provided in the 2016 QIA and NWB Annual Report for Operations.

4.4.1.1 *Fisheries Act* Direction and Letter of Non-Compliance

Following an early and intense freshet, Baffinland received a *Fisheries Act* Direction (FAD) from Environment and Climate Change Canada (ECCC, 2016a) and a Letter of Non-Compliance (LNC) from INAC (INAC, 2016) on June 7, 2016 and June 16, 2017, respectively. The FAD and LNC were based on concerns identified during inspections made of the Mary River Project by ECCC and INAC Enforcement and Water Resources Officers during the period of May 18 to 20, 2016.

The FAD and LNC specified measures to be taken by Baffinland to reduce the risk of ongoing and future sedimentation and to also take action to improve current conditions (e.g., completion of some construction ditching projects). Baffinland acted quickly to address concerns raised in the FAD and LNC, providing biweekly progress reports and a final completion report to INAC and ECCC, to inform regulators of the corrective actions taken and planned to address outstanding concerns. The FAD, LNC, biweekly reports and the completion report are provided in the 2016 QIA and NWB Annual Report.

4.4.1.2 INAC Inspections

During 2016, four (4) inspections were conducted by INAC Water Resources Officers:

- May 18 - 20
- July 6 - 8
- July 27 - August 3
- September 28 - 30

Inspection results were conveyed during close-out meetings and are documented in Water Licence Inspection Reports subsequently distributed to Baffinland. Baffinland responds to any issues raised during the inspections to provide additional information or address the issue. More details are available in the 2016 QIA and NWB Annual Report.

4.4.1.3 QIA Inspections

In 2016, two (2) inspections were conducted on the following dates by the QIA under the agreement of the Commercial Lease:

- June 24 - 28
- August 11 - 15

In addition to the inspections, the QIA conducted one (1) environmental audit during period of September 15 to 21, 2016.

The findings from the audit and inspections were conveyed during the close-out meetings between the QIA personnel and Baffinland representatives as well as documented in subsequent reports and correspondence. Baffinland responds to any issues raised during the inspections to provide additional information or address the issue. More details are available in the 2016 QIA and NWB Annual Report.

4.4.1.4 Workers' Safety and Compensation Commission (WSCC) Mine Inspections

In 2016, the Workers' Safety & Compensation Commission (WSCC) conducted four (4) inspections of both the Mine Site and Milne Port. The reports for these inspections were distributed to Baffinland management as well as Baffinland's Occupational Health & Safety (OHS) Committee. The inspections conducted over 2016 resulted in directives being issued to the company over the course of the year. All directives were reviewed by the management team and responses were sent to the WSCC Mines Inspector within a timely manner.

4.4.2 Unauthorized Discharges and Spills

Overall, the frequency of spills reported to the Nunavut Spill Line, INAC and QIA decreased by 42 percent in 2016, when compared to the frequency of reportable spills in 2015.

During 2016, twenty-four (24) spills were reported to the Nunavut Spill Line, INAC and QIA. Five (5) spills were unauthorized releases of sediment to receiving water bodies during freshet and nineteen (19) spills met or exceeded the reporting threshold for hazardous materials as outlined in the Nunavut Spill Contingency Planning and Reporting Regulations. The twenty-four (24) reportable spill events are listed in Table 4.2. The five (5) sediment releases occurred in water bodies at the Mary River Mine Site and along the Tote Road during freshet in May and June. Corrective actions taken to address these sediment releases were documented and provided to regulators in the FAD-LNC biweekly reports and completion report. During 2016, there were also several significant natural sedimentation events upstream of Project infrastructure. On June 28, 2016, a tributary was discharging significant amounts of sediment into Phillips Creek near the Km 17 Bridge along the Tote Road. Upon investigation, it was determined that an ice dam at the outlet of a highland lake had released, resulting in high flows and bank scouring and erosion of the Phillips Creek tributary. Water quality monitoring conducted at the outlets of the Phillips Creek tributary and Phillips Creek indicated TSS levels reaching as high as 600 mg/L at the outlet of the tributary. On July 26, 2016 it was observed that Mary River was discharging significant amounts of sediment into Sheardown Lake (SE Basin) and Mary Lake (South Basin). Upon investigation, it was determined that the primary source of the sediment was natural bank erosion along a small Mary River tributary approximately 16 kilometers upstream of the Mine Site. The erosion of the bank appeared to be caused by a combination of recent rainfall events prior to the event and continued snow melt/thaw. Following the sedimentation event, the bank along the Mary River tributary continued to thaw and caused an additional sedimentation event in Mary River in late August.

For the remaining nineteen (19) spills, a detailed follow-up report was submitted within thirty days of each reported spill in addition to the original spill report submitted within 24 hours of each spill event. The follow-up reports included a description

of the event, the immediate cause(s), corrective and preventative action(s), and a map showing the location of the spill. Original spill reports and follow-reports are provided in the 2016 QIA and NWB Annual Report.

Table 4.2 List of Unauthorized Discharges in 2016

Date of Occurrence	Quantity (L)	Product Spilled	Approximate Location (UTM Coordinates)	Proximity to Water body?	Spill Line ID No.
6-Jan-16	120	Gear/Lube Oil	17 W 561662 7913179	>150 m	16-006
26-Feb-16	120	Fuel - Diesel	17 W 503879 7976063	> 200 m	16-056
1-Mar-16	300	Gear/Lube Oil	17 W 561684 7913147	> 100 m	16-063
3-Mar-16	100	Grey Water	17 W 561353 7913349	> 100 m	16-065
4-Apr-16	140	Engine Oil	17 W 558283 7914563	> 100 m	16-109
3-May-16	300	Fuel - Diesel	17 W 503714 7976179	> 200 m	16-149
7-May-16	-	Sediment	Sheardown Lake and Tributary	-	15-158
10-May-16	250	Fuel - Diesel	17 W 521762 7949583	> 100 m	16-159
17-May-16	-	Sediment	Camp Lake and Tributary	-	16-176
20-May-16	-	Sediment	Sheardown Lake and Tributary	-	16-181
26-May-16	1000	Waste Oil	17 W 558314 7914506	> 500 m	16-195
29-May-16	-	Sediment	Camp Lake and Tributary	-	16-198
31-May-16	-	Sediment	Water Bodies along Tote Road	-	16-2021
6-Jun-16	1000	Grey Water	17 W 561353 7913349	> 100 m	16-210
16-Jul-16	200	Hydraulic Oil	17 W 563249 7914665	> 500 m	16-264
2-Aug-16	155000	Fuel - Diesel	17 W 503712 7976182	> 200 m	16-283
26-Aug-16	1500	Grey Water	17 W 561353 7913349	> 100 m	16-315
06-Sep-16	2500	Sewage	17 W 561325 7913254	> 100 m	16-327
12-Sep-16	200	Hydraulic Oil	17 W 503298 7976333	> 100 m	16-338
09-Oct-16	1000	Grey Water	17 W 561353 7913349	> 100 m	16-374
12-Oct-16	300	Sewage	17 W 561327 7913431	> 100 m	16-377
14-Nov-16	500	Grey Water	17 W 561353 7913349	> 100 m	16-403
03-Dec-16	1	Gear/Lube Oil	17 W 542310 7922176	0 m	16-414
27-Dec-16	150	Sewage	17 W 561325 7913254	> 100 m	16-434

On Aug 2, 2016, 155,000 litres of diesel was released into the engineered secondary containment berm of the Milne Port Tank Farm as result of a ruptured pipe. During the incident, no diesel fuel or impacted water was released to the receiving environment. To date operations has recovered 130,000 litres of diesel and impacted water from within the Milne Port Tank Farm containment berm. Operations continues to address the cause of the incident and will continue fuel recovery efforts, water treatment and monitoring at the Milne Port Tank Farm in 2017.

4.4.3 Water Licence Compliance (Type A 2AM-MRY1325 and Type B 2BE-MRY1421)

4.4.3.1 Conditions Applying to Water Use

Under the Type A and Type B Water Licences, Baffinland is required to record and report on its water usage, and remain within the limits identified in the water licence. Baffinland did not exceed its daily water usage limits in 2016. Details on water use are provided in monthly monitoring reports filed with the NWB, as well as the annual reports to the QIA and NWB.

4.4.3.2 Effluent Discharges

Compliance monitoring specific to Project effects on the freshwater environment were conducted to satisfy requirements under the Type A Water Licence No. 2AM-MRY1325, and PC conditions 17 and 24. Details on monitoring conducted in 2016 under the Type A Water Licence are provided in monthly monitoring reports filed with the NWB, as well as the 2016 QIA and NWB Annual Report for Operations.

During 2016, there were a number of sedimentation events and incidents where water samples collected downstream of Project quarries and construction and operation areas exceeded the applicable discharge criteria for total suspended solids (TSS). In each case, appropriate control measures were implemented to restore TSS levels below applicable discharge criteria.

In addition, there were four (4) minor exceedances during the active discharge of Project effluents to the receiving environment. These exceedances are summarized below (Table 4.3) and are further discussed under PC Condition 17 of this report.

Table 4.3 Water Licence Monitoring Results for Discharged Project Effluents

SNP Station	Description	Non-compliance	Date
MS-01	Treated effluent from the Mine Site Wastewater Treatment Plant (WWTP). Exceedance due to upset conditions at the WWTP and/or issues during sample collection.	Faecal coliforms exceedance	February 23, 2016
MP-04	Treated effluent from the mobile Oily Water Treatment System at the Milne Port Landfarm Facility.	TSS exceedance	August 17, 2016 August 22, 2016
MS-08	Effluent from the Mine Site Waste Rock Sedimentation Pond. Disturbed sediments during sampling.	TSS exceedance	September 2, 2016

Several sampling results with exceedances were pre-discharge characterization samples, with no discharge to the receiving environment, and consequently no effects to the freshwater environment occurring.

All monitoring results reported under the Type A Water Licence along with further discussion of the exceedances, including corrective actions taken, are provided in the 2016 QIA and NWB Annual Report for Operations.

Water quality monitoring was not required under the Type B Water Licence due to the limited mineral exploration and geotechnical drilling activities undertaken in 2016.

4.5 PERFORMANCE ON ECOSYSTEMIC CONDITIONS

4.5.1 Meteorology and Climate (PC Conditions 1 through 6)

The first six (6) PC conditions relate to the potential impacts of the Project on meteorology and the climate, including climate change.

Stakeholder Feedback

Baffinland's stakeholders have identified climate change as a key issue for the Project. Communities report observations of the changing climate, and the NIRB prescribed several conditions in Baffinland's Project Certificate related to climate change, requesting Baffinland to identify GHG emissions reduction opportunities and to share any research or observations of climate change with communities, agencies and researchers. In 2015 and 2016, Baffinland engaged the communities of Pond Inlet and Arctic Bay through workshops to discuss the Phase 2 Proposal, and a limited amount of feedback was received in regard to observations of climate change.

Monitoring Activities

Baffinland operates meteorological stations and this information is made publically available on its website. As it is still early in the Project life, no observations of climate change impacts have been observed. Baffinland continues to track and monitor Greenhouse Gas (GHG) emissions and report as per Environment Canada’s GHG Emissions Reporting Program, which is included as part of the Air Quality and Noise Abatement Plan (Baffinland, 2016e). Baffinland is developing a Climate Change Strategy, which the company aims to implement in 2017.

Table 4.4 provides a summary of climate effects, monitoring completed in 2016, and an evaluation of impacts relative to the predictions presented in the FEIS. The calculated gaseous emissions in 2016 were below the maximum annual GHG emissions predicted in the FEIS.

Table 4.4 Climate Impact Evaluation

Component	Effect	Monitoring Program	Impact Evaluation
Greenhouse Gases (GHGs)	Increased GHG emissions	GHG emissions calculated from fuel combustion: Emissions below FEIS forecast	Effect within FEIS predictions
SO ₂ and NO ₂	Increased SO ₂ and NO ₂ emissions	SO ₂ and NO ₂ emissions calculated from fuel combustion: Emissions below FEIS forecast	Effect within FEIS predictions

Path Forward

In 2017, Baffinland plans to establish its Climate Change Strategy. This will be an important tool to guide and articulate Baffinland’s efforts on PC conditions 2, 3 and 4. Baffinland will continue to conduct monitoring activities and develop initiatives to ensure any impacts that the Project may have on the climate are measured to the extent possible. Reporting on each PC condition is included in the pages that follow.

Project Certificate Condition No. 1

Category	Meteorology and Climate
Responsible Parties	The Proponent
Project Phase(s)	All phases
Objective	To provide data on tide levels and storm surges
Term or Condition	The Proponent shall use GPS monitoring or a similar means of monitoring at both Steensby Port and Milne Port, with tidal gauges to monitor the relative sea levels and storm surges at these sites
Reporting Requirement	The Proponent shall summarize and supply these monitoring results to NIRB in the annual project report
Status	In Progress
Stakeholder Review	None
Reference	None
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

In 2014, tide data was collected using a tidal gauge installed at Milne Port (ASL Environmental Sciences, 2015). The data retrieved at that time was used to support oceanography and ballast water dispersion modelling for the Project. Following completion of the modelling exercise, the gauge was removed and was not re-installed at Milne Port in 2016.

Baffinland does not see the need to install a tidal gauge(s) at Steensby Port, as that phase of the project is currently inactive.

RESULTS

No results available from Milne Port for the 2016 year. No activity took place at Steensby Port in 2016.

TRENDS

Trends cannot be predicted based on data available only from 2014.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has engaged a marine consultant to install a tidal gauge(s) and GPS monitoring at Milne Port in the summer of 2017, with the intention of renewing the monitoring of relative sea levels and storm surges at the site.

The measurement of sea levels and storm surges at Steensby Port will be re-evaluated when activities are renewed at Steensby Port.

Project Certificate Condition No. 2

Category	Meteorology and Climate - Climate Change Validation and Studies
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide feedback on the impacts that climate change might be having on the Project
Term or Condition	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
Reporting Requirement	The Proponent shall provide new or revised assessments and studies to the NIRB, the affected communities, relevant regulatory authorities, and interested parties
Status	Not applicable in 2016
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

No new or revised assessments nor studies were conducted in 2016. Baffinland is currently developing a climate change strategy in 2017 as a component of the Phase 2 Expansion Project.

Project Certificate Condition No. 3

Category	Meteorology and Climate - Green House Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To confirm that the Proponent is exploring and implementing concrete steps to reduce greenhouse gases
Term or Condition	The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions
Reporting Requirement	The Proponent shall include relevant information in the Annual Report submitted to the NIRB
Status	In Progress
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Air Quality and Noise Abatement Management Plan
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

To date, Baffinland has calculated its annual Greenhouse Gas (GHG) emissions in accordance with PC Condition 6. In late 2016, Baffinland initiated the development of a Climate Change Strategy, which is expected to be completed by the end of 2017. The strategy will include a commitment to evaluating GHG reduction opportunities.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 4

Category	Climate Change - Consultation on Climate
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote public awareness and engagement of affected groups
Term or Condition	The Proponent shall endeavour to include the participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

No climate change related studies or research was conducted in 2016. Baffinland is currently developing a climate change strategy in 2017. The strategy will include Traditional Knowledge already collected by Baffinland as well as other sources of Traditional Knowledge. One of the objectives of the strategy is to involve Inuit from the local communities in any climate change studies undertaken in the future.

Project Certificate Condition No. 5

Category	Meteorology and Climate - Weather Monitoring Data
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide families of employees with up to date information
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Baffinland Corporate Website
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland ensures that weather related information is publicly accessible for the two active sites (Mary River and Milne Port) by posting current weather information on the Baffinland website (www.baffinland.com).

RESULTS

Weather related information for Project sites is publicly available.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide weather related information on the publicly available website for all active Project sites.

Project Certificate Condition No. 6

Category	Meteorology and Climate - Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide feedback on the Project's emissions
Term or Condition	The Proponent shall provide the results of any emissions calculations conducted to determine the level of sulphur dioxide (SO ₂) emissions, nitrogen oxide (NO _x) emissions and greenhouse gases generated by the Project using fuel consumption or other relevant criteria as a basis
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland used Environment and Climate Change Canada's (ECCC's) Facility Greenhouse Gas (GHG) Emissions Reporting, Technical Guidance on Reporting Greenhouse Gas Emissions (ECCC, 2016b) to calculate its annual GHG emissions. Annual emissions were calculated considering annual on-site fuel consumption, and waste management.

SO₂ and NO₂ emissions vary between types of equipment that burn fuel; heavy industrial mobile equipment has higher emission factors than small vehicles, which have higher emission factors than power generators. Because a detailed breakdown of fuel consumption by equipment was not available, Baffinland conservatively assumed that all fuel was consumed by the equipment on-site with the highest emissions factor (a front-end loader). Therefore, the calculated SO₂ and NO_x emissions presented overstate the actual emissions. The same methodology has been used each year.

RESULTS

Baffinland's 2016 annual emissions for GHG, SO₂ and NO₂ are presented in Table 4.5.

Table 4.5 Calculated 2016 Project Gaseous Emissions

Gaseous Emission	Units	Calculated Emissions
GHG	Kt-CO ₂ eq	116,400
SO ₂	t	2.70
NO ₂	t	2,308

TRENDS

Gaseous emissions have increased annually in relation to the increase in fuel consumption, as expected.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.5.2 Air Quality (PC Conditions 7 through 12)

Six (6) PC conditions relate to the potential impacts of the Project on air quality, including calculations of total Project emissions from fuel consumption and gaseous monitoring.

Stakeholder Feedback

Air quality has not been a significant focus of stakeholder concern. Of the potential air quality contaminants of concern, regulators and communities have focused on dustfall and potential impacts to soil, vegetation and forage to caribou.

Monitoring Activities

Table 4.6 provides a summary of air quality effects, monitoring completed in 2016, and an evaluation of impacts relative to the predictions presented in the FEIS.

Table 4.6 Air Quality Impact Evaluation

Component	Effect	Monitoring Program	Impact Evaluation
Particulate matter (PM), carbon monoxide (CO), mercury, dioxins, furans	Release of air contaminants, including PM, CO, mercury, dioxins, furans	Incinerator stack testing; not undertaken in 2016	Air quality limits should be met under normal operating conditions and appropriate use of incinerators
Total suspended particulate (TSP), sulphur dioxide (SO ₂), nitrogen dioxide (NO ₂), CO	Increased concentrations of TSP, SO ₂ , NO ₂ , CO and PAI	Not undertaken in 2016	2015 monitoring was below Nunavut air quality standards, and within FEIS predictions
Dustfall	Ore handling and transport, including wheel entrainment from haulage of ore	Dustfall monitoring was conducted along Milne Inlet Tote Road, at Mine Site and Milne Port. In 2016, dustfall at the Mine Site was within predicted levels, dustfall exceeded predicted levels at four Milne Port sites, and annual dustfall within 30 m and 100 m of the Tote Road centreline at both Tote Road south and north crossings exceeded predictions. Dustfall stayed relatively constant at most sites from 2015 to 2016. The 2016 monitoring results are summarized in PC Condition 58.	2016 dustfall monitoring exceeded FEIS predictions

Path Forward

In 2017, Baffinland plans to re-establish its gaseous emissions monitoring program and continue its dustfall monitoring program. The company will evaluate opportunities to reduce dustfall on the Project. Reporting on each PC condition is included in the pages that follow.

Project Certificate Condition No. 7

Category	Air Quality - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions
Term or Condition	The Proponent shall update its Air Quality and Noise Abatement Management Plan to provide for continuous monitoring at land-based monitoring stations designed to capture operations phase ship-generated SO ₂ and NO ₂ emissions at Steensby Port and Milne Port. Continuous monitoring is to be carried out through several shipping seasons at each port as required to determine that emissions are at acceptable levels.
Reporting Requirement	The updated plan shall be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	In Progress
Stakeholder Review	None
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016e)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Continuous ambient air quality monitoring was conducted beginning in Q4 of 2014 and continued throughout 2015. Monitoring was conducted at one station at both the Mary River and Milne Port site. Daily and monthly calibration checks of all instruments were completed and all instrument diagnostics appeared normal throughout the year. Monitoring was continued throughout the year yielding month-by-month results. Air quality data was compared to the Ambient Air Quality Standards (AAQS) as set out by the Government of Nunavut (2011).

The Air Quality and Noise Abatement Management Plan was last updated in March 2016. The updated plan was provided to the 2015 NIRB Annual Report.

RESULTS

No data were collected in 2016. The 2015 monitoring results were as follows:

- SO₂ levels at both sites do not exceed the 1-hour or 24-hour limits
- NO₂ levels peaked during the cold winter months (November to March) and were significantly lower during the warmer months (April to September)
- NO₂ levels at both sites do not exceed the 1-hour or 24-hour limits
- Maximum NO₂ levels recorded at Mary River were at about 90% of the 1-hour AAQS and 80% of the 24-hour AAQS
- Maximum NO₂ levels recorded at Milne Inlet were at about 45% of the 1-hour AAQS and the 24-hour AAQS

The Mary River site has an annual arithmetic mean for NO₂ of 17 ppb, while the Milne Port site has an annual arithmetic mean for NO₂ of 9 ppb during 2015 compared to the AAQS of 32 ppb. The annual arithmetic mean for SO₂ at both sites is less than 1 ppb compared to the ambient AAQS of 11 ppb.

TRENDS

Monitoring throughout 2015 concluded that all results were well below the AAQS. Data for both NO₂ and SO₂ shows a peak during the cold winter months and a significant decrease during the summer months.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland did not complete the required ambient air quality monitoring during 2016. In order to be in compliance with PC condition No. 007 in 2017, Baffinland is in the process of re-establishing the ambient air quality monitoring station at Milne Port in order to monitor NO₂ and SO₂ Project related emissions. Emissions will be monitored to ensure that maximum values remain below the AAQS. Following a number of shipping seasons, the data will be evaluated to determine what future actions and/or further monitoring are warranted.

Air quality monitoring at Steensby Port will be implemented when the Port is developed and shipping activities commence.

Project Certificate Condition No. 8

Category	Air Quality - Greenhouse Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions
Term or Condition	The Proponent shall demonstrate through monitoring of air quality at the mine site and at the Steensby Inlet and Milne Inlet port sites that SO ₂ and NO ₂ emissions remain within predicted levels and, where applicable, within limits established by all applicable guidelines and regulations. In cases where exceedances are manifested, the Proponent shall provide an explanation for the exceedance, a description of planned mitigation, and shall conduct additional monitoring to evaluate the effectiveness of mitigative measures.
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB
Status	In Progress
Stakeholder Review	None
Reference	Air Quality and Noise Abatement Plan (Baffinland, 2016e)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Monitoring of SO₂ and NO₂ was undertaken in previous years at both Milne Port and the Mine Site but was not undertaken in 2016. The monitoring equipment, measurement methods and Quality Assurance/Quality Control (QA/QC) measures are described in the Air Quality and Noise Abatement Plan.

RESULTS

Air quality monitoring was not completed in 2016.

TRENDS

In 2015, maximum measured NO₂ concentrations were below Ambient Air Quality Standard (AAQS). SO₂ concentrations at both sites remain quite low throughout the year and did not exceed the applicable guidelines.

The Mary River site had an annual arithmetic mean for NO₂ of 17 ppb, while the Milne Port site has an annual arithmetic mean for NO₂ of 9 ppb during 2015 compared to the ambient AAQS of 32 ppb. The annual arithmetic mean for SO₂ at both sites is less than 1 ppb compared to the ambient AAQS of 11 ppb. Data for both NO₂ and SO₂ shows a peak during the cold winter months and a significant decrease during the summer months. Maximum values were below applicable guidelines in 2014 and 2015.

RECOMMENDATIONS / LESSONS LEARNED

Air quality monitoring did not take place in 2016 as a result of equipment malfunctions which were not resolved throughout the year. Baffinland has retained an air quality consultant to re-commission the air quality monitoring equipment at the mine site and Milne Port in 2017. Air quality sampling at Steensby will be implemented when the Port is developed.

Project Certificate Condition No. 9

Category	Air Quality - Greenhouse Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions
Term or Condition	The Proponent shall provide calculations of greenhouse gas emissions generated by activities at the Steensby Inlet and Milne Inlet port sites and other Project sources including aircraft associated with the Project. Calculations shall take into consideration, fuel consumption as measured by Baffinland's purchase and use as well as the fuel use of its contractors and sub-contractors.
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

This information is reported under PC Condition No. 6. The Greenhouse Gas (GHG) emissions calculated for PC Condition No. 6 are inclusive of aircraft fuel purchased and used by Baffinland at site.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 10

Category	Air Quality - Dust Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to air quality from dust dispersion.
Term or Condition	<p>The Proponent shall update its Dust Management and Monitoring Plan to address and/or include the following additional items:</p> <ul style="list-style-type: none"> a) Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site b) Identify the specific adaptive management measures to be considered should monitoring indicate that dust deposition from trains transporting along the rail route is greater than initially predicted c) Outline specific plans for monitoring dustfall at intervals along and in the vicinity of the Milne Inlet Tote Road to determine the amount and extent of dustfall d) Identify the specific adaptive management measures to be considered if monitoring indicates that dust deposition from traffic on the Milne Inlet Tote Road is greater than initially predicted
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	Indigenous and Northern Affairs Canada, Environment and Climate Change Canada
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016e) Dust Management Protocol, Attachment A of the Road Management Plan (Baffinland, 2016f) Dust Mitigation Action Plan (Golder, 2016b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Dust Management and Monitoring was incorporated into the Air Quality and Noise Abatement Management Plan and the Road Management Plan (Attachment A, Dust Management Protocol) prior to the start of construction.

RESULTS

Not applicable.

TRENDS

Generally, dust levels are above the model predictions.

RECOMMENDATIONS / LESSONS LEARNED

A Dust Mitigation Action Plan was developed in 2016 in response to excessive dust, to identify specific adaptive management measures to be implemented to reduce dust emissions (Golder, 2016b). Retro-fit of equipment used for dust control will be taking place during 2017 (i.e. crusher dust reduction and watering trucks with spray bars for better utilization of suppression materials). The Roads Management Plan is undergoing revisions in 2017 to include adaptive management measures to be considered if dustfall deposition is elevated in comparison to predictions.

Project Certificate Condition No. 11

Category	Air Quality - Incineration Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to air quality from incineration activities
Term or Condition	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)
Reporting Requirement	Updated Incineration Management Plan to be provided to the NIRB at least 60 days prior to the commencement of construction activities
Status	Complete
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	An Incinerator Management Plan is presented as Section 3.5 of the Waste Management Plan (Baffinland, 2016g)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

An Incineration Management Plan is presented in Section 3.5 of the Waste Management Plan. Upon review of the plan, it is noted that currently the plan references the Government of Nunavut's *Environmental Guideline for the Burning and Incineration of Solid Waste* (Government of Nunavut, 2012). In 2017, Baffinland will review Section 3.5 of its Waste Management Plan to ensure it also aligns with the Environment Canada Technical Document for Batch Waste Incineration (EC, 2010).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 12

Category	Air Quality - Incineration
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to air quality from incineration activities
Term or Condition	Prior to commencing any incineration of on-site Project wastes, the Proponent shall conduct at least one stack test immediately following the commissioning of each temporary and permanent incinerator
Reporting Requirement	Stack test results to be reported to the NIRB and Environment Canada annually as required
Status	Complete
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

No new temporary nor permanent incinerators were commissioned in 2016. Stack testing was conducted on the incinerators when commissioned in 2013.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.5.3 Noise & Vibration (PC Conditions 13 through 15)

Five (5) PC conditions (including 13, 14, 14a, 14b and 15) relate to the potential impacts of the Project on noise and vibration.

Stakeholder Feedback

Stakeholders have expressed concerns regarding noise and vibration focused on effects to fish, inclusive of underwater noise and vibration impacts to fish and marine mammals. Impacts of noise and vibration have not been a focus of stakeholder concern.

Monitoring Activities

Monitoring of noise and vibration in 2016 was conducted within the accommodation building. Table 4.7 provides a summary of noise effects monitored in 2016, and an evaluation of impacts relative to the predictions presented in the FEIS.

Table 4.7 Noise and Vibration Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Ambient Noise and Vibration	Disturbance of sleeping workers, affecting worker health and safety	Measured indoor noise at worker accommodations at the Mine Site were below the World Health Organization's (WHO's) guideline for dormitory accommodations of 40 dBA at the Mine. The guideline was exceeded slightly at Milne Port (50.3 dBA), but remain within the acceptable range. Vibration at worker accommodations were not measurable by the equipment. Monitoring results are summarized in PC Condition 14.	Effects exceeded FEIS predictions
Underwater Vibration Levels	Increased vibration levels affecting fish in nearby watercourses	No Project interactions to monitor in 2016; no explosives used near watercourses in 2016.	N/A

The worst-case noise levels predicted in the FEIS ranged from 36 to 55 dBA, but outside of the accommodation building. The measured occupational noise and vibration levels were acceptable exceeded FEIS predictions at Milne Port, but were still within an acceptable range (the sound level of a clothes dryer) in 2016.

Path Forward

Baffinland will continue to monitor occupational noise at worker accommodations in 2017. Though not expected in 2017, any underwater vibration effects near or in water will be monitored for compliance with applicable thresholds. Reporting on each PC condition is included in the pages that follow.

Project Certificate Condition No. 13

Category	Noise and Vibration - Use of Explosives
Responsible Parties	The Proponent, Fisheries and Oceans Canada
Project Phase(s)	Construction
Objective	To determine appropriate protection of fish and aquatic life in the Arctic
Term or Condition	The Proponent is encouraged to work with Fisheries and Oceans Canada at the regulatory phase and to take a precautionary approach when selecting the overpressure threshold to be applied to explosives use for the protection of fish and aquatic life
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Department of Fisheries and Oceans (DFO), Qikiqtani Inuit Association (QIA), Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC), Nunavut Impact Review Board (NIRB)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2016m) Operations Blasting Procedure (Nuna Contracting Ltd., 2013) Environmental Protection Plan (Baffinland, 2016n)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland's Surface Water and Aquatic Ecosystem Management Plan states work requiring the use of explosives (blasting) in or near water bodies shall be carried-out in accordance with Fisheries and Oceans Canada (DFO, 1998) guidance, in order to mitigate possible effects on fish habitat and fish health. Blasting occurs as stipulated by the approved Baffinland Blasting Management Plan and Environmental Protection Plan.

The aforementioned plans preclude and mitigate the possibility of an explosive to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e., overpressure) greater than 100 kPa (14.5 psi) in the swimbladder of a fish. Setback distances for blasting are required.

Water Licence monitoring downstream of quarries is also performed to detect potential levels of ammonia runoff. The Aquatics Effects Monitoring Plan incorporates fish population health monitoring to detect potential mine related influences on fish and fish habitat.

RESULTS

Not Applicable. No blasting occurred in 2016 within the required setback distances.

TRENDS

Not Applicable. No blasting occurred within the required setback distance of fish habitat in previous years as stipulated by above DFO guidance document.

RECOMMENDATIONS / LESSONS LEARNED

Not Applicable.

Project Certificate Condition No. 14

Category	Noise and Vibration - Noise and Vibration Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate noise and vibration at Project sites, especially living areas
Term or Condition	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
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	In Progress
Stakeholder Review	None
Reference	None
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Noise and vibration monitoring at the Mary River and Milne Port sites accommodations is scheduled annually by Baffinland Health and Safety staff. Monitoring uses a sound meter with microphone and a vibration pad with meter set-up in different rooms and wings of accommodation buildings at both sites. The noise equipment used by Baffinland runs continuously for two 12 hr periods (the vibration equipment runs for two 10 hr periods) in each room with calibration of the instruments occurring before and after use as well as between the periods. Monitoring is conducted once per summer and once per winter season. For comparison, the types of noises that correspond to the range of noise levels measured at the Project sites (35 to 65 dBA) are as follows:

- 35 dBA - Average whisper; typical quiet outdoors
- 40 dBA - Typical background noise level in a library
- 45 dBA - Background office noise caused by an heating, ventilation and air conditioning (HVAC) system
- 50 dBA - Clothes dryer
- 55 dBA - Running tap water
- 60 dBA - Background noise in a large department store
- 65 dBA - Normal human speech in an unraised voice at a distance of 1 m

Also for comparison, the World Health Organization (WHO) (2009) recommends an indoor A-weighted energy equivalent sound level (LAeq) of 40 dBA for night noise while Health Canada (2012) considers that sounds with levels below 70 dBA pose no known risk of hearing loss, no matter how long the noise is heard.

RESULTS

In July 2016, one room at the Mine Site and two rooms at the Port site were tested for noise and vibration. During this time, noise monitoring was conducted in each room for two twelve hour periods representing the day and night shifts worked at the sites with vibration monitoring conducted in each room for 10 hours during the day and night. The results of the 2016 noise and vibration monitoring are presented in Tables 4.8 and 4.9.

Due to equipment malfunctions and availability that were not resolved before the end of 2016, scheduled winter noise and vibration monitoring was unable to be conducted in 2016.

Table 4.8 Noise Monitoring Results, 2016

Location	n	Minimum Noise Level (dBA)	Average Noise Level (dBA)	Maximum Noise Level (dBA)
<i>Summer Monitoring (July 2016)</i>				
Mine Site	1	29.0	30.6	68.4
Milne Port	2	29.0	50.3	71.5

The minimum and maximum values presented are the highest value recorded between the day and night shifts. Average noise levels presented were time weighed over 12 hours for comparison to the WHO recommended value of 50 dBA for dormitory accommodations.

Vibration data was collected for 10 hours and then averaged over 8 hours (Table 4.9). In most cases, vibrations in the rooms were too low to register on the equipment.

Table 4.9 Vibration Monitoring Results, 2016

Location	Vibration Level (m/s ²)			
	Mine Site		Port Site	
Shift	Day	Night	Day	Night
Re				
A(8) X-axis (m/s ²)	0.06	0.00	0.00	0.00
A(8) Y-axis (m/s ²)	0.06	0.00	0.00	0.01
A(8) Z-axis (m/s ²)	0.57	0.00	0.00	0.00

TRENDS

Average noise levels were slightly higher in 2016 at the Milne Port (41.7 and 50.3 dBA in 2015 and 2016 respectively) and slightly lower at the Mine site (34.8 and 30.6 dBA in 2015 and 2016 respectively). Vibration levels in 2015 and 2016 were generally too low to register on the equipment.

RECOMMENDATIONS / LESSONS LEARNED

To date, Baffinland has field trialed several methods and various timings to conduct the accommodations noise and vibration monitoring. In 2017, Baffinland is developing a protocol to standardize noise and vibration monitoring of the accommodations at all active sites based on the experience gained from previous years. The standardized protocol will include monitoring events over a 24-hour period in one to two rooms of the accommodation complexes at each active site (currently the Mine Site and Milne Port) once per summer and once per winter season.

Project Certificate Condition No. 14 (a)

Category	Noise and Vibration - Noise and Vibration Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate potential impacts of noise to marine wildlife during project construction
Term or Condition	The Proponent, through coordination with the MEWG as may be appropriate, shall demonstrate appropriate adaptive management for construction activities at Milne Inlet that have the potential to disrupt marine mammal species, including pile driving and ore dock construction, are undertaken
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Not Applicable in 2016
Stakeholder Review	Marine Environment Working Group
Reference	Shipping and Marine Wildlife Management Plan (Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

As identified in the Shipping and Marine Wildlife Management Plan, mitigation and adaptive management measures to protect marine mammals were established as follows, for the construction phase (blasting and drilling measures were for Steensby Inlet only, pile driving for Milne Inlet only, and measures for dredging and vessel traffic near dock sites were applicable to both sites):

- Docks were designed to minimize footprint
- Blasting control followed the DFO blasting guideline; meeting 100 kPa overpressure limit
- A blasting safety zone of 500 m was established for marine mammals
- Drilling was conducted in late April / early May
- Vessel idling at dock site was minimized and vessels should be designed to limit noise output
- A pile driving safety zone of 200 m was established for marine mammals
- Monitoring for marine mammals was conducted daily in the dock construction safety zones prior to commencement of work
- Noise levels were to be determined to confirm compliance with the safety zones
- Bubble curtain systems would be used if required
- Blasting would be limited to late May to ensure that pupping and nursing periods for ringed and bearded seals were avoided
- Active deterrents would be used to prevent seals from entering the blast zone
- Bear monitors would be used for on-ice activities
- Vessel traffic was to maintain a constant speed and course when possible
- Vessel speed was to be reduced
- Shipboard Marine Wildlife Observers were on board select vessels to monitor interactions with marine mammals
- Aircraft overflights would maintain an altitude of 450 m over marine waters when possible
- Aircraft were prohibited from flying over marine mammals for sightseeing or photography.

RESULTS

Not applicable in 2016 as there was no active construction in the marine environment.

TRENDS

Not applicable in 2016 as there was no active construction in the marine environment.

RECOMMENDATIONS / LESSONS LEARNED

Prior to any future construction in the marine environment, Baffinland will review the adaptive management approaches identified in the SMWMP with the MEWG.

Project Certificate Condition No. 14 (b)

Category	Noise and Vibration- Noise and Vibration Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To mitigate potential impacts of noise to wildlife and people during project operations
Term or Condition	The Proponent, through coordination with the TEWG as may be appropriate, shall demonstrate appropriate adaptive management for project activities during operations which have the potential to produce noise and sensory disturbance to wildlife and other users of project areas.
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Baffinland has procedures to minimize the impact of noise to people including regular maintenance of equipment to reduce unnecessary noise levels, noise reduction rules in and around living quarters, and a no-idling policy to reduce truck noise. Noise and vibration monitoring for worker health and safety has been conducted by the Baffinland Health and Safety Department. If unacceptable levels are observed, specific adaptive management measures are taken.

Adaptive management measures for project activities to reduce noise and sensory disturbance to wildlife has not been a topic of discussion within the Terrestrial Environment Working Group to date as it is likely that wildlife that is disturbed by excessive noise would vacate the area related to the disturbance.

RESULTS

Not Applicable

TRENDS

Not Applicable

RECOMMENDATIONS / LESSONS LEARNED

Noise levels are monitored in relation to worker health and safety, therefore mitigation measures to reduce noise and sensory disturbance are implemented with respect to human safety. Baffinland will continue to monitor noise levels in relation to human health and safety and implement adaptive measures as required.

Project Certificate Condition No. 15

Category	Noise and Vibration - Noise and Vibration Monitoring
Responsible Parties	The Proponent, Qikiqtani Inuit Association, local Hamlet organizations
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enhance public safety when travelling around the Project area
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland continues to work with local Hamlet organizations and the Qikiqtani Inuit Association (QIA) regarding safety considerations for travel and interaction with the Project for those travelling in the area. In support of this, Baffinland and the QIA established the Mary River Community Group (which includes representatives from the Mittimatalik Hunters and Trappers Organization (MHTO) and the local Hamlet). In addition, the QIA and the MHTO are members of the Marine and Terrestrial Environment Working Groups.

The November 2016 Baffinland community tour included public meeting presentations provided in Inuktitut with each of the five North Baffin communities, which included visual representation of different aspects of the Project.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the QIA through the working groups and/or other venues to enhance the general public's understanding of the project.

4.5.4 Hydrology and Hydrogeology (PC Conditions 16 through 19)

Four (4) PC conditions relate to the potential impacts of the Project on hydrology and hydrogeology. These conditions cover water aspects of the project that are regulated under Baffinland’s Type A Water Licence (for mining) and Type B Water Licence (for mineral exploration).

Stakeholder Feedback

The Nunavut Water Board (NWB) is the primary stakeholder regulating water use and waste disposal through its issuance of water licences. The QIA is also a key stakeholder; substantial effects to the quantity, quality, or flow of water through Inuit Owned Land is subject to a Water Compensation Agreement between Baffinland and the QIA, pursuant to Article 20 of the Nunavut Agreement (INAC and Nunavut Tunngavik, 2010). Water diversions have the potential to impact fish and fish habitat, and the Department of Fisheries and Oceans administers the fish and fish habitat sections of the *Fisheries Act*.

Monitoring Activities

Hydrology monitoring is undertaken by recording water use and reporting this information to the NWB under the water license, and by operating six long-term seasonal hydrometric stations. Visual monitoring is conducted of water conveyance structures, including bridges and culverts. The Type A Water Licence specifies water withdrawal limits, which were not exceeded in 2016. The mining footprint remains small relative to the fully developed project, and hence water diversions associated with the open pit and waste rock stockpile are minor.

Table 4.10 provides an evaluation of the Project’s impacts on hydrology and hydrogeology based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.10 Hydrology and Hydrogeology Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Water Usage	Water usage exceeding thresholds and affecting the aquatic environment	Measure/monitor and report water usage in accordance with water licence	Water usage within water licence limits and FEIS predictions
Water Diversions	Reductions or increases in water flow due to diversions	None; this is primarily a function of the growing Project footprint, particularly the open pit and waste rock stockpile	Minor; within FEIS predictions

Path Forward

Baffinland will implement its Tote Road Earthworks Execution Plan (TREP) in 2017, will continue to operate its long-term hydrometric network, and will monitor and report water use to the NWB under the company’s water licences.

Project Certificate Condition No. 16

Category	Hydrology and Hydrogeology - Water Infrastructure
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To provide assurance that the potential impacts to flow and quantity of water in the Project area are minimized
Term or Condition	The Proponent shall ensure that the water related infrastructure or facilities that are designed and constructed, including the modification of culverts, diversion of watercourses, and diversion of runoff into watercourses along the railway, access roads, port sites, the Milne Inlet Tote Road, and other areas of the Project site, are consistent with those proposed in the FEIS and FEIS Addendum in terms of type, location, and scope and that the requirements of all relevant regulatory authorities are satisfied advance of constructing those facilities
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association, Environment and Climate Change Canada, Department of Fisheries and Oceans, Nunavut Impact Review Board
Reference	Final Environmental Impact Statement (FEIS; Baffinland, 2012) Addendum to the FEIS (Baffinland, 2013a)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland ensures that applicable regulatory approvals are obtained prior to the construction of water related infrastructure and facilities.

RESULTS

During 2016, the following work was completed on water related infrastructure and facilities:

- Completion of the contouring and ditching of the Mine Site Crusher Pad to direct pad surface water runoff to the Crusher Pad Sedimentation Pond
- Completion of the contouring and ditching of the Milne Port Ore Pad to direct pad surface water runoff to the Milne Port Ore Pad Sedimentation Ponds (East and West)
- Completion of the Mine Site Waste Rock Sedimentation Pond and associated perimeter drainage ditching around the facility to capture waste stockpile runoff
- The replacement of several culverts along Milne Tote Road
- Continued construction and commissioning of the Mine Site Truck Wash Facility

The applicable regulatory approvals were obtained prior to the construction of the facilities and infrastructure listed above.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Water related infrastructure and facilities constructed to date are consistent with those proposed in the FEIS and FEIS Addendum in terms of type, location, and scope.

Project Certificate Condition No. 17

Category	Hydrology and Hydrogeology - Effluent Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to water bodies from effluent
Term or Condition	The Proponent shall develop and implement effective 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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Environment and Climate Change Canada (ECCC), Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC), Qikiqtani Inuit Association (QIA)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2016i) 2016 Environment and Climate Change Canada Metal Mining Effluent Regulations Annual Report (Baffinland, 2017b) 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations (Baffinland, 2017c)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Wastewater management practices and procedures are outlined in Baffinland's FSWMP.

Water quality discharge criteria (discharge criteria) for wastewater generated by the Project are stipulated in Baffinland's Type A Water Licence (2AM-MRY1325 - Amendment 1) issued by the NWB.

Prior to discharge, wastewater (treated sewage, contaminated water, runoff, etc.) is sampled to ensure effluent water quality will meet applicable discharge criteria stipulated in the Type A Water Licence. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken during the wastewater discharge to ensure the effluent water quality remains in compliance with applicable discharge criteria. In the event that effluent sampling during discharge indicates that effluent water quality is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant effluent is stopped.

Wastewater that does not meet the applicable discharge criteria is treated onsite using approved treatment processes (Sewage Treatment Plants, Mobile Oily Water System, etc.) and is not discharged to the receiving environment until it can be confirmed by water quality analysis that the effluent will meet applicable discharge criteria.

All wastewater sampling at the Mary River Project is conducted in accordance with Baffinland's Sampling Program - Quality Assurance and Quality Control Plan.

As required by Baffinland's Type A Water Licence, volumes and water quality analysis of wastewater discharged to the receiving environment are reported to regulators (INAC, NWB) on a monthly and annual basis. As a requirement of the Metal Mining Effluent Regulations (MMER), volume and water quality analysis data associated with effluent discharges from the Crusher Pad

Sedimentation Pond (MS-06) and Waste Rock Sedimentation Pond (MS-08) are reported to Environment and Climate Change Canada (ECCC).

RESULTS

During 2016, there were three (3) minor exceedances during the discharge of Project related effluent to the receiving environment. These exceedances are listed below.

- On February 23, a treated sewage effluent sample from the Mine Site Sewage Treatment Plant (MS-01) exceeded the discharge criteria limit for faecal coliforms of 1,000 CFU/100 mL with a result of 1,050 CFU/100 mL. This exceedance was due to a temporary upset condition at the Mine Site Sewage Treatment Plant and/or possibly a problem during sampling, resulting in a sample bias. The result from a subsequent sample taken on March 8 was compliant with a faecal coliform count of 1 CFU/100 mL.
- On August 17 and 22, final effluent samples collected from the Mobile Oily Water Treatment System treating hydrocarbon contaminated water at the Milne Port Landfarm Facility (MP-04) slightly exceeded the discharge criteria limit for total suspended solids (TSS) of 15 mg/L with TSS results of 20 mg/L and 16.4 mg/L, respectively. However, the result of a third sample, collected on August 31, showed TSS concentrations far below the referenced criteria with a result of 4.8 mg/L. The monthly TSS average for the three (3) samples collected during August was 13.7 mg/L, below the 15mg/L TSS discharge limit.
- On September 2 inclement weather restricted access to Mine Site Waste Rock Sedimentation Pond discharge outfall location (MS-08) resulting in the water sample being collected directly from the pond. Elevated TSS levels seen in the sample taken at 11:00 HRS were caused by snow and ice that had fallen into the pond at the sampling location which may have disturbed bottom sediments. A follow-up sample collected at 17:00 HRS on September 2 confirmed that TSS levels were less than the applicable TSS discharge limit of 15 mg/L for grab samples. The monthly average of the 3 samples collected at MS-08 during September was 14.5 mg/L.

In addition to the minor exceedances discussed above, there were two (2) incidents in 2016 where the monthly acute toxicity sampling requirement stipulated by the MMER was not satisfied. This MMER sampling requirement stipulates that each month wastewater to be discharged during that month must be sampled and demonstrated to be acutely non-lethal. This sampling requirement is relevant for effluent discharges from the Mine Site Crusher Pad and Waste Rock Sedimentation Ponds (MS-06 & MS-08). Both of these incidents were a result of weather related logistical issues and exceedances in sample holding times.

- Due to weather related logistical issues and holding time requirements, pre-discharge sampling of the Mine Site Waste Rock Sedimentation Pond (MS-08) was completed on August 30 instead of during the month of the planned effluent discharge, September. A discharge of effluent from MS-08 occurred on September 1 and 2. Pre-discharge samples taken on Aug 30 demonstrated the effluent discharged from MS-08 in early September to be non-lethal and fully compliant with discharge criteria.
- Due to weather related logistical issues, the MS-06 acute toxicity sample taken from the Crusher Pad Sedimentation Pond on September 12 had exceeded the recommended sample holding time upon reaching the ALS laboratory in Waterloo, ON, resulting in the sample not being analyzed.

The exceedances discussed above were reported to INAC and QIA during 2016 in the monthly water licence reports. Moreover, the incidents involving the acute toxicity MMER requirement were reported to Environment and Climate Change Canada in the quarterly MMER reports submitted to ECCC under the *Fisheries Act*.

TRENDS

Overall, the frequency and nature of incidents involving the discharge of effluent to the receiving environment that exceeds discharge criteria have remained low and incidental since the start of operations in 2014.

RECOMMENDATIONS / LESSONS LEARNED

Overall, Baffinland remains in compliance with Project Certificate Condition No. 17. Exceedances of applicable discharge criteria for effluent discharged to the receiving environment were minor in 2016, with subsequent effluent sampling demonstrating that exceedances were incidental and short-term in nature. Incidents where the acute toxicity MMER sampling requirement was not satisfied were a result of weather related logistical issues that resulted in exceedances of sample holding times. Baffinland will continue to work the analytical laboratory to reduce the risk of similar logistical issues occurring in future years.

Project Certificate Condition No. 18

Category	Hydrology and Hydrogeology - Pit Lake Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enhance predictions for mine site closure conditions
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Qikiqtani Inuit Association (QIA), Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC), Nunavut Impact Review Board (NIRB)
Reference	Interim Closure and Reclamation Plan (Baffinland, 2016j)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The latest revision of the Interim Closure and Reclamation Plan (ICRP) discusses the estimated fill time for the mine pit lake.

RESULTS

Current mining activity has not yet created a pit at Deposit 1 so there is no additional information available to update the estimated fill time.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will update the estimated mine pit lake fill time in the ICRP as additional information becomes available.

Project Certificate Condition No. 19

Category	Hydrology and Hydrogeology - Water Infrastructure Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to natural water flow
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Department of Fisheries and Oceans (DFO), Indigenous and Northern Affairs Canada (INAC)
Reference	Early Revenue Phase - Tote Road Upgrades Fish Habitat Monitoring 2016 Annual Report to Department of Fisheries and Oceans 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board Annual Report for Operations (Type A Water Licence)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

As a requirement of Baffinland's Authorization under the Fisheries Act, an annual report summarizing the monitoring results of the Milne Tote Road fisheries crossings (i.e. culverts, bridges) is submitted to the DFO each year. Monitoring results include observations from an annual Milne Tote Road fisheries crossings inspection conducted each year by a certified fisheries biologist as well as water quality monitoring data collected at select crossings along the Milne Tote Road.

In addition, routine monitoring of crossings along the Milne Tote Road and at Project Sites are conducted throughout the year by road maintenance and environmental monitoring personnel to ensure crossings are not obstructed and are working as designed.

Baffinland is also required as a condition of the Type A Water Licence to monitor, document and report the withdrawal rates for water removed and utilized for all domestic and industrial purposes. This information is submitted to INAC, NWB and QIA on a monthly and annual basis.

RESULTS

The 2016 monitoring results of crossings and water infrastructure at Project sites and along the Milne Tote Road will be used to support the development of the Tote Road Earthworks Execution Plan (TREETP) which will outline future road improvements, including the modification and replacement of select culverts along the Milne Tote Road.

During 2016, water withdrawal rates from approved water sources did not exceed the limits stipulated in Baffinland's Type A and B Water Licences.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor water infrastructure to ensure the natural flow of surface water around the Project is not significantly hindered or altered.

4.5.5 Groundwater & Surface Water (PC Conditions 20 through 30)

Eleven (11) PC conditions relate to the potential impacts of the Project on groundwater and surface water. There is overlap in the scope of these PC conditions with PC Conditions 16 to 19 for hydrology and hydrogeology. Several of the conditions require the development of management plans. These conditions also overlap with aspects of the Project that are regulated under Baffinland's Type A Water Licence (for mining) and Type B Water Licence (for mineral exploration).

Stakeholder Feedback

As described in Section 4.5.4 (Hydrology and Hydrogeology), the NWB is the primary stakeholder regulating water use and waste disposal through its issuance of water licences. The QIA is also a key stakeholder; the QIA and Baffinland have a Water Compensation Agreement should the Project substantially affect the flow or quality of water through IOL. ECCC is a key regulator administering the section of the Fisheries Act regarding the prohibition on the release of deleterious substances to fish-bearing waters. Groundwater is not a valued resource since it is limited to minor seepage through the active layer during the brief snow-free period. Surface water quality, however, is a key resource to Inuit and to regulatory agencies, and it is among the most closely regulated aspects of the environment through effluent monitoring and an aquatic effects monitoring program under the Project's water licences.

Monitoring Activities

Monitoring activities undertaken in relation to groundwater and surface water include:

- Sampling and testing of various effluents prior to discharge to the environment in accordance with Part F of the Type A Water Licence
- Monitoring of water and sediment quality under the Aquatic Effects Monitoring Plan (AEMP), which is a required monitoring plan under Part I of the Type A Water Licence
- Undertaking annual geotechnical inspections of engineering structures and potential effects to permafrost, also required under Part I of the Type A Water Licence

PC Conditions 29 and 30 require Baffinland to submit construction designs, as-built drawings and site-specific management plans to the relevant regulatory agency, as required under Part D of the Type A Water licence.

Spring freshet in 2016 was characterized by an early onset and high flows in the tributaries and streams due to a thick snow pack and large snow drifts from blowing snow. During the early stages of freshet, there were a number of instances where water samples exceeded the discharge limit for total suspended solids (TSS). As such, Baffinland self-reported unauthorized releases of sediment to ECCC, INAC, and the NT-NU Spill Line (Spill Report numbers 16-158, 16-176, 16-81, 16-198, 116-202, and 116-202 Update No. 1) over the period of May and June 2016. On June 7, 2016 ECCC issued Baffinland a Direction under Section 38 (7.1) of the *Fisheries Act*. INAC also issued a Letter of Non-Compliance to Baffinland on June 16, 2017.

- The Direction outlined a number of measures to be taken to protect fish and fish habitat, all of which were completed by the deadlines specified. Monitoring during this period found that the majority of the discharge samples sampled met the discharge criteria, and all acute toxicity analyses were non-lethal. The final measure was the submission of a report documenting the completion of the measures by September 30, 2016. Upon submission of Baffinland's completion report, ECCC confirmed that Baffinland fulfilled the requirements of the Direction. At the conclusion of the first quarter of 2017, Baffinland is completing a Tote Road Earthworks Execution Plan (TREETP), which outlines future road improvements, including the modification and replacement of select culverts along the Milne Inlet Tote Road.
- Several one-time exceedances of effluent discharge limits specified in the Type A Water Licence occurred in 2016. Exceedances of applicable discharge criteria for effluent discharged to the receiving environment were minor in 2016, with

subsequent effluent sampling demonstrating that exceedances were incidental and short-term in nature (see PC Condition 17). Incidents where the acute toxicity MMER sampling requirement was not satisfied were a result of weather related logistical issues that resulted in exceedances of sample holding times. Baffinland will continue to work to reduce the risk of similar logistical issues occurring in future years.

Surface water runoff downstream of active quarries and mining areas was also monitored in 2016 for water quality parameters as outlined in the Type A Water Licence, including parameters related to explosives residue, such as ammonia and nitrate. Although several water samples collected downstream of active quarries and mining areas showed elevated ammonia and nitrate levels in comparison to baseline concentrations, nearly all samples were well below the established CCME water quality guidelines for ammonia and nitrate (CCME, 2012). All acute toxicity water samples collected downstream of Project quarries and mining areas in 2016 were acutely non-lethal.

Monitoring under the AEMP in 2016 included the Core Receiving Environment Monitoring Plan (CREMP), a key component of the AEMP used to detect Project-related changes in water quality, sediment quality, phytoplankton (chlorophyll a), benthic invertebrate community metrics, and arctic char (*Salvelinus alpinus*) fish populations in mine exposed lakes and streams. Evidence of Project-related change was observed in Camp Lake and Sheardown Lake, along with several of their respective tributaries. Each of these waterbodies showed changes in AEMP monitoring parameters and metrics in 2016. AEMP water quality monitoring of mine-exposed tributaries flowing into Camp Lake and Sheardown Lake showed elevated concentrations of nitrate in 2016, however in each case, nitrate concentrations were well below the established AEMP water quality guideline for nitrate (13 mg/L). The 2016 AEMP reports, including a complete analysis and discussion of the 2016 CREMP results, are provided in the 2016 QIA and NWB Annual Report for Operations (Baffinland, 2017c).

Table 4.11 provides an evaluation of the Project's impacts on groundwater and surface water, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.11 Groundwater and Surface Water Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Groundwater Quality	Adverse seepage from project areas (landfill, landfarm, waste rock stockpile) affecting groundwater quality	Groundwater is not monitored; surface seepage is monitored in accordance with the water licence	N/A
Surface Water Quality	Releases of TSS or other changes in water quality due to point-source discharges (i.e., stormwater and sewage effluents)	Effluents are monitored prior to discharge; the receiving aquatic environment is monitored in accordance with the AEMP	Minor one-time exceedances of effluent discharge criteria noted; within FEIS predictions
	Releases of TSS or other changes in water quality due to non-point source releases (i.e., erosion and sedimentation)	Runoff from ground disturbance areas (construction areas, quarries) are monitored for TSS; site is inspected visually for evidence of erosion and sedimentation, with follow-up sampling if required	TSS exceedances occurred at the Mine and along the Tote Road. ECCC issued a Direction under the Fisheries Act, which Baffinland implemented satisfactorily. Erosion and sedimentation impacts exceeded FEIS predictions.
	Releases of TSS or other changes in water quality due to airborne emissions	Visual observations and sampling of runoff water quality noted excessive ore dust running off into Sheardown and Camp Lakes at the Mine Site	Ore dust runoff exceeded FEIS predictions

Path Forward

Baffinland will implement its TREEP in 2017, will continue to operate its long-term hydrometric network, and will monitor and report water use to the NWB under the company's water licences.

Project Certificate Condition No. 20

Category	Groundwater/Surface Waters - Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the areas surrounding the Project
Term or Condition	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 explosives do not negatively impact the Project and surrounding areas
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB) Environment and Climate Change Canada (ECCC) Qikiqtani Inuit Association (QIA)
Reference	2016 QIA and NWB Annual Report for Operations (Baffinland, 2017c) Aquatic Effects Monitoring Plan (AEMP; Baffinland, 2015a) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2016k)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Surface water runoff downstream of Project mining areas and quarries is monitored as prescribed in the Type A Water Licence, with water quality results reported to the NWB on a monthly and annual basis. Sampling methods are described in Baffinland's Sampling Program - Quality Assurance and Quality Control Plan (QA/QC Plan), which is an approved plan under the Type A Water Licence.

In addition, the AEMP, a follow-up monitoring program identified in Baffinland's Final Environmental Impact Statement and prescribed by the Baffinland's Type A Water Licence, monitors the receiving aquatic environment downstream of Project activities at the Mine Site.

RESULTS

During 2016, surface water runoff downstream of active quarries and mining areas were monitored for water quality parameters as outlined in the Type A Water Licence, including parameters related to explosives residue, such as ammonia and nitrate. Although several water samples collected downstream of active quarries and mining areas showed elevated ammonia and nitrate levels in comparison to baseline concentrations, nearly all samples were well below the established CCME water quality guidelines for ammonia and nitrate (CCME, 2012). All acute toxicity water samples collected downstream of Project quarries and mining areas in 2016 were acutely non-lethal.

Monitoring under the AEMP in 2016 included the CREMP, a key component of the AEMP used to detect Project-related changes in water quality, sediment quality, phytoplankton (chlorophyll a), benthic invertebrate community metrics, and arctic char (*Salvelinus alpinus*) fish populations in mine exposed lakes and streams. Evidence of Project-related change was observed in

Camp Lake and Sheardown Lake, along with several of their respective tributaries. Each of these waterbodies showed changes in AEMP monitoring parameters and metrics in 2016. AEMP water quality monitoring of mine-exposed tributaries flowing into Camp Lake and Sheardown Lake showed elevated concentrations of nitrate in 2016, however in each case, nitrate concentrations were well below the established AEMP water quality guideline for nitrate (13 mg/L). The 2016 AEMP reports, including a complete analysis and discussion of the 2016 CREMP results, are provided in the 2016 QIA and NWB Annual Report for Operations.

TRENDS

Overall, 2016 monitoring results of surface water runoff and aquatic environments downstream of Project mining areas and quarries were generally consistent with monitoring results observed in 2015.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor surface water runoff and aquatic environments downstream of Project mining areas and quarries as outlined in the Type A Water Licence and the AEMP.

Project Certificate Condition No. 21

Category	Groundwater/Surface Waters - Aquatic Effects Monitoring Plan and dustfall monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To mitigate potential impacts to surface and ground waters.
Term or Condition	<p>The Proponent shall ensure that the scope of the Aquatic Effects Monitoring Plan (AEMP) includes, at a minimum:</p> <ul style="list-style-type: none"> a) Monitoring of non-point sources of discharge, selection of appropriate reference sites, measures to ensure the collection of adequate baseline data and the mechanisms proposed to monitor and treat runoff, and sample sediments b) Measures for dustfall monitoring designed as follows: <ul style="list-style-type: none"> i. To establish a pre-trucking baseline and collect data during Project operation for comparison ii. To facilitate comparison with existing guidelines and potentially with thresholds to be established using studies of Arctic char egg survival and/or other studies recommended by the Terrestrial Environment Working Group (TEWG) iii. To assess the seasonal deposition (rates, quantities) and chemical composition of dust entering aquatic systems along representative distance transects at right angles to the Tote Road and radiating outward from Milne Port and the Mine Site
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC), Qikiqtani Inuit Association (QIA), Environment and Climate Change Canada (ECCC)
Reference	Aquatic Effects Monitoring Plan (AEMP; Baffinland, 2016a) 2016 QIA and NWB Annual Report for Operations (Baffinland, 2017c) Terrestrial Environment Monitoring and Mitigation Plan (TEMMP; Baffinland, 2016x)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The AEMP was submitted to the NWB on June 27, 2014 as required in Type A Water Licence No. 2AM-MRY1325 and was subsequently accepted by the NWB. The Plan was subsequently updated to reflect the amended 2AM-MRY1325 licence and resubmitted on October 31, 2015 and approved.

The AEMP has been structured to serve as an overarching ‘umbrella’ that conceptually provides an opportunity to integrate results of individual but related aquatic monitoring programs including water and sediment quality, dustfall monitoring and freshwater biota and fish health. Under the AEMP, the CREMP evaluates potential mine-related influences on water quality, sediment quality, and/or biota (including phytoplankton, benthic invertebrates and/or fish) within aquatic environments near the mine. Water and sediment quality monitoring programs incorporating derived Benchmarks from Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of freshwater aquatic life (CCME, 2016) and baseline data are performed on the potential impacted Mine receiving environments including Camp Lake, Sheardown Lake, Mary Lake, a reference Lake and various tributaries and reference tributaries. A Lake Sedimentation Monitoring Program is also performed under the AEMP which evaluates the effects of dust and sediment deposition from Mine related influences on biota.

The CREMP and Lake Sedimentation Monitoring Program Report details the methods and results of this monitoring and is supplied in the 2016 QIA and NWB Annual Report for Operations.

As an appendix to the AEMP, a prescribed dustfall monitoring program is performed annually with sampling stations set up at the Mine site, Port Site, transects perpendicular radiating out from the Tote road and reference sites.

There are three main objectives of the dustfall monitoring program:

1. To quantify the extent, magnitude and composition of dustfall generated by Project activities;
2. To determine seasonal variations in dustfall at all sampling locations; and
3. To determine if annual changes in dustfall at sampling locations exceed identified thresholds associated with isopleth dispersion models and assessments performed in the FEIS.

The results of this dustfall monitoring program is supplied annually in the Terrestrial Environment Monitoring Report.

RESULTS

The results of the aforementioned CREMP and Lake Sedimentation Monitoring programs are supplied annually in the QIA/NWB Annual Report as appendices. Evidence of potential Project-related change in water quality and sediment deposition was observed in Camp Lake and Sheardown Lake, along with several of their respective tributaries. Each of these waterbodies showed changes in AEMP monitoring parameters and metrics in 2016. The results of the above Dustfall Monitoring Program is supplied annually in the Terrestrial Environment Annual Monitoring Report. Dustfall exceedances were observed at multiple sites along the Mine site, Tote road and Port Site and deposition rates generally increased in proximity of Project Site infrastructure.

TRENDS

Overall, 2016 monitoring results of surface water runoff and sediment in receiving aquatic environments downstream of Project mining areas were generally consistent with monitoring results observed in 2015; with increases in select sedimentation monitoring sample sites in Sheardown Lake. 2016 dustfall monitoring results were elevated at select stations compared to 2015.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with appropriate stakeholders and regulatory agencies to identify required revisions to the Aquatic Effects Monitoring Plan and programs. Baffinland submitted the Aquatic Effects Monitoring Plan, Rev. 2 in April 2016 and is continuing to work with stakeholders and required regulatory agencies for its approval. Rev.2 is not in use yet and will be provided to NIRB after its approval.

Project Certificate Condition No. 22

Category	Groundwater/Surface Waters - Sediment and Erosion Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To develop appropriate sediment and erosion controls to prevent impacts to surface waters.
Term or Condition	The Proponent shall develop a detailed Sediment and Erosion Management Plan to prevent and/or mitigate sediment loading into surface water within the Project area
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	None
Reference	Surface Water and Aquatic Ecosystems Management Plan (SWAEMP; Baffinland, 2016m)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The Sediment and Erosion Management Plan is incorporated into the SWAEMP, which was prepared prior to construction.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 23

Category	Groundwater / Surface Waters - Groundwater Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to groundwater quality
Term or Condition	The Proponent shall develop and implement a Groundwater Monitoring and Management Plan to monitor, prevent and/or mitigate the potential effects of the Project on groundwater within the Project area
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	In Progress
Stakeholder Review	Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC)
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2016m)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A groundwater monitoring program, involving the installation of shallow groundwater wells downstream of Project infrastructure, is discussed in Baffinland's SWAEMP, approved by the NWB. Baffinland will advance the implementation of a groundwater monitoring program by installing groundwater wells downstream of high risk Project infrastructure in 2017. A proposal for the groundwater monitoring program will be submitted to regulators and stakeholders for review and comment prior to implementation.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 24

Category	Groundwater/Surface Waters - Effluent Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to groundwater and surface waters from effluent discharge
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (Baffinland, 2016i) 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations (Baffinland, 2017c) Sampling Program - Quality Assurance / Quality Control (QA/QC) Plan (Baffinland, 2016k) Type A Water Licence 2AM-MRY1325 - Amendment 1 (NWB, 2014)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Effluent management practices and procedures are outlined in Baffinland's Fresh Water Supply, Sewage and Wastewater Management Plan. Effluent sampling methods are described in the Sampling Program - Quality Assurance / Quality Control (QA/QC) Plan, which is an approved plan under the Type A Water Licence.

Water quality discharge criteria (discharge criteria) for effluent generated by the Project are stipulated in Baffinland's Type A Water Licence (2AM-MRY1325 - Amendment 1) issued by the NWB. Prior to discharge, wastewater (treated sewage, contaminated water, runoff, etc.) is sampled to ensure effluent water quality will meet applicable discharge criteria stipulated in the Type A Water Licence. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken during the wastewater discharge to ensure the effluent water quality remains in compliance with applicable discharge criteria. In the event that effluent sampling during discharge indicates that the effluent is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant effluent is stopped.

Wastewater that does not meet the applicable discharge criteria is treated onsite using approved treatment processes (Sewage Treatment Plants, Mobile Oily Water System, etc.) and is not discharged to the receiving environment until it can be confirmed by water quality analysis that the effluent will meet applicable discharge criteria.

RESULTS

Refer to the results section of Project Certificate Condition No. 17.

TRENDS

Refer to the Trends section of Project Certificate Condition No. 17.

RECOMMENDATIONS / LESSONS LEARNED

Refer to the Recommendations/Lessons Learned section of Project Certificate Condition No. 17.

Project Certificate Condition No. 25

Category	Landforms - Additional Geotechnical Investigations
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to sensitive landforms.
Term or Condition	The Proponent shall undertake the additional geotechnical investigations to identify sensitive landforms, modify engineering design for Project infrastructure, develop and implement preventative and/or mitigation and monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	Indigenous and Northern Affairs Canada (INAC)
Reference	Annual Geotechnical Inspections - Mary River Project. October 2016 (Martin, 2016)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

In 2016, Barry H. Martin, P. Eng., Consulting Engineer, completed the eighth geotechnical inspection of the following on-site engineered facilities:

- Pit Walls
- Quarries
- Landfills
- Land Farms
- Bulk Fuel Storage Facilities
- Sediment Ponds
- Collection Ponds
- Polishing and Waste Stabilization Ponds

The inspections took place in two phases, the first phase was from July 28 to August 3rd, 2016 and the second phase was October 5 to October 11, 2016. The inspections were carried out in accordance with the guidelines set out in the Canadian Dam Association's Dam Safety Guidelines 2007 (Canadian Dam Association, 2013).

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as constructed" and "as-built" drawings (provided in the first and subsequent reports).
2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.
3. The areas around the structures were examined for evidence of seepage.
4. Quarry walls were reviewed for relative stability.
5. New structures under construction were reviewed for conformity with design drawings.

In addition, geotechnical site investigations were completed in 2016 along the length of the proposed north railway between the Mine Site and Milne Port, which runs mostly parallel to the Milne Inlet Tote Road. A total of 113 boreholes were drilled ranging from a depth of 1.5 m to 30 m. Additional work will be completed in 2017.

RESULTS

Results from the geotechnical inspection at the Mine Site indicate there has been little or no erosion from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1. As noted in the previous year, there are only just now signs of settlement appearing at PSWP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area. These settlements appear within the one metre (\pm) active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Massive ice lenses were located at several locations along the proposed rail alignment, which have necessitated moving the proposed rail alignment to avoid these features. Additional investigations are planned for 2017. As identified in previous years, project's activities have led to localized permafrost degradation along the Tote Road and Mine Haul Road. In addition to the work above, Baffinland has retained 3rd party consultants to assess, develop and prioritize preventative and mitigation measures to minimize the impacts of the Project's activities and infrastructure on landforms along the Tote Road and Mine Haul Road. This work is reflected in Baffinland's 2017 Work Plan and captured in a Tote Road Earthworks Execution Plan scheduled for implementation in 2017.

Project Certificate Condition No. 26

Category	Landforms and Soils - Erosion Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To develop appropriate measures for preventing destabilization and erosion
Term or Condition	The Proponent shall develop and implement a comprehensive erosion management plan to prevent or minimize the effects of destabilization and erosion that may occur due to the Project's construction and operation
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	Nunavut Water Board, Department of Fisheries and Oceans, Environment and Climate Change Canada, Qikiqtani Inuit Association
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2016m) Environmental Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	Appendix F (EPP only); http://www.baffinland.com/shareddocuments/

METHODS

A comprehensive erosion management plan is included in the Surface Water and Aquatic Ecosystem Management Plan, which is approved by the Nunavut Water Board under Baffinland's Type A Water Licence. Specific sediment and erosion control procedures are found within the EPP (i.e., Section 2.3 Land Disturbance, Section 2.9 Sediment and Erosion Control, 2.18 Road Construction and Borrow Development, 2.19 Tote Road Watercourse Crossing Installation, 2.25 Quarry and Borrow Pit Operation, 2.27 Excavations and Foundations).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 27

Category	Landforms, Geology and Geomorphology - Natural Aesthetics
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to natural aesthetics
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Pond Inlet, Arctic Bay, Clyde River, Hall Beach and Igloolik
Reference	November 2016 Community Tour Notes
Ref. Document Link	Appendix B

METHODS

In 2016, Baffinland has implemented the use of StakeTracker, which is a purpose built stakeholder information management software. The implementation of StakeTracker will allow Baffinland to efficiently manage and track communication with regulators, communities and government agencies.

In 2016, Baffinland held public meetings and carried out a community survey within the five North Baffin communities that are the most likely to be affected by the Mary River Project. The survey consisted of a series of high level questions that asked about how the project may potentially be affecting the communities, the environment, and the overall way of life in North Baffin Island. The survey was also used to gather information about the overall relationship between Baffinland and the North Baffin communities. The survey was a mechanism for community residents to have their voices heard, and for Baffinland to support positive relationship building with the communities. All records of communications have been entered into StakeTracker and comments related to the aesthetic value of the Project area have been identified.

RESULTS

Public consultation did not reveal any significant concerns from affected communities about the impacts that changes to the topography and landscape have had on the aesthetic value of the Project area. There was a single comment during the public meeting (November, 2016) that expressed a desire to protect the landscape. Other comments about changes to the land and sea tended to reflect effects of the Project on land use (hunting and harvesting) and on the environment.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track and report on comments made regarding the aesthetic value of the Project area.

Project Certificate Condition No. 28

Category	Landforms, Geology and Geomorphology - Permafrost
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that permafrost integrity is maintained
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	
Reference	October 2016 Annual Geotechnical Inspections (Martin, 2016)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Biannual geotechnical inspections are completed by Barry H. Martin, P.Eng as required by the Nunavut Water Board (NWB) Licence No. 2AM-MRY 1325 for the following on-site engineered facilities at the Mary River and Milne Port sites:

- Pit walls
- Quarries
- Landfills
- Land farms
- Bulk fuel storage facilities
- Sediment ponds
- Collection ponds
- Polishing and waste stabilization ponds

Inspections in 2016 took place between July 28 and 30 and October 5 and 11, 2016, at the commencement and end of the shipping season, respectively. Inspections are carried out in accordance with the Canadian Dam Association (CDA) *Dam Safety Guidelines* (CDA, 2007).

The inspections focus on the following aspects of the facilities:

- Conformance with design basis as presented in as-constructed and as-built drawings
- Evidence of settlement, cracking, and seepage through berms
- Examination of seepage around structures
- Observations of the relative stability of pit and quarry walls

The south railway will form a part of the biannual inspections once it is constructed.

RESULTS

The geotechnical inspection indicated that the Mary River Polishing/Waste Stabilization Ponds (PWSPs) 1, 2 and 3 were noted to be experiencing minor overall settlements of the total structures with respect to the surrounding area. The settlements appear to be within the active zone above and not in the permafrost.

All other facilities and structures inspected do not appear to be impacting permafrost.

TRENDS

The minor settlements noted at the Mary River PWSPs 1, 2 and 3 were first observed in the 2014 biannual geotechnical inspections. As identified in previous years, project's activities have led to localized permafrost degradation issues along the Tote Road and Mine Haul Road.

RECOMMENDATIONS / LESSONS LEARNED

Project designs and the placement of infrastructure consider sensitive landforms and permafrost. Issued for construction drawings are submitted to the NWB in accordance with Water License No. 2AM-MRY 1325. Baffinland continues to have a third party conduct biannual geotechnical inspections.

To address historic localized permafrost degradation issues along the Tote Road and Mine Haul Road, Baffinland has retained 3rd party consultants to assess, develop and prioritize preventative and mitigation measures to minimize the impacts of the Project's activities and infrastructure on landforms along the Tote Road and Mine Haul Road. This work is reflected in Baffinland's 2017 Work Plan and captured in a Tote Road Earthworks Execution plan scheduled for implementation in 2017.

Project Certificate Condition No. 29

Category	Landforms, Geology and Geomorphology - Design Plans
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To confirm constructed components meet design as assessed
Term or Condition	The Proponent shall provide to the respective regulatory authorities, for review and acceptance, for-construction engineering design and drawings, specifications and engineering analysis to support design in advance for constructing those facilities. Once project facilities are constructed, the Proponent shall provide copies of the as-built drawings and design to the appropriate regulatory authorities.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA), Indigenous and Northern Affairs Canada (INAC), Environment and Climate Change Canada (ECCC)
Reference	Completion Report: Environment and Climate Change Canada Fisheries Act Direction (File:4408-2016-05-10-001) (Baffinland, 2016c) Indigenous and Northern Affairs Canada Letter of Non-Compliance (INAC, 2016) 2016 QIA and NWB Annual Report for Operations (Baffinland, 2017c)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

As required by the Type A Water Licence and Commercial Lease, several engineering submissions were provided to regulatory agencies and stakeholders throughout 2016, including several as-built drawings and Construction Summary Reports. A summary of these submissions is provided in Table 4.12.

Table 4.12 Submissions Provided to Regulatory Agencies and Stakeholders

Date of Submission	Regulatory Agencies and Stakeholders	Content
September 30, 2016	<ul style="list-style-type: none"> Nunavut Water Board (NWB) Qikiqtani Inuit Association (QIA) Indigenous and Northern Affairs Canada (INAC) Environment and Climate Change Canada (ECCC) 	<ul style="list-style-type: none"> As Built Report: Mine Haul Road Drainage Improvement Project Phase 1 Construction As Built Drawings: Milne Ore Stockpile Ditches As Built Drawing: Crusher Stockpile Ditches <p>These files included as Attachments A.1, A.2 and A.3 to Baffinland's Completion Report for the Fisheries Act Direction and Letter of Non-Compliance (Baffinland, 2016c)</p>
March 31, 2017	<ul style="list-style-type: none"> Nunavut Water Board (NWB) Qikiqtani Inuit Association (QIA) 	<ul style="list-style-type: none"> Construction Summary Report for the Mine Site Waste Rock Sedimentation Pond and Drainage Ditch (Hatch, 2017)

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide the appropriate regulatory agencies and stakeholders, for review and acceptance, design and engineering documentation, drawings and construction reports for current and future Project infrastructure.

Project Certificate Condition No. 30

Category	Landforms, Geology and Geomorphology - Quarries
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide oversight on quarry design and management
Term or Condition	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit
Reporting Requirement	Plans to be provided to the NIRB for review and comment at least 30 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	None
Reference	Borrow Pit and Quarry Management Plan BAF-PH1-830-P16-0004, Borrow Source Management Plan BAF-PH1-830-P16-0030
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Quarry Management Plans have been developed and delivered in advance of the development of any potential quarry site or borrow pit.

RESULTS

All Management plans have been delivered prior to development.

TRENDS

None

RECOMMENDATIONS / LESSONS LEARNED

Further plans to be developed as required and communicated to all stakeholders involved.

4.5.6 Vegetation (PC Conditions 31 through 40)

Ten (10) PC conditions relate to the potential impacts of the Project on vegetation. Several of the conditions require the development of vegetation monitoring plans within the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).

Stakeholder Feedback

Key stakeholders that have expressed concern regarding vegetation have included the QIA, ECCC and the Government of Nunavut (GN). Vegetation is an important resource in itself, but perhaps more importantly, vegetation is important to key species such as caribou, as well as birds. Issues related to vegetation have included a desire to minimize the overall disturbance footprint of the Project, concerns over potential introduction of invasive terrestrial vegetation species, and the potential for ore dust deposited on vegetation and soil to be taken up by plants, potentially affecting foraging wildlife such as caribou. Additionally, despite the climatic challenges to revegetation at closure, stakeholders have expressed an interest in revegetation being incorporated into reclamation plans. These issues are reflected in PC Conditions 31 through 40.

Monitoring Activities

Baffinland's vegetation monitoring programs include the following:

- Dustfall monitoring program
- Vegetation abundance monitoring
- Vegetation and soil base metal sampling
- Exotic invasive plant species monitoring program
- Monitoring of natural revegetation in disturbed areas
- Dustfall monitoring

Not all of these programs involve annual sampling, and trends may become apparent only after many years of monitoring. In 2016, monitoring for vegetation abundance and composition was completed, as well as metals sampling in soil and vegetation.

Table 4.13 provides an evaluation of the Project's impacts on vegetation, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.13 Vegetation Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Vegetation Health	Ore dust emissions result in an increase in concentrations of contaminants of potential concern in soils and vegetation	Metals analysis of soil and vegetation; all results within expected range except for two possible outliers, to be investigated in follow up monitoring. Insufficient data exists for trend analyses	N/A
Vegetation Abundance	Dustfall results in changes in species composition and vegetation abundance	Monitoring has not indicated differences in ground cover or canopy cover with distance from the project	Within FEIS predictions
Invasive Species	Invasive species introduction to North Baffin Island	Monitoring is conducted every 5 years (i.e., 2014 and again in 2019)	N/A

Path Forward

In accordance with the TEMMP, the next round of vegetation monitoring will be undertaken in 2019.

Project Certificate Condition No. 31

Category	Vegetation - Construction and Operations
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To minimize impacts to vegetation
Term or Condition	The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	
Reference	BAF-PH1-830-P16-0027 r1 - Terrestrial Environment Mitigation and Monitoring, BAF-PH1-830-P16-0008 r1 - Environment Protection Plan
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

As a result of the remoteness of the Mary River Project and to ensure Project activities are planned and conducted in such a way as to minimize the Project footprint as reasonably possible, Baffinland's project design philosophy focuses on the minimization of earthworks, re-use of existing facilities, and the use of modularization and pre-assembly. This philosophy minimizes the project footprint to the extent practical by, in part, maximizing the activities able to be conducted offsite which facilitates reduced development\assembly areas and required on-site project workforce, and therefore footprints of associated support infrastructure (camps, utilities, fuel, waste storage etc.). Specific examples of the philosophy include:

- Engineering and procurement to support the proposed strategy
- Maximize the removal of site activities through the use of pre-cast concrete where feasible including the use of integrated module foundations
- Maximize the removal of site activities through the use of pre-assemblies such as building wall and roof panels, ground conveyors, elevated conveyors, conveyor bents, fuel tanks etc.
- Maximize the removal of site activities through the use of complete multi discipline modules such as screen building modules, crushing building modules, powerhouse modules, transfer stations, etc.
- Use of fully assembled yard and mobile mining equipment offsite such as the stacker, reclaimer, ship loader, loader, mine haul truck, etc.

RESULTS

Baffinland has completed all construction within the Potential Development Area (PDA) and the current project footprint is below what was assessed in the FEIS which assumed the entire PDA would be disturbed. Baffinland's project design philosophy as described above has been executed and continues to be in force as it relates to the Operation's capital projects. In addition, Baffinland restricts any overland movement of equipment or personnel which are required to operate to existing site roads and laydowns. Any unauthorized land disturbance or deviation from the PDA is reported as an incident and is investigated. Any overburden that is removed from an area to be disturbed is stockpiled for the remediation of the area.

TRENDS

Baffinland has completed all construction within the Potential Development Area (PDA). In general, any physical disturbance to plant cover likely results in the loss of plants in the immediate area. During the construction activities, direct habitat loss occurred primarily due to surface disturbance including compaction, burial, and removal. During the operations phase, vegetation loss occurs mainly as ore extraction expands within Deposit No. 1 and as quarries expand to support ongoing maintenance.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to abide by its project design philosophy as it ensures minimization of the Project footprint while minimizing costs. Long term vegetation and dustfall surveys will continue to be monitored and used for analysis to determine if vegetation is being impacted by the development footprint of construction and operations infrastructure and activities.

Project Certificate Condition No. 32

Category	Vegetation - Construction and Operations
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent introduction of invasive species
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Ongoing
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016l) Environment Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	Appendix F1 (EPP only); http://www.baffinland.com/shareddocuments/

METHODS

1. All equipment and supplies are to be inspected prior to being offloaded at Baffinland's Milne Port. All service agreements and contracts sent to suppliers have been updated to include a clause "All equipment delivered to site must be free and clear of soils that may contain seeds of invasive species."
2. A review of acceptable office plants that pose low risk to the environment was conducted in December of 2016.
3. Vegetation Surveys are conducted to monitor for invasive species.

RESULTS

Invasive and exotic surveys have been conducted around the project area. No exotics have been found to be brought up by project activities.

TRENDS

Not Applicable.

RECOMMENDATIONS / LESSONS LEARNED

A Baffinland Standard Operating Procedure will be created and implemented for the inspection of equipment arriving at Milne Port.

Project Certificate Condition No. 33

Category	Vegetation - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To facilitate monitoring
Term or Condition	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP)
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The TEMMP includes vegetation monitoring, consisting of the following components: vegetation abundance and composition, vegetation health, culturally-valued vegetation, exotic invasive vegetation and natural revegetation, and dustfall.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 34

Category	Vegetation - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	<ol style="list-style-type: none"> 1. Monitor metals concentrations in both soils and vegetation, particularly caribou forage (i.e., lichen) at varying distances from the PDA to compare metal concentrations in soil and vegetation between near (impacted) and far (control) sites. 2. Determine if metal concentrations in soil and vegetation exceed CCME and relevant available threshold levels provided in the literature.
Term or Condition	The Proponent shall conduct soil sampling to determine metal levels of soils in areas with berry-producing plants near any of the potential development areas, prior to commencing operations
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

The vegetation and soil base metals monitoring program began in 2014 prior to commencing operations, and considers three Project areas (Milne Port, Tote Road, Mine Site) at varying distances from the Project Development Area (PDA; 0 to 100 m; 101 to 1000 m; >1000 m). Soil and lichen samples are collected every three to five years, typically between late-July to early-August. Samples are analyzed for total metal concentrations to assess the relationship of metals in soil and lichen with distance from the PDA. A subset of total metals, referred to as metal/metalloid of potential concern (CoPC), are selected for analysis and typically includes arsenic, cadmium, copper, lead, selenium and zinc. The CoPCs are compared to Project specific thresholds.

RESULTS

The pre-mining vegetation monitoring results were presented in the 2014 Terrestrial Environment Annual Monitoring Report (EDI, 2015), which was included in the 2014 Annual Report to the NIRB (Baffinland, 2015b).

In 2016, the following vegetation monitoring work was undertaken:

- A total of 50 sites and 100 samples (50 soil and 50 lichen) were collected in 2016 to increase sample size and improve the power to detect a change in metal concentrations for all CoPCs before exceeding threshold levels.
- All samples were well below thresholds with the exception of one soil and one lichen sample. Samples above threshold levels were investigated to determine the likelihood of a potential sampling error.

TRENDS

A trend analysis is not applicable at this time as there has only been one round of data collection. Trend analyses will be completed when more data are collected and analyzed and as appropriate.

RECOMMENDATIONS / LESSONS LEARNED

Continue monitoring at 50 sites as part of the vegetation and soil base metals monitoring program and in accordance with the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).

Project Certificate Condition No. 35

Category	Vegetation - Monitoring
Responsible Parties	The Proponent, local Hunters and Trappers Organizations
Project Phase(s)	Construction and Operations
Objective	To determine baseline metal levels in foraging caribou.
Term or Condition	The Proponent shall undertake monitoring of baseline metal levels in organ tissue from caribou harvested within the local study area, prior to commencing operations. The Proponent is strongly encouraged to coordinate with local Hunters and Trappers Organizations regarding procurement of harvested caribou organs.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The north Baffin herd is at low numbers and there are few to no caribou being harvested, particularly from within the Regional Study Area (RSA) around the Mary River project, from which to collect samples.

At the November 17, 2015 Terrestrial Environment Working Group (TEWG) meeting No. 7, Baffinland asked if the Government of Nunavut (GN) would like Baffinland to distribute sample kits to hunters coming through site. The GN's response was that no kits were available to send to site.

A suitable sampling protocol has yet to be developed in coordination with the GN and the local Hunters and Trappers Organizations. This Project Condition will be addressed once caribou numbers reach a harvestable level near the Mary River site and a coordinated sampling effort can be accomplished.

Project Certificate Condition No. 36

Category	Vegetation - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	Measure percent plant cover and plant group composition of available caribou forage within the RSA to track potential changes at varying distances from the edge of the PDA through long-term monitoring
Term or Condition	The Proponent shall establish an on-going monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A monitoring program for caribou forage focused on lichen abundance at sites close to and away from mining and road activities has been established. To align with other vegetation monitoring requirements, lichen monitoring was included in the broader vegetation abundance program.

The vegetation abundance monitoring program includes 15 transects, 66 sites, and 151 plots. Six transects radiate out from the Mine Site, five transects from the Tote Road, and four transects from Milne Port. In addition, six control (reference) sites were established within the Regional Study Area (RSA), approximately 20 km from the Project footprint. Along each transect, sample sites are located at 30, 100, 750 and 1,200 m from the Project Development Area (PDA). Each sample site consists of one open plot and one closed plot. Vegetation within each plot is sampled for percent plant cover by plant group using the point quadrat method. The plant groups selected for the study include deciduous shrubs, evergreen shrubs, forbs, graminoids, moss, lichen and standing dead litter. Data are analyzed for total percent ground cover, total percent canopy cover and percent cover by plant group to determine the relationship to the distance from the PDA, while accounting for the potential effect of herbivory.

RESULTS

- Average ground cover by vegetation was 28.0%. Moss was the most abundant ground cover (8.5%), followed by evergreen shrubs (4.3%), and lichens (1.8%).
- Average canopy cover was 49.8%. Standing dead litter was the most abundant canopy cover (25.3%), followed by graminoids (10.5%), deciduous shrubs (4.5%), evergreen shrubs (3.8%), and forbs (2.2%).

TRENDS

- Ground Cover - There has not been evidence of a difference in ground cover by distance class ($p = 0.72$) nor plot treatment (open vs. closed; $p = 0.53$). Also, there has not been strong support for an interaction between plot treatment and distance class ($p = 0.17$).
- Canopy Cover - There has not been evidence of a difference in canopy cover by distance class ($p = 0.38$), nor has there been support for an interaction between plot treatment and distance class ($p = 0.13$).

- Plant Group / Plot Treatment - There has not been evidence of a relationship between plant group and plot treatment for the ground cover nor canopy cover layers.

RECOMMENDATIONS / LESSONS LEARNED

Continue monitoring at all 15 transects and 66 sites as part of the vegetation abundance monitoring program and in accordance with the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).

Project Certificate Condition No. 37

Category	Vegetation - Monitoring
Responsible Parties	The Proponent, Government of Nunavut Department of Environment
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent establishment of invasive species
Term or Condition	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 to the Government of Nunavut Department of Environment
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2014 Annual Terrestrial Monitoring Report Terrestrial Environment Mitigation and Monitoring Plan
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Exotic invasive vegetation monitoring is focused on surveying previously disturbed areas within and adjacent to the Project footprint. Presence/absence sampling is used to search for exotic invasive vegetation where invasive plants could be found (i.e., disturbance areas along buildings, infrastructure and road ditches). Each of the three focal areas (Mine Site, Milne Inlet Port and Tote Road) is surveyed on foot, with some sections surveyed in a vehicle at slow speeds along the Tote Road. The Terrestrial Environment Mitigation and Monitoring Plan specifies that the monitoring of exotic invasive vegetation will take place every 5 years.

RESULTS

Not applicable in 2016 as surveys were not conducted.

TRENDS

A trend analysis is not applicable at this time as there has only been one round of data collection. Trend analyses will be completed when more data are collected and analyzed and as appropriate.

RECOMMENDATIONS / LESSONS LEARNED

Continue monitoring in 2019 as part of the exotic invasive vegetation and natural regeneration program and in accordance with the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).

Project Certificate Condition No. 38

Category	Vegetation - Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to vegetation abundance, diversity, and health
Term or Condition	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
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016l)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Vegetation Abundance

The vegetation abundance monitoring program includes 15 transects radiating out from the Mine Site (six transects), Tote Road (five transects) and Milne Inlet (four transects). In addition, six control (reference) sites have been established within the Regional Study Area (RSA), approximately 20 km from the Project footprint. Along each transect, sample sites are located at 30, 100, 750 and 1,200 m from the Project Development Area (PDA). Each sample site consists of one open plot and one closed plot. Vegetation within each plot is sampled for percent plant cover by plant group using the point quadrat method. The plant groups selected for this study include deciduous shrubs, evergreen shrubs, forbs, graminoids, moss, lichen and standing dead litter. Data are analyzed for total percent ground cover, total percent canopy cover and percent cover by plant group to determine the relationships to distance from the PDA, while accounting for the potential effect of herbivory.

Vegetation and Soil Base Metals

The vegetation and soil base metals monitoring program considers three Project areas (Milne Port, Tote Road, Mine Site) at varying distances from the PDA (0 to 100 m; 101 to 1000 m; >1000 m). Soil and lichen samples are typically collected between late-July and early-August. Samples are analyzed for total metal concentrations to assess the relationship of metals in soil and lichen with distance from the PDA. A subset of total metals referred to as metal/metalloid of potential concern (CoPC) are selected for the analysis and typically include arsenic, cadmium, copper, lead, selenium and zinc. These CoPCs are compared to Project-specific thresholds.

Exotic Invasive Vegetation and Natural Regeneration

Exotic invasive vegetation monitoring is focused on surveying previously disturbed areas within and adjacent to the Project footprint. Presence/absence sampling is used to search for exotic invasive vegetation where invasive plants could be found (i.e., disturbance areas along buildings, infrastructure and road ditches). Each of the three focal areas (the Mine Site, Milne Inlet and Tote Road) are surveyed on foot, with some sections surveyed in a vehicle at slow speeds along the Tote Road.

RESULTS

Vegetation Abundance

- In 2016, seven additional transects were established within the RSA for a total of 15 transects, 66 sites and 151 plots.
- Average ground cover by vegetation was 28.0%.
- Average canopy cover was 49.8.

Vegetation and Soil Base Metals

- A total of 50 sites and 100 samples (50 soil and 50 lichen) were collected in 2016 to increase sample size and improve the power to detect a change in metal concentrations for all CoPCs before exceeding threshold levels.
- All samples were well below thresholds with the exception of one soil and one lichen sample. Samples above threshold levels were investigated to determine the likelihood of a potential sampling error.

Exotic Invasive Vegetation and Natural Regeneration

Exotic invasive vegetation and natural regeneration monitoring was conducted once from August 1-3, 2014. No exotic invasive plant species were found within the Project footprint and adjacent areas. No surveys conducted in 2016.

TRENDS

Vegetation Abundance

- Ground Cover - There has not been evidence of a difference in ground cover by distance class ($p = 0.72$) nor plot treatment (open vs. closed; $p = 0.53$). Also, there has not been support for an interaction between plot treatment and distance class ($p = 0.17$). Moss was the most abundant ground cover (8.5%), followed by evergreen shrubs (4.3%), and lichens (1.8%).
- Canopy Cover - There has not been evidence of a difference in canopy cover by distance class ($p = 0.38$), nor has there been support for an interaction between plot treatment and distance class ($p = 0.13$). Standing dead litter was the most abundant canopy cover (25.3%), followed by graminoids (10.5%), deciduous shrubs (4.5%), evergreen shrubs (3.8%), and forbs (2.2%).
- Plant Group / Plot Treatment - There has not been evidence of a relationship between plant group and plot treatment for the ground cover nor canopy cover layers.

RECOMMENDATIONS / LESSONS LEARNED

Continue vegetation program monitoring in accordance with the TEMMP.

Project Certificate Condition No. 39

Category	Vegetation - Reclamation and Revegetation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent erosion and promote progressive revegetation of disturbed areas
Term or Condition	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
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities
Status	Complete
Stakeholder Review	Reclamation Research program proposal under QIA review
Reference	Interim Closure and Reclamation Plan (Baffinland, 2016j)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

As described in the Interim Closure and Reclamation Plan, a Reclamation Research program is proposed (under QIA review in 2017) to identify best practices for promoting natural re-vegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. Due to limited research conducted to date for mines in the Canadian Arctic, research will focus on the development of methods to successfully achieve sustainable vegetation cover that meets the desired land use for the Project sites post-closure in the shortest duration possible. These sites include gravel roads, gravel pads, waste rock, stockpiles, and waste dumps. The objective of this reclamation research program 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.

Specific objectives of the reclamation research program are:

- To determine which substrates are most effective for plant establishment and growth.
- To determine which groups and individual native plant species are able to establish and survive on a variety of substrates.
- To determine the duration groups and individual native plant species are able to establish and survive on a variety of substrates.
- To evaluate the potential for native plant species to egress from site of introduction to adjacent areas.

RESULTS

Not applicable for 2016.

TRENDS

A Reclamation Research program was proposed by Baffinland to identify best practices for promoting natural re-vegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. This program is currently under QIA review.

RECOMMENDATIONS / LESSONS LEARNED

Studies and/or observations of natural re-vegetation, such as colonization potential of vegetation species to disturbed areas, will be undertaken as part of on-going terrestrial monitoring and future reclamation research programs. Establishment of representative test plots for reclamation research studies will be designed in 2017 and implemented in 2018.

In 2016, Baffinland conducted a review of baseline data collection results applicable to re-vegetation. Findings indicated that approximately 20 plots were established historically on the old road surface or adjacent to it, in sites disturbed in the past. These sites were surveyed in the past to contribute to the knowledge of natural succession and the plant species that can become re-established without intervention. Findings include:

- Natural re-vegetation in this general environment is slow, but not as slow as expected. Based on observations on an old silver mine near the Doris North Project in the Kitikmeot Region, researchers expected little re-vegetation in the Mary River study area thirty years after use, but were surprised to find that considerable re-vegetation had occurred along the old tote road, particularly in damp areas. The difference is that much of the area traversed by the tote road is on sandy soils, whereas the Roberts Bay Silver Mine is located mostly on fractured gravels (Burt, 2003).
- Colonization of dry areas along the old roads, paths, and campsite areas is occurring slowly, so slowly as to be almost immeasurable in the time since the disturbance.
- Plant communities around the old mining camp near Sheardown Lake have been slightly affected by the addition of nutrients, and are, as expected, richer than normal, with more lush growth and more species of grasses and forbs.
- This colonization (around the old camp) may be on the wane, due to depletion of nutrients and lack of enrichment in the ensuing years.
- There are plenty of local species that can be utilized for reclamation; it is neither necessary nor advisable to obtain plant stocks for reclamation from elsewhere. Use local/regional plant stocks and seed sources for any re-vegetation being done on the Mary River Project.

Project Certificate Condition No. 40

Category	Vegetation - Reclamation and Revegetation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent erosion and promote progressive revegetation of disturbed areas.
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Complete
Stakeholder Review	Reclamation Research program proposal under QIA review
Reference	Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

As described in the Interim Closure and Reclamation Plan, a Reclamation Research program is proposed (under QIA review in 2017) to identify best practices for promoting natural re-vegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. Due to limited research conducted to date for mines in the Canadian Arctic, research will focus on the development of methods to successfully achieve sustainable vegetation cover that meets the desired land use for the Project sites post-closure in the shortest duration possible. These sites include gravel roads, gravel pads, waste rock, stockpiles, and waste dumps. The objective of this reclamation research program 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.

Specific objectives of the reclamation research program are:

- To determine which substrates are most effective for plant establishment and growth.
- To determine which groups and individual native plant species are able to establish and survive on a variety of substrates.
- To determine the duration groups and individual native plant species are able to establish and survive on a variety of substrates.
- To evaluate the potential for native plant species to egress from site of introduction to adjacent areas.

RESULTS

Not applicable for 2016.

TRENDS

A Reclamation Research program was proposed by Baffinland to identify best practices for promoting natural re-vegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. This program is currently under QIA review.

RECOMMENDATIONS / LESSONS LEARNED

Studies and/or observations of natural re-vegetation, such as colonization potential of vegetation species to disturbed areas, will be undertaken as part of on-going terrestrial monitoring and future reclamation research programs. Establishment of representative test plots for reclamation research studies will be designed in 2017 and implemented in 2018.

In 2016, Baffinland conducted a review of baseline data collection results applicable to re-vegetation. Findings indicated that approximately 20 plots were established historically on the old road surface or adjacent to it, in sites disturbed in the past. These sites were surveyed in the past to contribute to the knowledge of natural succession and the plant species that can become re-established without intervention. Findings include:

- Natural re-vegetation in this general environment is slow, but not as slow as expected. Based on observations on an old silver mine near the Doris North Project in the Kitikmeot Region, researchers expected little re-vegetation in the Mary River study area thirty years after use, but were surprised to find that considerable re-vegetation had occurred along the old tote road, particularly in damp areas. The difference is that much of the area traversed by the tote road is on sandy soils, whereas the Roberts Bay Silver Mine is located mostly on fractured gravels (Burt, 2003).
- Colonization of dry areas along the old roads, paths, and campsite areas is occurring slowly, so slowly as to be almost immeasurable in the time since the disturbance.
- Plant communities around the old mining camp near Sheardown Lake have been slightly affected by the addition of nutrients, and are, as expected, richer than normal, with more lush growth and more species of grasses and forbs.
- This colonization (around the old camp) may be on the wane, due to depletion of nutrients and lack of enrichment in the ensuing years.

There are plenty of local species that can be utilized for reclamation; it is neither necessary nor advisable to obtain plant stocks for reclamation from elsewhere. Use local/regional plant stocks and seed sources for any re-vegetation being done on the Mary River Project.

4.5.7 Freshwater Environment (PC Conditions 41 through 48a)

Nine (9) PC conditions (includes 48 and 48a) relate to the potential impacts of the Project on the freshwater environment, focused on fish and other freshwater biota. Several of the conditions recommend environmental protection measures, such as setbacks from watercourses and meeting blasting thresholds, or relate to meeting discharge requirements for effluents and runoff (the latter is evaluated in Section 3.4.5).

Stakeholder Feedback

The Department of Fisheries and Oceans administers the fish and fish habitat sections of the *Fisheries Act*, and is therefore the primary stakeholder with respect to freshwater biota. The Nunavut Water Board also regulates in-water structures such as bridges and culverts. The QIA took a keen interest in the freshwater biota component of previous environmental reviews. Freshwater biota has not been a key concern for local communities, as the Project does not interact with freshwater bodies containing anadromous (sea run) arctic char. From most stakeholders, the use of explosives near or in fish-bearing waters was a key area of concern, and hence NIRB established two PC conditions related to this.

Monitoring Activities

Monitoring activities undertaken in relation to the freshwater environment include:

- Monitoring of fish habitat offsetting measures associated with the 2007 Authorization under the *Fisheries Act* for crossings along the tote road
- Monitoring of different trophic levels of the freshwater environment (benthics, fish) as part of the Aquatic Effects Monitoring Plan (AEMP)
- Monitoring of sedimentation rates in Sheardown Lake to evaluate the potential for dust from the project to affect incubating fish eggs

As described in Section 3.4.5, spring freshet in 2016 was characterized by an early onset and high flows, and during the early stages of freshet, there were a number of instances where water samples exceeded the discharge limit for total suspended solids (TSS). A subsequent Direction under Section 38(7.1) of the *Fisheries Act* issued by ECCC outlined a number of measures to be taken to protect fish and fish habitat, all of which were completed by the deadlines specified. The majority of subsequent TSS monitoring samples met discharge criteria, and all acute toxicity analyses were non-lethal. There were also several natural sedimentation events in areas around the project that occurred later in the summer due to erosion along a water course and the release of water from a lake near Phillips Creek where an ice dam gave way.

Evidence of Project-related change was observed in Camp Lake and Sheardown Lake, along with several of their respective tributaries. Each of these waterbodies showed changes in AEMP monitoring parameters and metrics in 2016 (Section 4.5.5; PC Condition 20).

Table 4.14 provides an evaluation of the Project's impacts on the freshwater environment, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.14 Freshwater Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Freshwater Biota	Culvert replacements or extensions; sea container crossings were removed	Monitoring undertaken in accordance with the 2007 authorization under the Fisheries Act. An annual report was submitted to the DFO documenting work undertaken.	Within FEIS predications
	Culvert perching	Monitoring identified the old sea container crossing BG-50A becoming perched and impassable in July; the crossing was removed in November 2016. Mild (e.g., CV-106) to severe (e.g., south channel at BG-50) perching of culverts has been noted at a few crossings.	Exceeds FEIS predictions
	Water withdrawals from lakes affecting nearshore fish habitat	Water withdrawals were within water licence limits	Within FEIS predications
	Fish impingements at camp and dust suppression water takes	No monitoring; appropriate screens are used on all intakes	Within FEIS predications

Path Forward

Baffinland will implement its Tote Road Earthworks Execution Plan (TREETP), an outcome of the 2016 Fisheries Act Direction, in 2017, and will undertake annual monitoring of the freshwater environment as prescribed in the AEMP. Crossings with mild perches will continue to be monitored in future years, and a Tote Road Earthworks Execution Plan (TREETP) is being developed to improve fish passage issues, and reduce erosion and sedimentation, which have been noted at several crossings.

Project Certificate Condition No. 41

Category	Freshwater Aquatic Environment - Setbacks
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of runoff into freshwater aquatic habitat
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	AMEC Foster Wheeler and Hatch Ltd. Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association Nunavut Impact Review Board
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2016m) Borrow Pit and Quarry Management Plan (Baffinland, 2014b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

An important aspect of planning is to assess suitability of quarry material. Baffinland will avoid using quarry material that has the potential for generating Acid Rock Drainage (ARD) or Metal Leaching. Geotechnical investigations have been or will be carried out at the proposed sites, and ARD sources are being avoided. Testing was completed in 2010 by AMEC to determine the potential for acid rock drainage or metal leaching in proposed quarries that are now in operation. Section 3.1 Planning and Design of the Borrow Pit and Quarry Management Plan outlines the procedure described above.

RESULTS

No new quarries were developed in 2016. Existing quarries maintained the 100 metre buffer from the high water mark to any fish bearing water bodies.

TRENDS

No quarries with the potential for ARD have been used during the projects lifetime.

RECOMMENDATIONS / LESSONS LEARNED

New quarry developments will continue to be tested for ARD and metal leaching using the protocol for the Assessment for the Potential for Acid Rock Drainage (Borrow Pit and Quarry Management Plan, Appendix 2). Quarries with potential for acid rock drainage or metal leaching are not planned at the current time for development.

Project Certificate Condition No. 42

Category	Freshwater Aquatic Environment - Setbacks
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of runoff into freshwater aquatic habitat
Term or Condition	The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2016m) Environmental Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	Appendix F1 (EPP only) http://www.baffinland.com/sharedocuments/

METHODS

Bi-weekly inspections carried out by environmental personnel to ensure all project related operations are at a distance greater than 30 metres from any water body. If infractions are discovered, responsible departments for development areas are actioned to remove materials or infrastructure, and to reclaim developed area. New proposed development must be approved by Site Environment to ensure the developed area has a setback of 30 metres from the high water mark of natural water bodies. Consultants preparing design drawings for new infrastructure are made aware of the requirement. Baffinland conducts annual Environmental Protection Plan training for superintendents and managers. The presentation highlights on various project activities and the required natural vegetation buffers to any water bodies.

RESULTS

During internal inspections completed by site environment items within 30 meters of a water body were noted and responsible departments were actioned to address these issues. Site Environment followed up with further inspections to ensure that infrastructure was relocated or material was reclaimed.

TRENDS

Project mining operations have maintained the 30-meter buffer between water bodies in previous years and the condition continues to be enforced.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland personnel continue to monitor all new project developments to ensure the 30 metre buffer condition is adhered to.

Project Certificate Condition No. 43

Category	Freshwater Aquatic Environment - Drainage
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts of runoff into freshwater aquatic habitat
Term or Condition	Prior to the start of construction, the Proponent must submit a Site Drainage and Silt Control Plan to the appropriate regulatory authorities for approval
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC)
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2016m)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A site drainage and silt control plan is included in the SWAEMP.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The SWAEMP has been and will continue to be followed prior to the construction of any new facilities.

Project Certificate Condition No. 44

Category	Freshwater Aquatic Environment - Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of explosives on freshwater aquatic habitat
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Not applicable.

RESULTS

No blasting near water was conducted in 2016.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 45

Category	Freshwater Aquatic Environment - General
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to freshwater aquatic habitat
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Fisheries and Oceans Canada
Reference	Fisheries Authorization No. NU-06-0084 (For Tote Road Crossings; DFO, 2007) Fisheries Authorization No. 14-HCAA-00525 (For Ore Dock; DFO, 2014) 2016 Milne Ore Dock Fish Offset Monitoring (Sikumiut Environmental Management Ltd., 2017a) Early Revenue Phase - Tote Road Upgrades Fish Habitat Monitoring - 2016 Annual Report to the Department of Fisheries and Oceans (Baffinland, 2016o)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The two above-referenced Authorizations under the *Fisheries Act* are the regulatory instruments by which Baffinland can demonstrate that it has adhered to the no-net-loss principle. Annual monitoring of off-setting works is undertaken, as described below.

RESULTS

Milne Inlet Tote Road Crossings (Fisheries Authorization No. NU-06-0084)

Status of Watercourse Crossings

As of November 30, 2008, all authorized HADD water crossings were installed. Remedial work up to August 2009 at the habitat compensation sites was substantially completed, and by October 2011 additional habitat compensation investigations and access structure installation were complete at select crossings. In 2012, new culverts were installed at two HADD crossings (BG-04 and BG-32) and habitat compensation works were completed at BG-30. No additional work was completed in 2013 due to pending potential upgrades to large portions of the Tote Road as part of the Early Revenue Phase of the Project. In 2013/14 bridges were installed at four crossings and culvert replacement/extension was initiated on another crossing. The now obsolete sea containers were removed from the CV-223 crossing during late fall 2014 and from BG-50 in late 2016.

Fish Use Assessments at Select Crossings

Fish use assessments in 2016 were conducted at all fish-bearing sites, including those where ERP upgrades had been completed by early July and those where potential future upgrades may proceed. Five normally fish-bearing streams were dry or nearly dry in 2016, with no fish observed at the time of the survey in early July. Fish were observed at all remaining known fish-bearing crossings with generally unobstructed upstream passage through most of the culverts. At the fish-bearing crossings where new construction works had been completed by early July 2016, most showed no issues with fish use of habitat or passage potential through the culverts. The old sea containers at BG-50A were becoming perched and impassable as of the early July survey and

were subsequently removed in late November 2016. This should restore full access to all fish using the north channel of that stream. The remaining two sea container crossings (CV-128 and CV-217B) were removed prior to DFO's deadline of March 28, 2017.

To minimize the amount of sediment entering watercourses during freshet and damage to culverts along the Tote Road, a snow management plan with an emphasis on fish-bearing streams has been implemented to mitigate future sedimentation issues. During the Fall of 2016, fish-bearing streams were identified with roadside flags/markers. This will assist in providing visual reminders that identify fish habitat streams for routine equipment operations on the road.

Mild (e.g., CV-106) to severe (e.g., south channel at BG-50) perching of culverts has been noted at a few crossings. Mild perching does not appear to have affected fish passage, but the crossing at BG-50 is sufficiently perched to prevent all upstream access for fish in the south channel, however fish passage is accessible in the north channel, especially with the removal of the perched sea can bridge at this crossing. In addition, the culverts at BG-01, though improved with the addition of a rocky ramp in 2008, are becoming increasingly perched through erosion and may become impassable in the near future. Crossings with mild perches will continue to be monitored in future years, and a Tote Road Earthworks Execution Plan (TREETP) is being developed to improve fish passage issues and erosion and sedimentation, which have been noted at several crossings.

Fish Use Assessments at Compensation Sites

Fish use assessments conducted in 2016 verified that all previous compensation works remain successful. This includes fish use of the rustic fishway installed at BG- 30.

It is expected that there will be a reduction in the original HADD footprint size at crossings where bridges replaced sea containers and some change to the footprint size at crossings where new culverts are being installed and others replaced. Following completion of ERP upgrades and any additional works as recommended by the TREETP, HADD and compensation will be revisited to determine if sufficient compensation remains or if additional works will be required.

Ore Dock Fisheries Authorization No. 14-HCAA-00525

Under the *Fisheries Act* Authorization issued for the ore dock, Baffinland is required to undertake monitoring and reporting of the structural stability and biological utilization of offsetting measures at the Milne ore dock. The second year of monitoring of the effectiveness of the fish offset was conducted in August 2016, consisting of:

- Underwater video surveys to assess the structural stability and examine for evidence of siltation and sediment
- Underwater video surveys to qualitatively evaluate biological utilization of the armour stone
- Use of artificial substrate baskets to monitor biological colonization (e.g., encrusting epifauna)
- Use of larval traps for determining fish larvae occurrence
- Zooplankton sampling for presence of ichthyoplankton
- Use of Fukui traps to determine the presence of fish and mobile epifauna

Video transects documented the extents of the armour stone in the vicinity of the caisson. Video data were assessed for evidence of instability or movement of the armour stone and, generally, the coarse rock material was stable with no evidence of any movement or slumping. Video data were assessed for siltation and/or sedimentation and only minor indications of silt deposit on the armour stone were apparent in shallower areas protected from wave action. There was also limited evidence of fines along the caisson in an area of expected deposition of fines during ore loading and it is possible that prop wash from ore carriers is redistributing deposited fines. There was also evidence of possible bulk spillage of ore at one location along the caisson.

Monitoring of the biological utilization of the armour stone provided evidence of utilization by a wide variety of taxa representing several trophic levels. Observations of fauna included zooplankton; invertebrates including krill, mysid shrimp, sea urchins and brittle stars; juvenile and adult fish including Arctic cod, sculpin species, and eelpout; and ringed seal. Observations of flora included four taxa of algae with green algae (*Urospora* sp.) and brown algae (*Desmarestia* sp.) being the most dominant taxa. The presence of organisms from all levels of the ecosystem provides evidence that the ore dock offset is supporting biological productivity at all trophic levels.

There was considerable evidence of algal production on the armour stone indicating sufficient nutrients were available to support this production. It is probable that terrestrially derived nutrients, from Robertson Creek to the east of the ore dock, is providing a nutrient source to support biological productivity at the offset. Krill or mysid shrimp were also in abundance and these taxa are an important food resource for Arctic char and Arctic cod, as well as seabirds, whales and seals. Arctic cod were present as juveniles, and in great abundance, and this species is also important forage for Arctic char, as well as other fish species, marine mammals, and birds. Presence of large schools of juvenile cod suggested successful reproduction in inner Milne Inlet or potentially in association with the ore dock.

TRENDS

No trends were noted.

RECOMMENDATIONS / LESSONS LEARNED

The process of biological invasion and colonization of the offset habitats was expected to be slow. This was confirmed by slow colonization of settlement baskets deployed near the ore dock in 2014. Monitoring in 2016 has however indicated a more rapid process of biological colonization of the fish offset than expected with productivity evident at all trophic levels. This is encouraging and supports the underlying biological concept for the offset that increasing habitat complexity and heterogeneity will lead to increased biological productivity.

Project Certificate Condition No. 46

Category	Freshwater Aquatic Environment - Drainage
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to freshwater aquatic habitat
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board, Qikiqtani Inuit Association
Reference	2016 Qikiqtani Inuit Association and Nunavut Water Board Annual Report for Operations (Baffinland, 2017c) Completion Report: Environment and Climate Change Canada Fisheries Act Direction (Baffinland, 2016c) Indigenous and Northern Affairs Canada Letter of Non-Compliance (INAC, 2016)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland's Type A Water Licence specifies water quality discharge criteria and monitoring requirements for the various sources of Project effluent and surface water runoff downstream of Project operations and construction areas.

Monitoring results collected under Type A Water Licence are reported to the Nunavut Water Board (NWB) and Qikiqtani Inuit Association (QIA) on a monthly and annual basis.

Sampling is undertaken following the sampling methods described in Baffinland's Quality Assurance / Quality Control (QA/QC) Plan approved by the NWB under the licence.

RESULTS

Refer to Project Certificate Condition No. 17, for exceedances involving effluent discharges that were actively managed and discharged to the receiving environment in 2016.

In 2016, there were several sedimentation events and instances where surface water run-off downstream of Project facilities exceeded the discharge criteria for total suspended solids (TSS). The majority of exceedances occurred in May and June as the result of an early and intense freshet. As required under the Type A Water Licence and Commercial Lease, these sedimentation events and exceedances have been reported to the QIA and NWB in the 2016 Qikiqtani Inuit Association and Nunavut Water Board Annual Report for Operations.

These sedimentation events and exceedances led to a Fisheries Act Direction in June of 2016 issued by Environment and Climate Change Canada (ECCC, 2016a) under the *Fisheries Act* (ECCC, 2016). Indigenous and Northern Affairs Canada (INAC) issued a letter of non-compliance at the same time (INAC, 2016). In response to the non-compliance letter and Fisheries Directive, Baffinland prepared a completion report outlining the measures to be taken to address the directive to mitigate any further possible *Fisheries Act* issues at the Project, including a schedule of actions outlined in accompanying Sediment and Dust

Mitigation Action Plans (Golder Associates Ltd., 2016a,b). The completion report was accepted by the Department of Fisheries and Oceans (DFO) as meeting the requirement and demonstrated compliance with the issues identified in the Fisheries Act Direction. A copy of the completion report was submitted to ECCC, DFO, INAC, the NWB, and the QIA.

TRENDS

A higher number of non-compliant discharges occurred in 2016 largely as a result of the freshet that occurred in the early spring.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is actively following the schedule of corrective actions outlined in the Sediment and Dust Mitigation Action Plans to mitigate future sedimentation events and exceedances at Project sites.

Project Certificate Condition No. 47

Category	Freshwater Aquatic Environment - Watercourses
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent blockages or restrictions to fish passage
Term or Condition	The Proponent shall ensure that all Project infrastructure in watercourses are designed and constructed in such a manner that they do not unduly prevent and limit the movement of water in fish bearing streams and rivers
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA), Department of Fisheries and Oceans (DFO)
Reference	Early Revenue Phase - Tote Road Upgrades Fish Habitat Monitoring - 2016 Annual Report to the DFO (Baffinland, 2016o)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A fish habitat monitoring plan was developed to ensure that all measures and works specified in the No Net Loss and Monitoring Plan (Knight Piésold, 2007), as well as the *Fisheries Act* Authorization and amendments, have been implemented and are functioning as intended. Aquatic monitoring in 2016 focussed on assessing any changes to fish, habitat, and accessibility at fish-bearing crossings where replacement/installation of culverts occurred since November 2015.

RESULTS

Fish use assessments in 2016 were conducted at all fish-bearing sites, including those where Early Revenue Phase (ERP) upgrades had been completed by early July and those where potential future upgrades may proceed. Table 3.3 of the 2016 Annual Report to DFO summarizes assessments conducted in 2016 and provides recommendations for future monitoring or construction works for 2017. Follow-up and corrective actions are also provided in Table 3.3 of the same report, subsequent to receiving field reports from the responsible fisheries biologist.

Five normally fish-bearing streams were dry or nearly dry in 2016, with no fish observed at the time of the survey in early July. Fish were observed at all remaining known fish-bearing crossings with generally unobstructed upstream passage through most of the culverts. At the fish bearing crossings where new construction works had been completed by early July 2016, most showed no issues with fish use of habitat or passage potential through the culverts. The old sea containers at BG-50A were becoming perched and impassable as of the early July survey and were subsequently removed in late November 2016. This is expected to restore full access to all fish using the north channel of that stream. Removal of remaining sea containers at CV-128 and CV-217B was completed in early March 2017.

All compensation works remain successful, including fish use of the rustic fishway installed at BG-30.

TRENDS

Mild (e.g. CV-106) to severe (e.g. south channel at BG-50) perching of culverts has been noted at a few crossings as described in Table 3.3 of the 2016 Annual Report to the DFO. Mild perching does not appear to have affected fish passage. The crossing

at BG-50 however is sufficiently perched to prevent all upstream access for fish in the south channel, however fish passage is accessible in the north channel, especially with the removal of the perched sea can bridge at this crossing in November 2016.

The culverts at BG-01, though improved with the addition of a rocky ramp in 2008, are becoming increasingly perched through erosion and may become impassable in the near future. Crossings with mild perches will continue to be monitored in future years. A Tote Road Earthworks Execution Plan (TREETP) is being developed to improve fish passage issues and manage erosion and sedimentation issues that have been noted at several crossings.

RECOMMENDATIONS / LESSONS LEARNED

Fish use assessments will be continued in 2017 as part of the fish habitat monitoring program and will include an assessment of improvements to fish passage due to removal of sea-can bridges and upgrades to culverts along the Tote Road.

Project Certificate Condition No. 48

Category	Freshwater Aquatic Environment - Explosives
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Fisheries and Oceans Canada
Project Phase(s)	Construction, Operations
Objective	To mitigate impacts to freshwater aquatic habitat
Term or Condition	The Proponent shall engage with Fisheries and Oceans Canada and the Qikiqtani Inuit Association in exploring possible Project specific thresholds for blasting that would exceed the requirements of Fisheries and Oceans Canada's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (D.G. Wright and G.E. Hopky, 1998)
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Fisheries and Oceans Canada, Qikiqtani Inuit Association (QIA)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

To date there has been no requirement to undertake blasting in or near water, and as such, there has been requirement to discuss blasting near water with Fisheries and Oceans Canada and the Qikiqtani Inuit Association. Baffinland will discuss Project specific blasting thresholds with the appropriate parties if required in the future.

Project Certificate Condition No. 48(a)

Category	Freshwater Aquatic Environment - Arctic char
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To determine presence and health of arctic char in freshwater aquatic habitat
Term or Condition	The Proponent shall develop plans to conduct additional surveys for the presence of arctic char in freshwater bodies and ongoing monitoring of arctic char health where applicable, within watersheds proximal to the mine, tote road and Milne Inlet Port project development areas, including but not limited to, Phillips Creek, Tugaat and Qurluktuk. The Proponent shall consult with the MHTO regarding the design, timing, and location of proposed surveys and ongoing monitoring.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	
Reference	2016 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Monitoring - Milne Inlet Marine Ecosystem (Sikumiut Environmental Management Ltd., 2017b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Additional fish studies were undertaken in 2016 within the marine environment at Milne Port as per the Milne Inlet marine Environmental Effects Monitoring (EEM) Program referenced above.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

None

4.5.8 Terrestrial Environment (PC Conditions 49 through 64)

Sixteen (16) PC conditions relate to the potential impacts of the Project on the terrestrial environment, focusing primarily on caribou, carnivores, and terrestrial wildlife habitat. Most of these conditions relate to the development of mitigation and monitoring plans focusing on caribou, the establishment of the Terrestrial Environment Working Group (TEWG), and the annual reporting of monitoring of the terrestrial environment to the NIRB.

Stakeholder Feedback

Caribou has been and continues to be the primary focus of stakeholder concern with respect to the terrestrial environment. Local communities including hunter and trapper organizations, the QIA and the GN (the latter with the regulatory mandate of caribou wildlife management) participate in the TEWG. The TEWG has become the collective stakeholder body that Baffinland interacts with regarding caribou and other components of the terrestrial environment.

During the environmental reviews, sensory disturbance to caribou due to the project was a key issue. This included sensory disturbance and the potential for mortalities due to collisions with trains on the south railway and truck traffic along the Milne Inlet Tote Road. Communities were initially very concerned that the railway would interrupt the typical northward movement of caribou into the North Baffin Region, though through the review process the communities seemed to become more comfortable with the idea that the caribou would acclimatize to the railway over time. Another concern was that caribou are particularly sensitive to disturbance at their current state of low abundance within their natural population cycle. Carnivores received disproportionately less focus, though there are a couple of PC conditions focused on carnivores. The importance of Baffinland support to regional wildlife monitoring and management initiatives was stressed by the NIRB, the GN and other parties.

Monitoring

Baffinland completes a number of monitoring programs of the terrestrial environment, many of which in collaboration with government agencies. Baffinland is increasing its focus on inclusion of community based monitoring into all aspects of the programs. The TEWG members, consisting of government agencies, technical experts and community representatives, provide advice on all aspects of Baffinland's terrestrial monitoring programs. Their work includes review and comment of the Annual Terrestrial Monitoring Report, and updates to the monitoring program. Two in-person meetings are held annually to review the trends and results of all programs and to provide advice to Baffinland regarding future monitoring.

Baffinland's terrestrial environment monitoring program includes the following:

- Caribou
 - Helicopter flight height analysis
 - Snow track surveys
 - Snow bank height monitoring
 - Height-of-land caribou surveys
- Carnivores
 - Den surveys

Table 4.15 provides an evaluation of the Project's impacts on the terrestrial environment, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.15 Terrestrial Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Habitat Loss	Direct habitat loss due to the Project footprint, and indirect habitat loss due to sensory disturbances	Height of Land monitoring; snow track and snow bank monitoring; incidental observations; GN regional aerial surveys. No caribou were observed in 2016. Regional numbers appear very low.	Within FEIS predictions
Restriction of Movement	Project infrastructure and the tote road act as a barrier to the movement of caribou		
Mortality	Mortality resulting from vehicle collisions or project-induced hunting	Incidental observations; biologists and other staff on-site: no mortalities observed	Within FEIS predictions

To the extent that Project impacts on the terrestrial environment can be evaluated, the effects of the Project appear to be within FEIS predictions.

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect the terrestrial environment and wildlife resources. Baffinland will continue to seek input and review monitoring results trends from technical members of the TEWG. Reporting on each Project Condition follow.

Project Certificate Condition No. 49

Category	Terrestrial Wildlife and Wildlife Habitat - Terrestrial Environment Working Group
Responsible Parties	The Proponent
Project Phase(s)	All phases
Objective	To provide environmental oversight
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 TEWG Meeting Notes
Ref. Document Link	Appendix C1

METHODS

Baffinland established the TEWG in 2013. Members include: Environment and Climate Change Canada, Qikiqtani Inuit Association, Government of Nunavut, Baffinland with technical experts as required. The Mittimatalik Hunters and Trappers Organization joined the group in 2016. WWF-Canada participate as observers only.

The Terms of Reference for the group were first developed in March of 2013. In November of 2016, with three years of experience, Baffinland and the TEWG began revisions to the Terms of Reference (revision 2). Major revisions include adding the Mittimatalik Hunters and Trappers Organization to the membership list, clarifying reporting and meeting structures and adding the roles and responsibilities of the organizations of the working group.

The group meets at two in-person meetings annually, rotating between Iqaluit and Ottawa. In 2016, the group has added at least two conference calls in between in-person meetings and to take advantage of smaller expert focused sub-group meetings.

Draft technical annual reports and other documentation are provided to the group in advance of meetings and an on-going basis to allow for review, comment and advice to be provided by all members. Baffinland and their technical experts take into consideration comments received by the working group in the finalization of documents and planning of monitoring programs.

RESULTS

The TEWG has guided the development of the Terrestrial Environment Effects Monitoring Program (TEEMP). The program is reviewed annually and adjustments are made to the monitoring program as needed following guidance from the group.

The TEWG reviews the annual terrestrial environment monitoring report and provides comments to Baffinland for consideration in the final version.

TRENDS

The TEWG has successfully developed a robust terrestrial monitoring program which is reviewed and adjusted on an annual basis.

RECOMMENDATIONS / LESSONS LEARNED

In 2017, Baffinland will work with the TEWG and NIRB to finalize revisions to the Terms of Reference. Baffinland will continue to work with the TEWG to review and guide monitoring programs on an annual basis and develop mitigate measures or action plans as and when needed.

Baffinland, with support from the QIA and other members of the TEWG, has put a strong emphasis on continuing existing and developing more diverse community based monitoring programs.

Project Certificate Condition No. 50

Category	Terrestrial Wildlife and Habitat - General
Responsible Parties	The Proponent and other Parties as appropriate
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure appropriate and responsive adaptive management
Term or Condition	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).
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016l)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The TEMMP outlines Baffinland's monitoring program for terrestrial wildlife and habitat. The plan has received refinement from contributions from the TEWG over the past several years. The TEMMP also includes applicable thresholds for the assessment of long-term trends.

The TEMMP is supplemented by Baffinland's contributions to information gathered from region-wide monitoring for caribou conducted by the Government of Nunavut, and seabird research conducted by Environment Canada.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Updates to the TEMMP are developed on an as-needed basis. The updates are based on statistical analysis of data and adjustments necessary to improve robustness of survey design and methods. The TEMMP updates are based on annual monitoring data review, and discussion with technical experts in the TEWG.

Project Certificate Condition No. 51

Category	Terrestrial Wildlife and Habitat - General
Responsible Parties	The Proponent and/or TEWG
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote coordination of monitoring efforts
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG), GN Department of Environment
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland has provided financial and logistical support for the Government of Nunavut's (GN's) North Baffin Island caribou survey research on a number of occasions since 2009. Baffinland supported the north Baffin Island fall caribou survey in 2016 (conducted by Morgan Anderson). Baffinland is currently discussing support for the GN's north Baffin Island spring 2017 survey. These regional studies provide information on the North Baffin Island caribou population. To Baffinland's knowledge, based on discussion in the TEWG, there are currently no harvest programs.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work to the greatest extent possible to support the GN's regional caribou surveys. In 2016, the Mittimatalik Hunters and Trappers Organization became a member of the TEWG. Baffinland is open to and encouraging opportunities for community based monitoring initiatives.

Project Certificate Condition No. 52

Category	Terrestrial Wildlife and Habitat - Caribou
Responsible Parties	The Proponent, TEWG
Project Phase(s)	Construction
Objective	To ensure best practices are used for caribou protection.
Term or Condition	Within 3 months of issuance of the Project Certificate, the Proponent shall initiate design, and develop the timeline to test and implement means of deterring caribou from pits and other hazardous areas. A review of best practices and techniques will be undertaken at other Northern mines where interactions with caribou occur. Considerations should include temporary ribbon placement, inuksuks, or fencing and subsequent monitoring for effectiveness. These activities shall be reported back to the Terrestrial Environment Working Group.
Reporting Requirement	To be developed following approval of the Project by the Minister; results to be reported back to the Terrestrial Environment Working Group
Status	Not Applicable in 2016
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The issue of caribou protection measures was discussed with the TEWG in December 2013, and a number of protection measures were considered including Inukshuks, electric fences, wildlife fencing and berms.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland requires all employees to adhere to a stop work policy when wildlife is present which reduces hazardous conditions. Currently, caribou populations are low and no sightings of caribou have been made at the Project sites. Baffinland will continue to monitor for caribou and, in conjunction with the TEWG, identify appropriate caribou deterrents from hazardous areas when required.

Project Certificate Condition No. 53

Category	Terrestrial Wildlife and Habitat - Caribou
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to caribou from Project-related traffic
Term or Condition	<p>The Proponent shall demonstrate consideration for the following:</p> <ol style="list-style-type: none"> a. Steps taken to prevent caribou mortality and injury as a result of train and vehicular traffic, including operational measures meant to maximize the potential for safe traffic relative to operations on the railway, Milne Inlet tote road and associated access roads <ol style="list-style-type: none"> i. Specific measures intended to address the reduced effectiveness of visual protocols for the Milne Inlet Tote Road and access roads/trails during times of darkness and low visibility must be included b. Monitoring and mitigation measures at points where the railway, roads, trails and flight paths pass through caribou calving areas, particularly during caribou calving times. The details of these monitoring and mitigation measures shall be developed in conjunction with the Terrestrial Environment Working Group. c. Evaluation of the effectiveness of proposed caribou crossings over the railway, Milne Inlet tote road and access roads as well as the appropriate number d. Development of a surveillance system along the railway corridor to identify the presence of caribou in proximity to the train tracks and operational protocols for the train to avoid collisions and enable caribou to cross the train tracks unimpeded e. Protocols for documentation and reporting of all caribou collisions and mortalities, as well as mechanisms for adaptive management responses designed to prevent further such interactions
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Prevention of Caribou Mortality and Injury as a Result of Vehicular Traffic

- The Caribou Decision Tree presented in the TEMMP directs driver responses when caribou are near or crossing the Tote Road
- Snow bank heights are managed and assessed to manage potential barriers to caribou movement across the Tote Road
- Snow track surveys are used to monitor caribou interaction with the Tote Road to determine if they cross it or deflect their paths of movement

Refer to TEMMP sections 3.3.3 and 4.5.2, and Figure 3-2 for detailed methods.

Monitoring and Mitigation Measures

Twenty-four (24) Height-of-Land (HOL) stations are visited at least once during the caribou calving period annually.

Each site is visited for a minimum of 20 min, and the landscape is scanned for caribou presence using binoculars and spotting scope to detect and record caribou and their proximity to Project infrastructure. If caribou are observed, a detailed survey commences, tracking caribou behaviour and interaction with project infrastructure and vehicles. Additional monitoring occurs when trained biologists are on site throughout the year.

These methods are identified in the TEMMP sections 3.3.3 and 4.5. Note that railroads are not constructed at this time and, as such, are not a concern for terrestrial wildlife and habits.

Evaluation of Effectiveness of Caribou Crossings

Snow track surveys collect data on caribou response to Project activities based on patterns of movement observed. The surveys are conducted by driving slowly (30 km/hr) from Mary River to Milne Inlet on the Tote Road. When wildlife tracks are observed, surveyors stop and walk to the tracks to confirm species and then follow the tracks towards and away from the road to observe behaviour, habitat use and possible divergence of travel paths. When tracks were near or crossed the Tote Road, surveyors would record the location, species that produced the tracks, number of sets of tracks counted (i.e., group size), travel path in relation to the road (e.g., deflected, travelled along, or crossing the Tote Road) and the height of the snow bank measured at either the crossing point, or likely point of deflection.

These details are included in the TEMMP sections 3.3.3 and 4.5.2. Due to low embankments and existing low profile road conditions, there were no caribou crossings proposed for the Tote Road. Monitoring to date has focused on managing snow bank heights to minimize barriers to movement.

Surveillance System

Not applicable in 2016 as the railway is not constructed. The TEMMP section 3.3.3, which includes avoiding collisions with caribou, will include an updated surveillance system once the railway becomes a viable option.

Documentation and Reporting

The TEMMP section 3.3.4 details the protocol for documenting and reporting caribou collisions and mortalities. Although caribou numbers are very low and the risks of having a vehicle-caribou collision are low, ongoing mitigation such as use of the Caribou Decision Tree are occurring to prevent caribou mortalities.

RESULTS

Prevention of Caribou Mortality and Injury as a Result of Vehicular Traffic

- Caribou numbers are low at this time and therefore interactions with the Tote Road and vehicles have not occurred
- Snowbank height management continued to ensure barrier-free movement of caribou
- Snow tracking surveys have not yet observed caribou tracks due to very low caribou numbers

Monitoring and Mitigation Measures

- A total of 8 hours and 36 minutes of survey effort was conducted during the calving period in 2016
- No caribou were detected on the landscape in 2016

Evaluation of Effectiveness of Caribou Crossings

Results are inconclusive at this point as no caribou have been detected while a biologist was on site since 2013; however, ongoing management of snowbanks heights and providing escape routes, and monitoring wildlife responses continue.

Surveillance System

Not applicable in 2016 as the railway was not constructed.

Documentation and Reporting

Not applicable in 2016 as no collisions nor mortalities occurred.

TRENDS*Prevention of Caribou Mortality and Injury as a Result of Vehicular Traffic*

Caribou interactions with the Tote Road and vehicles have not occurred.

Monitoring and Mitigation Measures

Based on caribou observed per hours of survey effort, there was a drop in caribou observations from 2013, when the surveys began, to present. These data reflect the regional low of caribou numbers of the north Baffin Island herd.

Evaluation of Effectiveness of Caribou Crossings

Trend analysis is not applicable at this time.

Surveillance System

Not applicable in 2016 as the railway was not constructed.

Documentation and Reporting

Not applicable in 2016 as no collisions nor mortalities occurred.

RECOMMENDATIONS / LESSONS LEARNED

Once caribou numbers start increasing and their presence is identified on or near the Tote Road, the caribou decision tree will be reviewed; seasonal migrations of caribou and their interaction with the Tote Road will be considered; and monitoring and snow track surveys will occur more often by on-site staff.

Project Certificate Condition No. 54

Category	Terrestrial Wildlife and Habitat - Caribou
Responsible Parties	The Proponent
Project Phase(s)	Construction - within six (6) months of issuance of Project Certificate
Objective	To Update the Terrestrial Environmental Management and Monitoring Plan
Term or Condition	<p>The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include, but not be limited to the following:</p> <ol style="list-style-type: none"> a. Details of the methods and rationale for conducting monitoring prior to the commencement of construction; b. Monitoring for caribou presence and behavior during railway and Tote Road construction; c. Description and justification of statistical design or other means of determining effect and proposed analyses to support the conclusions drawn from monitoring impacts of the mine and related infrastructure on wildlife; d. Details of monitoring and mitigation activities, which should be established in collaboration with the Terrestrial Environment Working Group and are expected to include: <ol style="list-style-type: none"> i. Dustfall (fugitive and Total Suspended Particulates), that addresses methods to reduce risk to caribou forage from dustfall; ii. Snow track surveys during construction and the use of video-surveillance to improve the predictability of caribou exposure to the railway and Tote Road. Using the result of this information, an early warning system for caribou on the railway and Tote Road shall be developed for operation. e. Details of monitoring thresholds related to level of mitigation and management; and f. Details of a comprehensive hunter harvest survey to determine the effect on caribou populations and potential effects on caribou behaviour resulting from increased human access caused by upgrades to the Milne Inlet tote road (and any other roads if they are shifted from private to public use) and increase local knowledge of the mine site, including establishing pre-construction baseline harvesting data.
Reporting Requirement	Plan to be submitted to the NIRB and the TEWG within 6 months of issuance of a Project Certificate
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The TEMMP addresses PC Condition No. 54. The plan is reviewed and updated as needed on an annual basis. In regards to 54c, the programs are revised based on statistical analyses of annual data, as reported in the annual reports.

The response to PC Condition 53 addresses Baffinland's approach to 54b, 54dii, and 54e. The response to PC Condition 36 addresses Baffinland's approach to 54di.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

In regards to Project Condition 54f, Baffinland has been monitoring human use of the Project site. There is no legal obligation for users to report harvest to on-site personnel. Due to previous responses of harvesters from reported caribou sightings on the Project site, Baffinland has changed reporting of caribou sightings as confidential to the on-site environment staff. The challenges associated with Baffinland addressing Project Term 54f, and no legal mandate to monitor harvest, have been discussed at various TEWG meetings. The caribou harvest is now managed on a quota/tag system, and the harvest in the region is monitored by the Government of Nunavut.

Project Certificate Condition No. 55

Category	Terrestrial Wildlife and Habitat - Wolves
Responsible Parties	The Proponent, Government of Nunavut Department of Environment
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate potential impacts to wolves
Term or Condition	<p>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 <i>Nunavut Wildlife Act</i>. Consideration must be given to the following:</p> <ol style="list-style-type: none"> 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) Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development Area over time
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI 2017) Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

As a result of low caribou numbers, wolf numbers have also declined. Wolf monitoring programs will be activated as needed when caribou and wolf numbers increase as advised by the Government of Nunavut (GN). Baffinland consults with the GN during the Terrestrial Environment Working Group meetings. The current management of wolves is to avoid disturbance at active dens, when and if they are located.

Project Certificate Condition No. 56

Category	Terrestrial Wildlife and Habitat - Wildlife Habitat
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure progressive reclamation of disturbed wildlife habitat.
Term or Condition	The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the <i>Nunavut Wildlife Act</i> . 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.
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Progress
Stakeholder Review	Qikiqtani Inuit Association (QIA), Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (INAC)
Reference	Interim Closure and Reclamation Plan (Baffinland, 2016j)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

As described in the Baffinland's Interim Closure and Reclamation Plan, although most of the Project areas will be actively used during the Construction and Operation phases of the Project, where practical, areas which are no longer needed to carry out Project activities will be progressively reclaimed. The overall intent of the proposed progressive rehabilitation strategy is to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems/habitat that are compatible with a healthy environment and with human activities in as minimal duration as reasonably practical. The progressive rehabilitation strategy described in the Interim Closure and Reclamation Plan are expected to be technically and economically feasible and reflect Project closure principles.

RESULTS

Not Applicable.

TRENDS

Not Applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is currently planning for the establishment of a Mine Closure Working Group to provide an opportunity for local communities, QIA, and other interested parties to discuss closure planning. Once established, the working group will contribute to the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics in the strategy for progressive reclamation and closure. 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.

Project Certificate Condition No. 57

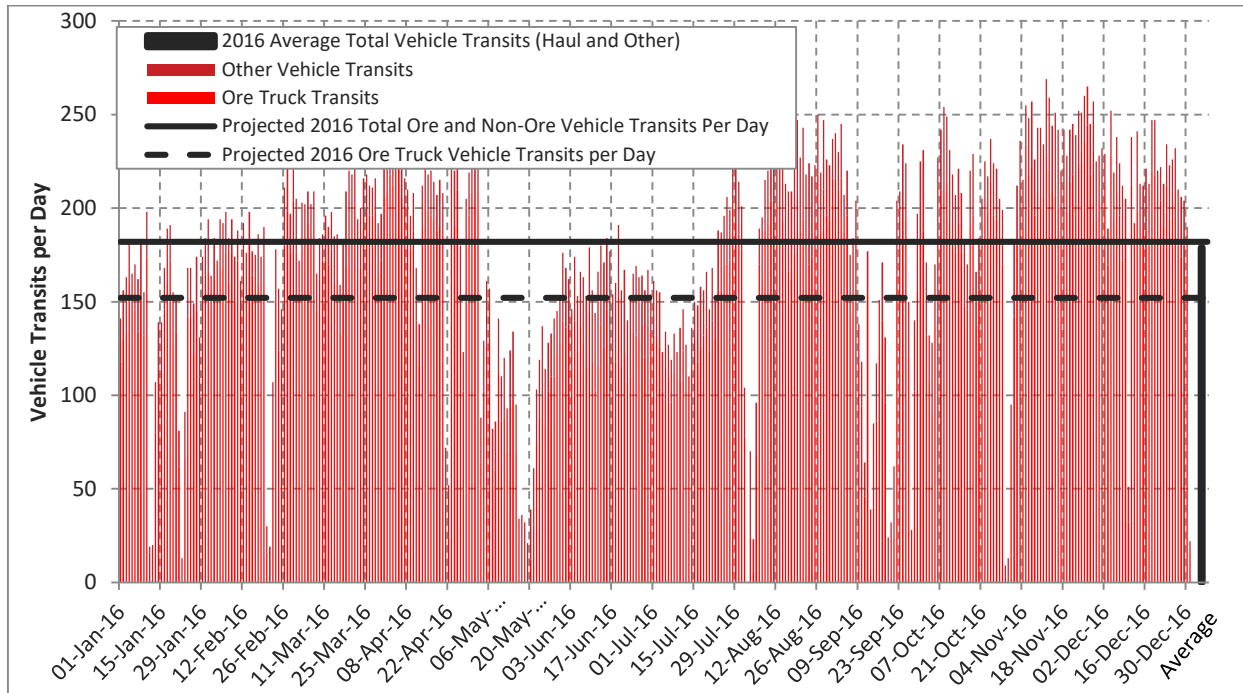
Category	Terrestrial Wildlife and Habitat - Reporting
Responsible Parties	The Proponent
Project Phase(s)	Construction, Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate and monitor for impacts to wildlife.
Term or Condition	<p>The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information:</p> <ol style="list-style-type: none"> Description of all updates to terrestrial ecosystem baseline data; A description of the involvement of Inuit in the monitoring program; An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; 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; Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; A summary of the chronology and level of mine activities (such as vehicle frequency and type); An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; 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.
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS AND RESULTS

- Updates and descriptions of all baseline data are recorded annually in the Terrestrial Annual Monitoring Reports.
- Inuit monitors are involved in all Terrestrial Annual monitoring programs conducted by Baffinland's consultant. This has included participation in snow track surveys, height of land surveys, and vegetation monitoring.
- Where relevant, the annual terrestrial environment monitoring reports discuss near-site wildlife observations to knowledge about regional populations. Bird monitoring survey data that derived density estimates was compared to regionally-available density estimates. The lack of caribou and wolf observations near site reflect low numbers reported throughout the north Baffin Island region. For vegetation abundance and metals in soils and vegetation, comparisons are made near site versus far site (regional). The vegetation monitoring plots are established to compare near site to far site (regional) trends.
- Project Certificate Condition No. 57(d) is addressed in the Terrestrial Annual Monitoring Reports through reporting of results of height-of-land surveys, snow tracking surveys, incidental observation logs, wildlife mortalities log, and reference to regional conditions from other publications and documents.

- e. All results of the monitoring programs, including methodologies and approach to statistics are included in the Terrestrial Annual Monitoring Reports.
- f. The terrestrial environment annual report summarizes mine traffic activity as a correlate to dustfall measures. All non-haul vehicle traffic on the Tote Road is recorded by Baffinland security. This type of vehicle traffic includes road maintenance mobile equipment, mechanical maintenance/fueling trucks, pick-up trucks, etc. The number of trucks hauling ore on the Tote Road each day is tracked by Mine Operations Dispatch. Data from both sources were collected, reviewed and compiled, and are presented on a 'vehicle transits per day' basis on Figure 4.2. Average number of vehicle passes per day on the Tote Road in 2016 is within that predicted in the Early Revenue Phase (ERP) Amendment to the Final Environmental Impact Statement (FEIS).

Figure 4.2 2016 Tote Road Vehicle Transits Per Day



- a. Since 2014, Project Certificate Condition No. 57(g) is addressed in the Annual Terrestrial Environment Report under the Dustfall Monitoring Program, as part of the section that addresses overview of weather conditions.

Annual weather data is recorded by Baffinland from on-site meteorological stations at Mary River, Milne Inlet, and Steensby Port. Baffinland established an on-site meteorological station at Mary River Camp in June 2005 and at Milne and Steensby Inlet in June 2006 which is the only available long term data for the Project. Parameters measured include air temperature, precipitation as rainfall, wind speed, and wind direction. Weather data, provided by Baffinland has been assessed annually since 2014 and is included in the annual reports submitted to NIRB. Currently, weather assessments as part of the Annual Report do not include Steensby Port.

On average, 2016 conditions at Mary River and Milne Inlet were somewhat warmer during the winter, similar during the summer, and drier compared to baseline conditions. Average 2016 wind direction and speed at Mary River and Milne Inlet were similar to baseline conditions.

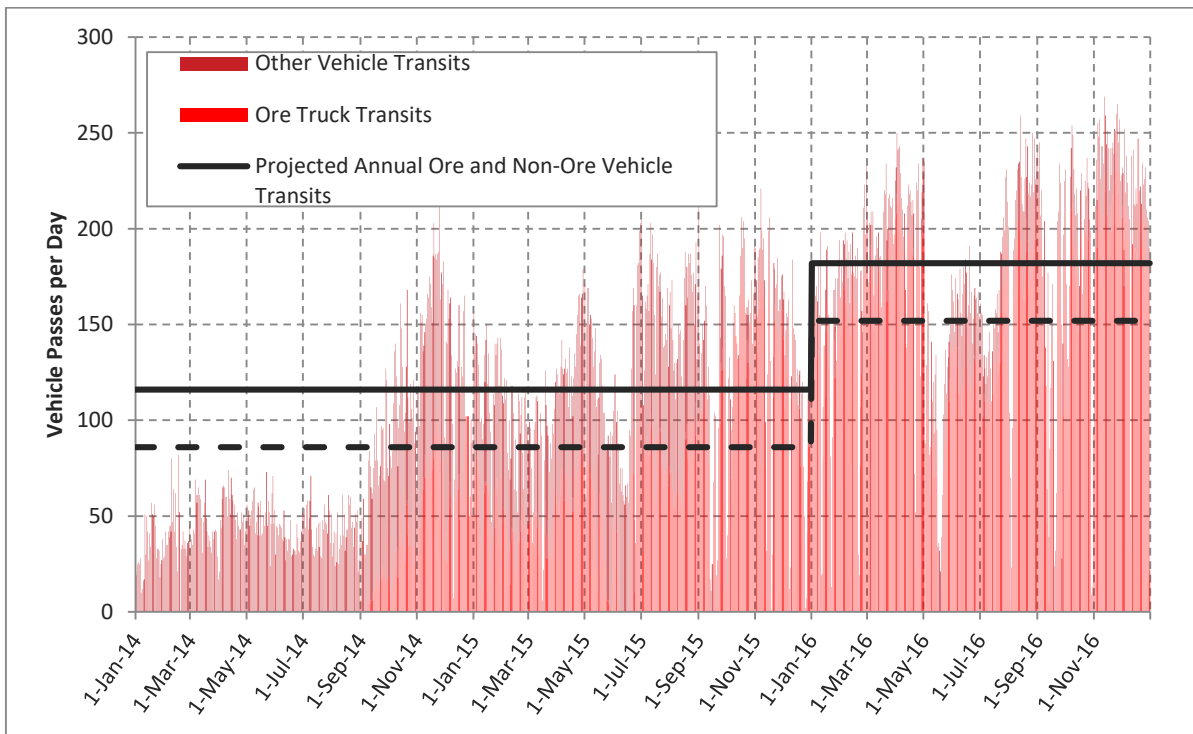
There is no specific monitoring related to timing of snowmelt or green-up for the project at present.

- b. The TEMMP addresses Project Certificate Condition No. 57(h). All versions of the TEMMP have revisions history table. Ongoing updates and changes to monitoring programs are also discussed in the Terrestrial Annual Monitoring Reports. This Project Condition is seemingly identical to Project Certificate Condition No. 58(e).

TRENDS

- a. No trends reported.
- b. No trends reported.
- c. No trends reported. Wolf and caribou observations on site follow the trends of regional observations; very low numbers. The low bird densities near site reflect low densities in the north Baffin Island region.
- d. No trends reported.
- e. No trends reported.
- f. Average number of vehicle passes has increased as production has increased as per projections in the ERP (Figure 4.3).
- g. No trends reported.
- h. No trends reported.

Figure 4.3 2016 Vehicle Passes Over the Tote Road by Vehicle Type



RECOMMENDATIONS / LESSONS LEARNED

- Continue monitoring traffic along the Tote Road in 2017 in accordance with the TEMMP.
- It is unclear what the intent of the tracking of snowmelt and green-up is for and how to qualify this timing. Baffinland will consider having onsite Environmental staff to monitor and record timing of snowmelt and green-up for Mary River and Milne Inlet on an annual basis and record in a database for long term tracking. However, clarification around the intent of this condition is requested.

Project Certificate Condition No. 58

Category	Terrestrial Wildlife and Habitat - Reporting
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate and monitor for impacts to wildlife.
Term or Condition	<p>Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:</p> <ol style="list-style-type: none"> An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails A description of the extent of dustfall based on measured levels of dustfall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and dustfall contribute to cumulative effects of the project Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program Any updates to information regarding caribou migration trails. Maps of caribou 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.
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Although regional environmental monitoring programs conducted by agencies are discussed at each TEWG meeting, there are no known reports of regional trends that can be used to address Part (a).

Part (b) is addressed in the Terrestrial Annual Monitoring Report annually through height-of-land surveys, snow bank height management and monitoring, and snow track surveys. However, caribou displacement has not yet been observed on site as caribou numbers are low in the north Baffin Island region.

Part (c) is addressed through dustfall sampling. In 2016, there were a total of 33 dustfall sample sites including: nine dustfall samplers located at the Mine Site; six dustfall samplers located at Milne Port; sixteen dustfall samplers divided between two sites along the Tote Road (the North site and South site); and two reference dustfall samplers are located 14 km southwest of the Tote Road.

Dustfall sampling was conducted year round; however, the winter sampling program was limited to a subset of the sampling sites (16 out of 33 in the 2016 season) because access to remote sites is restricted and unsafe during the winter months. Data analysis investigates differences between near, far and reference sites, seasonal differences, and calculates total annual deposition.

Vegetation monitoring for metals, described for PC Condition No. 34, addresses the potential uptake of dust born CoPCs in lichen and blueberries.

The annual dustfall measures are provided annually, but to date no effect has been measured, thus there is no perceived contribution to a cumulative effect.

The TEMMP addresses Part (e). Ongoing updates and changes to monitoring programs are also discussed in the Terrestrial Annual Monitoring Reports. This Project condition is seemingly identical to Part (h).

There is no new information on caribou migration trails since the data collection was summarized for the FEIS baseline report completed in 2012. Since construction started on the Project there has been no new collar data collected, and no caribou snow tracks have been observed. These results are reviewed within the TEWG, within which the Qikiqtani Inuit Association participates. Affected communities were consulted in November 2015 and April 2016 to gather contemporary knowledge about caribou movement in the Project area. Mapping of likely caribou movement areas adds to the growing local knowledge database that has been used to assess for and mitigate potential effects to caribou.

RESULTS

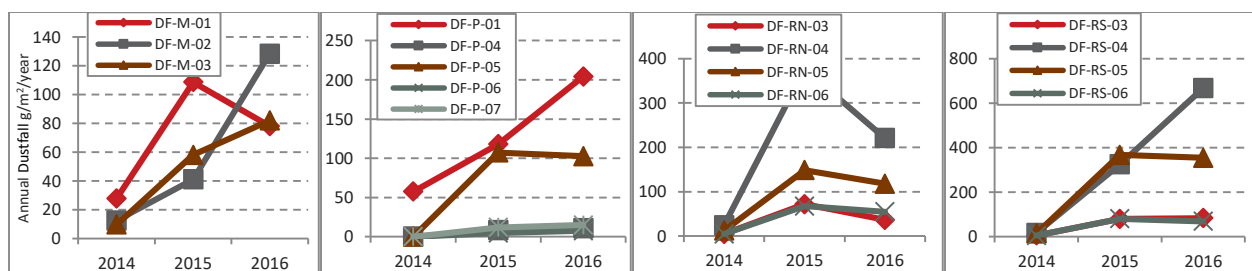
The results of the 2016 dustfall monitoring is presented below:

- Dustfall associated with the Tote Road was measured within one kilometre on either side of the road centreline. Outside one kilometre dustfall deposition decreased to at or below laboratory detection limits.
- Seasonal trends were not detected at the Mine Site, but were detected at Milne Port and the Tote Road south and north crossings. Dustfall in these areas was higher during the summer months.
- Annual dustfall at the Mine Site falls within predicted levels.
- Annual dustfall predictions at Milne Port sites DF-P-01, -04, -05, and -06 exceeded predicted levels.
- Annual dustfall along the Tote Road at the 30 m and 100 m distance from the centreline at both Tote Road south and north crossings exceeded predictions.

TRENDS

Throughout the Project area there was an increase in annual dustfall from 2014 to 2015; annual dustfall stayed relatively constant at most sites from 2015 to 2016 (Figure 4.4).

Figure 4.4 Trends in Annual Dustfall between 2014 and 2016



Caribou have not been observed in the project development area between 2013 and 2016. This information has been confirmed through collaboration with the Government of Nunavut who conducts caribou aerial surveys and through Inuit Qaujimajatuqangit received at workshops held in November 2015 and April 2016.

RECOMMENDATIONS / LESSONS LEARNED

The following recommendations relate to dustfall:

- Continue monitoring dustfall in 2017 in accordance with the TEMMP
- Continue ongoing and increase future dust suppression activities in all Project areas including the Mine Site, Milne Port, and the Tote Road
- Investigate new methods of transportation that will generate less dustfall (i.e., transportation by rail)

The annual reporting of the size of the Project footprint, dustfall, road traffic and helicopter overflights are measures of the Project's contribution to the potential cumulative effects in the north Baffin Island region. The project footprint contributes to a loss of habitat in the north Baffin Island region. Dustfall, road and air traffic have not yet been related to a measurable effect on any valued ecosystem components.

Project Certificate Condition No. 59

Category	Terrestrial Wildlife and Habitat - Aircraft Disturbances
Responsible Parties	The Proponent
Project Phase(s)	Construction, Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to wildlife and Inuit harvesting.
Term or Condition	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 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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Flight data from Canadian Helicopters for June 1 to September 31 was provided and analysed. Point data representing vertices along helicopter flight paths were provided and a Digital Elevation Model (DEM) was used to estimate ground level elevation values above sea level. The provided point elevation data was used to calculate the helicopter altitude above ground level. To find the actual elevation above ground level in metres, the metres above sea level (masl) from the DEM was subtracted from the masl from the helicopter data, resulting in a helicopter's approximate metres above ground level (magl) at each logged point. Data were split into two categories: 1) those data within the snow goose area in July and August in relation to 1,100 magl elevation requirement and 2) those data within and outside the snow goose area in all months in relation to 650 magl, and were analyzed separately to assess specific flight height allowances using the different areas and elevation values.

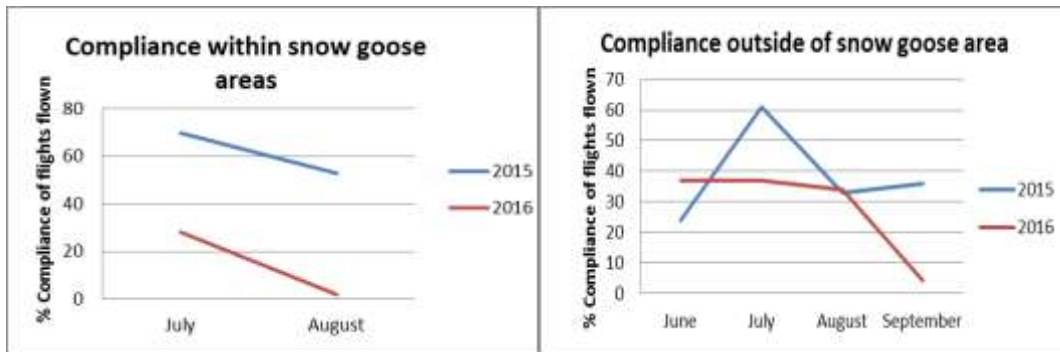
RESULTS

- There were no identified "observed concentrations of migratory birds", nor areas specifically prescribed by the TEWG to avoid for migratory birds excluding the snow goose area
- The analysis showed that overall helicopter flights were not compliant with the Project Conditions' requirements
- For transects flown within the snow goose area during July and August, compliance was 28% and 2% respectively. The helicopter flight height compliance outside of the snow goose area in July and August was 37% and 34% respectively, and all areas flown outside of the sensitive season for waterfowl, June and September, saw 37% and 4% compliance respectively.

TRENDS

Compliance was lower in 2016 than it was in 2015 (Figure 4.5). See the 2015 and 2016 Terrestrial Environment Annual Monitoring Report for details.

Figure 4.5 2016 Compliance of Project Aircraft Avoiding Bird Areas



RECOMMENDATIONS / LESSONS LEARNED

Further action needs to occur to ensure compliance, particularly within the snow goose area during the months of July and August when moulting geese are present in the area. Baffinland will work with the helicopter contractor on revised protocols, pilot training and monitoring of flight logs to improve performance in 2017.

Project Certificate Condition No. 60

Category	Terrestrial Wildlife and Habitat - Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to wildlife from explosives
Term or Condition	Prior to construction, the Proponent shall develop a detailed blasting program to minimize the effects of blasting on terrestrial wildlife that includes, but is not limited to the restriction of blasting when migrating caribou, sensitive local carnivores or birds may be negatively affected
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016l) Blasting and Quarry Management Plan (Nuna Contracting Ltd., 2013) Environmental Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland submitted a Blasting and Quarry Management Plan to the Nunavut Water Board in late 2013/early 2014. That plan accompanied a broader Environmental Protection Plan that included the requirement to scan for and report wildlife presence on a wildlife sightings log and that blasting not occur if wildlife is present and could be harmed by the activity.

RESULTS

No wildlife have been knowingly harmed or disturbed by blasting activities during construction.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 61

Category	Terrestrial Wildlife and Habitat - Operations (General)
Responsible Parties	The Proponent, TEWG
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate Project impacts to wildlife
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	Appendix F1

METHODS

A stop work policy when wildlife is in the area is implemented within the EPP.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 62

Category	Terrestrial Wildlife and Habitat - Operations (General)
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent increased harvesting pressure on wildlife
Term or Condition	The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Weapons on Site Policy (Baffinland, 2013b) Hunting and Harvesting Policy (Baffinland, 2013c)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

In 2013, Baffinland implemented its Weapons on Site Policy which prohibits employees from transporting firearms to site. Site orientation includes cultural awareness and goes over the policies outlined in the Hunting and Fishing (Harvesting) Policy. The policy states no employee or contractor will be permitted to hunt or fish (harvest) on lands leased to Baffinland. Baffinland does not interfere with rights of public hunting or fishing near or on the Project Development Area. All visitors and visitor activities are tracked through a human use log, provided in the Baffinland Terrestrial Annual Monitoring Report.

RESULTS

No incidences of project personnel hunting or fishing within lands leased to Baffinland occurred in 2016.

TRENDS

Over past years no project personnel have participated in hunting or fishing on the Project Development Area unless approved by scientific permit and have not interfered with public rights to fish or hunt in or near the Project Development Area.

RECOMMENDATIONS / LESSONS LEARNED

The Weapons on Site Policy has been successful in eliminating firearms from the workplace. Baffinland continues to monitor and implement the policy banning all employees and contractors from hunting and fishing within the Project Development Area.

Project Certificate Condition No. 63

Category	Terrestrial Wildlife and Habitat - Public Engagement
Responsible Parties	The Proponent, local Hunters and Trappers Organizations
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To keep communities up to date with Project operations
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	TEWG Meeting Minutes
Ref. Document Link	Appendix C1

METHODS

The Mittimatalik Inlet Hunters' and Trappers' Organization (MHTO) became a member of the TEWG in 2016. The TEWG meets twice in-person annually or more often as required via conference call. Baffinland facilitates these meetings through the provision of honoraria and meeting costs for MHTO members' participation.

Wildlife monitoring and mitigation programs and wildlife surveys are reviewed at the TEWG meetings. In addition, draft annual monitoring reports are provided to TEWG members for review and comment prior to finalization and for input into the following years monitoring programs.

In addition, Baffinland meets with the MHTO when practicable and necessary to discuss project activities and receive feedback.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MHTO at TEWG meetings and other meetings organized between Baffinland and the HTO.

Project Certificate Condition No. 64

Category	Terrestrial Wildlife and Habitat - Waste Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent human-carnivore interactions.
Term or Condition	<p>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:</p> <ol style="list-style-type: none"> 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.) 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 buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting)
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association, Nunavut Impact Review Board
Reference	Environmental Protection Plan (EPP; Baffinland, 2016n) Hazardous Materials and Hazardous Waste Management Plan (Baffinland, 2016p) Waste Management Plan (Baffinland, 2016g) Incinerator Operation Procedure (Baffinland, 2016q) Terrestrial Environmental Management and Monitoring Plan (TEMMP; Baffinland, 2016l)
Ref. Document Link	The EPP is included in Appendix F; all others available at: http://www.baffinland.com/sharedocuments/

METHODS

A waste management building is situated at the Mine and Port sites which houses a dual chamber incinerator designed for optimal incineration of approved specific wastes, including food wastes. Site Layout precluded the ability to situate the Waste Management Building directly beside complex kitchens, however Baffinland employs procedures in order to minimize animal attractants and interaction of carnivores with food or food wastes as described in the Environmental Protection Plan, Waste Management Plan and Incinerator Operation Procedure. Employees are educated on animal attractant policies upon arrival on site and during annual Environmental Protection Plan training. The specific measures implemented to mitigate attractants and animal interactions include double bagging food and food wastes with storage in closed top bins, and or sealed c-cans and are promptly removed for incineration inside the enclosed Waste Management Building. Food wastes are incinerated under stipulated conditions, and ash is visually inspected and tested under applicable Nunavut guidelines for landfilling. Ash deposited in the designated landfill is promptly covered with a layer of material to mitigate animal attraction and landfill fencing on specific areas of the landfill perimeter is used to reduce access.

Metal Skirting has been installed on kitchen and accommodation buildings on the project site to prevent carnivores accessing under buildings.

RESULTS

The Environmental Protection Plan and Waste Management Plan incorporates carnivore interaction and attractant mitigation measures and policies were implemented in 2016. Food and food wastes were stored as designated by the aforementioned plans, incinerated in the Waste Management Buildings and ash promptly disposed of and covered in the designated landfill.

Carnivore interactions have been minimized but still do occur due to Non Conformance issues related to the waste sorting guidelines. Arctic fox site habituation proved to be a challenge even while mitigating animal attractants on site. One instance of a rabid fox was documented in November 2016 and the risks associated with rabid animals discussed with the GN Wildlife Officer. Animal interactions are documented and discussed in the Baffinland Terrestrial Annual Monitoring Report.

Metal Skirting was maintained on accommodation and kitchen complexes in 2016. Repairs were performed on damaged areas and continue to be as required.

TRENDS

Carnivore and/or Arctic Fox interactions have gradually increased over the life of the Project. Various factors could be contributing to the trend, including the habituation of Arctic Fox in the PDA. Incineration, animal attractant mitigation measures and metal skirting installation continue to be enforced as previous years. The presence of rabies in the local arctic fox population will continue to be monitored to ensure safety issues with employees are being managed.

RECOMMENDATIONS / LESSONS LEARNED

Continue to implement and revise the food waste management process as required to reduce animal attractants and optimise mitigation measures. Perform revisions of applicable management plans as needed or advised by GN staff.

4.5.9 Birds (PC Conditions 65 through 75)

Eleven (11) PC conditions focus on potential impacts of the Project on birds. Most of these conditions relate to the implementation of mitigation measures within the TEMMP to protect birds in consultation with relevant organizations. Baffinland is also required to report on the amount of terrestrial habitat loss annually.

Stakeholder Feedback

The Canadian Wildlife Service (CWS) of Environment and Climate Change Canada (ECCC) has legislated responsibility for migratory birds, under the *Migratory Birds Convention Act* and associated regulations. The Government of Nunavut (GN) is responsible for species at risk within Nunavut, pursuant to the *Wildlife Act* (GN, 2005). During the course of the Project reviews, the focus was understandably on bird species at risk. Both agencies participate in the TEWG, and as such, Baffinland engages with these agencies bi-annually on the mitigation and monitoring of Project effects on birds through the TEWG.

Monitoring

Baffinland's bird monitoring program includes the following:

- Pre-clearing nest surveys
- Communication tower surveys
- Staging waterfowl surveys
- Cliff-nesting raptor occupancy and productivity surveys
- Roadside waterfowl surveys

The CWS also conducts annual seabird monitoring programs on behalf of Baffinland.

To the extent that Project impacts on the terrestrial environment can be evaluated, the effects of the Project appear to be within FEIS predictions. Table 4.16 provides a summary of the main activities in 2016 in relation to the birds, and an impact evaluation in comparison to the predictions outlines in the FEIS.

Table 4.16 Birds Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Bird Indicator Species/Species at Risk	Destruction of nests due to development in expanded project footprint	Pre-clearing nest surveys are conducted at the locations this was applicable; no nests were identified within the new disturbance area	Effect did not occur
	Habitat loss: direct habitat loss due to the Project footprint; and indirect habitat loss due to sensory disturbances	Staging waterfowl surveys; cliff-nesting raptor occupancy and productivity survey; cliff-nesting raptor nest site management and effects monitoring. No evidence of a relationship between distance from the road/PDA and the number of birds observed. No effect on cliff-nesting raptor nest occupancy rates since 2011. Distance to disturbance analysis suggests there is no negative effect on monitored raptor nesting.	Effect negligible
	Influences on health		Effect did not occur
	Mortality	No bird mortalities were observed through incidental observations and communication tower surveys	Effect did not occur

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect birds including bird species at risk. Baffinland will continue to seek input and review monitoring results trends from technical members of the TEWG. Reporting on each Project Condition follow.

Project Certificate Condition No. 65

Category	Birds - Awareness
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent disturbance to birds and bird habitat
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (EPP; Baffinland, 2016n)
Ref. Document Link	Appendix F4

METHODS

Supervisory training is delivered by the Baffinland Environment Department on a semi annual basis to ensure all employees are aware of the importance of avoiding nesting areas and large concentrations of foraging and moulting birds.

Section 2.13 Bird Protection Measures of the EPP is the relevant document that deals with Bird Awareness delivered to employees.

Baffinland endeavours to perform construction activities outside of the bird nesting season. If construction activity is required in undisturbed areas between May 31 and August 31, Active Migratory Bird Nest Surveys are conducted in accordance with the Migratory Birds Convention Act, 1994. The results of these surveys are provided to the TEWG for review on a yearly basis.

RESULTS

No reported disturbance or destruction of migratory bird nests or their young.

TRENDS

Continued training to all employees to raise the awareness of the importance to prevent the disturbance of all wildlife and habitats at all project sites

RECOMMENDATIONS / LESSONS LEARNED

Minimize disturbance (clearing) or other industrial activities in previously undisturbed areas during the nesting season between May 31 and August 31.

Project Certificate Condition No. 66

Category	Birds -Species at Risk
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to sensitive bird species
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland concentrates new ground disturbance outside of the breeding bird season and conducts active nest surveys in areas that are disturbed in the breeding season, prior to disturbance. Directions are provided in the TEMMP Section 3.2.5, Table 3-1 (setback distances).

RESULTS

No species at risk nests or eggs have been encountered during Project activities.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to avoid species at risk nests and eggs when encountered by establishing setback distances.

Project Certificate Condition No. 67

Category	Birds - Species at Risk
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to sensitive bird species
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Environment and Climate Change Canada (ECCC), Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

ECCC participates in the TEWG and continues to inform Baffinland of updates to species at risk habitat protection measures. Section 1.2.3.2 of the TEMMP speaks to mitigation and monitoring strategies for species at risk.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to co-ordinate with ECCC through the TEWG to address mitigation and monitoring strategies related to species at risk.

Project Certificate Condition No. 68

Category	Birds - Project Infrastructure
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent potential injuries to birds
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Environment and Climate Change Canada (ECCC), Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Through discussions with ECCC, Baffinland implemented the installment of reflectors on guy wires at the communication towers established for the Project. It was also determined that strobe lights were not a relevant mitigation measure as the majority of birds are in the area during the summer when there is 24 hours of light. Consideration has been given to reducing lighting where possible and not necessary for safe site operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Strobe lights were found not to be a relevant mitigation measure because birds are mostly present during the period of 24 hours of sunlight. Baffinland will maintain the reflectors installed on the guy wires of the communication towers for the Project.

Project Certificate Condition No. 69

Category	Birds - Construction/Clearing Activities
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent nesting by birds in active Project areas
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland prepared a bird deterrence review that was discussed at the TEWG meeting May 21, 2013. There was no feedback from the group on what would prove practical solutions prior to the 2014 construction season. Although active nest surveys were completed, deterrents were not erected. There were no apparent nesting attempts by birds in the cleared areas.

RESULTS

No deterrents have been used.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Given that most clearing of new ground has occurred outside of the breeding season, and that the smaller areas cleared during the breeding season are managed by active migratory bird nest surveys prior to disturbance, deterrents have not been required. Avoidance has been the primary method used to prevent disturbances to nesting birds. No evidence has been provided that an alternative method would be more successful. Baffinland feels that they have successfully complied with the intent of the condition.

Project Certificate Condition No. 70

Category	Birds - Construction/Clearing Activities
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to birds and nesting areas
Term or Condition	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-specific guidelines and procedures to ensure bird's nests and their young are protected.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Active migratory bird nest surveys are conducted in areas that are scheduled for clearing disturbance during the breeding bird season. When bird nests are found, Baffinland establishes clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the TEMMP.

RESULTS

No bird nests were located in 2016.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to avoid new ground disturbance during the nesting season where possible and continue to conduct Active Migratory Bird Nest Surveys throughout the breeding bird season in areas that need to be cleared.

Project Certificate Condition No. 71

Category	Birds - Flight Altitude Requirements
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to birds.
Term or Condition	Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: 650 m during point to point travel when in areas likely to have migratory birds 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds 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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Flight data from Canadian Helicopters for June 1 to September 31 was provided and analysed. Point data representing vertices along helicopter flight paths were provided and a Digital Elevation Model (DEM) was used to estimate ground level elevation values above sea level. The provided point elevation data was used to calculate the helicopter altitude above ground level. To find the actual elevation above ground level in metres, the metres above sea level (masl) from the DEM was subtracted from the masl from the helicopter data, resulting in a helicopter's approximate metres above ground level (magl) at each logged point. Data were split into two categories: 1) those data within the snow goose area in July and August in relation to 1,100 magl elevation requirement and 2) those data within and outside the snow goose area in all months in relation to 650 magl, and were analyzed separately to assess specific flight height allowances using the different areas and elevation values.

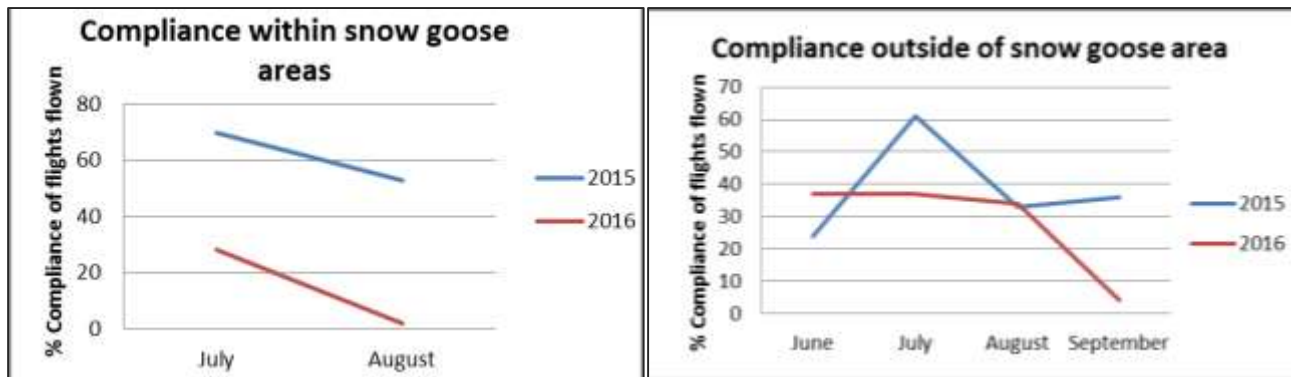
RESULTS

- There were no identified "observed concentrations of migratory birds", nor areas specifically prescribed by the TEWG to avoid for migratory birds excluding the snow goose area.
- The analysis showed that overall helicopter flights were not compliant with the Project Conditions' requirements.
- For transects flown within the snow goose area during July and August, compliance was 28% and 2% respectively. The helicopter flight height compliance outside of the snow goose area in July and August was 37% and 34% respectively, and all areas flown outside of the sensitive season for waterfowl, June and September, saw 37% and 4% compliance respectively.

TRENDS

Trends are presented in Figure 4.6. Compliance with Project Certificate Condition is much lower in 2016 than it was in 2015. See the 2015 and 2016 Terrestrial Environment Annual Monitoring Report for details.

Figure 4.6 Compliance Within and Outside of Snow Goose Area



RECOMMENDATIONS / LESSONS LEARNED

Further action needs to occur to ensure compliance, particularly within the snow goose area during the months of July and August when moulting geese are present in the area. Baffinland will work with it’s helicopter contractor in 2017 to improve on the flight height performance.

Project Certificate Condition No. 72

Category	Birds - Flight Altitude Requirements
Responsible Parties	The Proponent, Transport Canada
Project Phase(s)	Construction, Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to birds
Term or Condition	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 Canada to monitor adherence and to follow up on complaints
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	None
Reference	Environmental Protection Plan (EPP; Baffinland, 2016n) 2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Pilots and project personnel directing pilots are to be aware of the potential disturbance to wildlife and the potential disturbance to local users (Inuit Hunters) moving through the Project Area as stated in Section 2.8 Aircraft Flights of the EPP. Flight paths are recorded and flight height requirements are included in all aviation contracts. Pilots are made aware of these requirements in 'toolbox' talks given at the beginning of each season.

RESULTS

Although communicated to the pilots, there have been numerous occurrences of non-conformance with the flight altitude guidelines. Some of the non-conformance events are due to weather conditions, movement of equipment and personnel, or safety concerns of the pilots during flight.

TRENDS

In July 2016, there was a 72% non-compliance, and in August 2016 there was 96% non-compliance. Although these occurrences are unlikely to cause substantial impact, flight height compliance checks will be developed for the pilots and personnel directing the pilots.

RECOMMENDATIONS / LESSONS LEARNED

In 2017, helicopter pilots will provide non-compliant flight elevation logs with the reason for the non-compliance to the site environmental coordinator and changes to flight plans will be implemented if necessary.

Project Certificate Condition No. 73

Category	Birds
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to birds
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2012 Annual Terrestrial Environment Monitoring Report (EDI, 2013) 2013 Annual Terrestrial Environment Monitoring Report (EDI, 2014) 2014 Annual Terrestrial Environment Monitoring Report (EDI, 2015) 2015 Annual Terrestrial Environment Monitoring Report (EDI, 2016)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Since 2011, Baffinland has continued to monitor cliff nesting raptor site occupancy and productivity. This is an established monitoring program with the statistical power and design robustness to detect nesting raptor response to disturbances associated with the Mary River Project. That program has evolved since 2012 to accommodate statistical data requirements, and is described in the Terrestrial Environment Mitigation and Monitoring Plan, and annual Terrestrial Monitoring Reports.

Since 2012, Baffinland has provided financial support to Environment Canada's seabird research programs in Hudson Strait and Baffin Bay. The ongoing research results of those programs are reported separately by Environment Canada's National Research Centre. These programs were continued and implemented in 2016.

Since start of the Construction phase, Baffinland has conducted active migratory birds nest surveys (AMBNS) for areas of planned disturbance. Pre-clearing nest surveys were conducted by Baffinland environmental staff over the 2016 nesting season. In early June at the beginning of pre-clearing surveys. Baffinland environmental staff have been trained on methods to conduct nest searching surveys as well as common species found in the areas. In compliance with Canadian Wildlife Service (CWS) input provided in 2015 at the TEWG meeting, Baffinland acquired two rope drags (For Mary River and Milne sites) to use during 2016 pre-clearing surveys to increase the likelihood of nest/nesting adult detection. Rope drags were constructed following the template provided by CWS (Rausch 2015). More detail on the AMBNS surveys can be found in the annual Terrestrial Monitoring Report.

RESULTS

AMBNSs are conducted in areas that need to be cleared and/or disturbed during the breeding bird season. No bird nests were located during any AMBNS in 2016. See annual Terrestrial Monitoring Report for detailed results.

The cliff-nesting raptor surveys continue on an annual basis. Annual results have shown that near-site (disturbed sites) are occupied and produce as many chicks as those far from (undisturbed) sites.

TRENDS

The cliff-nesting raptor monitoring, which has been conducted consistently since 2011, has shown that peregrine falcons have not shown a response to the Mary River Project. Occupancy and productivity at nest sites near the Project are similar to those at further distances.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to support breeding bird PRISM plot survey efforts on a schedule conducive to Environment Canada's efforts in the Baffin Region.

When clearing cannot be avoided within the breeding bird season, Baffinland will continue with Active Migratory Bird Nest surveys, and implement no-disturbance buffers until the adults and chicks have left the nest area. Baffinland will continue with the cliff nesting raptor program until results determine that no further surveying is required.

Project Certificate Condition No. 74

Category	Birds - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To develop appropriate mitigation and monitoring of impacts to birds
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Canadian Wildlife Service (CWS)
Reference	2016 Annual Terrestrial Environment Monitoring Report (EDI, 2017) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016I)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Peregrine falcon and gyrfalcon monitoring includes:

- New nest site locating and revising existing nest sites annually. All nesting sites are categorized into distance bins from disturbance associated with project infrastructure.
- Spring occupancy surveys (indicates number of attempting breeding pairs) and Summer Productivity Surveys (surveys give count of number of young per occupied site) are used to collect demographic information and indicators on the raptor populations.
- Adult survival and juvenile recruitment are monitored through the use of leg banding and annual return of birds.

Power analysis based on 2013 results indicated that songbird and shorebird densities were low and that any monitoring program would be unlikely to detect an effect of disturbance; discussion with the TEWG and the CWS concluded that effects monitoring for tundra breeding birds could be discontinued but that Baffinland would commit to completing 20 PRISM plots every five years as a contribution to regional monitoring efforts.

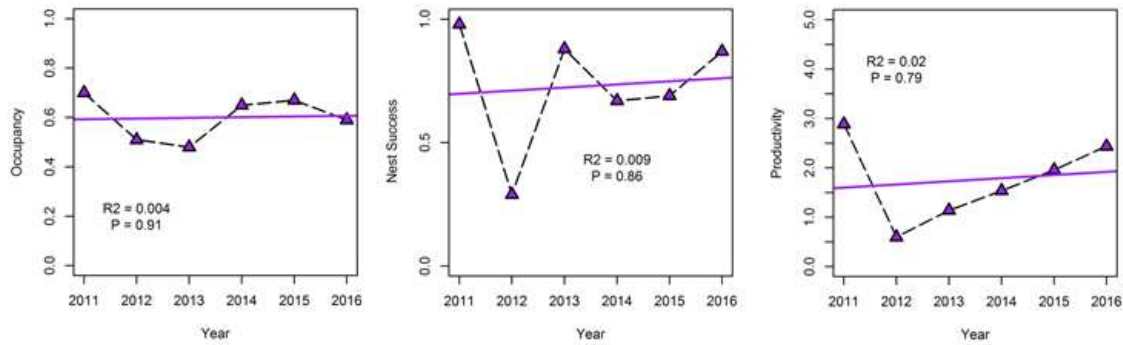
RESULTS

Arctic Raptors Inc. conducted initial monitoring of raptors in 2011 and 2012 as part of the Project's terrestrial baseline survey and conducts annual ongoing monitoring of peregrine falcon and gyrfalcon, from 2013 through 2016 and is reported in the Annual Monitoring Reports. The probability of site occupancy, brood size and nest success is modeled for nest sites located up to 10 km from the PDA. As of fall 2016, a total of 140 raptor nest sites are located within the 10 km buffer of the project infrastructure. 44 Peregrine Falcon and 2 Gyrfalcon occupied nests were observed in 2016 within the 10 km buffer.

TRENDS

Peregrine falcon occupancy, nest success, and productivity have remained consistent from 2011-2016, as shown on Figure 4.7.

Figure 4.7 Peregrine Falcon Occupancy, Nest Success, and Productivity from 2011-2016



Gyrfalcons observations have been inconsistent over the years and trends are not available at this time.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue monitoring programs as described in the annual monitoring reports, and continue to collect opportunistic information when qualified biologists are on site. Monitoring to date has found that densities of most species are not appropriate for monitoring project effects (i.e. songbirds, shorebirds, common and king eider, red knot and gyrfalcon). To date trend analysis has only been conducted for raptor species.

Project Certificate Condition No. 75

Category	Birds - Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assess the extent of terrestrial habitat loss
Term or Condition	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
Reporting Requirement	To be provided within the Annual Report to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016) 2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Pre-clearing nest surveys were done prior to any disturbance of habitat to ensure no bird nests were located in areas where any clearing or new area disturbance was scheduled. Baffinland used a rope drag, as recommended by CWS in the Fall 2014 TEWG meeting, to increase likeliness of detecting secretive and less likely to be flushed bird nests in areas scheduled for development. Methods, results, and discussion of active migratory bird nest searches and the corresponding extent of terrestrial habitat loss are reported annually in the Terrestrial Environment Annual Monitoring Report.

RESULTS

Baffinland has completed all construction within the Potential Development Area (PDA) and the current project footprint is below what was assessed in the FEIS which assumed the entire PDA would be disturbed. During 2016, there was an approximate 78,500 square metres marginal increase of disturbed areas within the PDA (see Table 4.17).

TRENDS

Planning for disturbances will be scheduled as much as practical to the periods preceding and succeeding the Active Migratory Bird Nesting period (June 1 – August 31). Baffinland restricts any overland movement of equipment or personnel which are required to operate to existing site roads and laydowns. Any unauthorized land disturbance or deviation from the PDA is reported as an incident and is investigated.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor terrestrial habitat loss due to disturbance and maintain the limits of the Project Development Area and restrict overland movement and traffic to existing roads, pads, and walkways.

Table 4.17 Marginal Increase of Disturbed Areas in 2016

Project	Approx Area Disturbed (m ²)
Tote Rd Km 45 Corner Realignment	4,600
Tote Rd Km 53 Realignment	9,800
Tote Rd Km 10 Hill	2,400
Tote Rd Km 55 Realignment	5,600
Tote Rd Km 54 Realignment	2,400
Waste Rock Sedimentation Pond	20,000
Check Dam #4 Magazine Laydown	400
Tote Rd Km 77 Hill	10,000
Check Dam #1 - Sheardown Valley along MHR	2,000
Check Dam #2, 3 - Sheardown Valley along MHR	3,300
Crusher Pad Clean Up	1,800
Landfill Expansion	8,700
Warehouse Expansion	2,900
Waste Rock Stockpile - Water Management Ditching	4,600
Total	78,500

4.5.10 Marine Environment (PC Conditions 76 through 98)

Twenty-four (24) PC conditions relate to the potential impacts of the Project on the marine environment, excluding marine mammals (Section 3.4.11). These conditions require the development of a comprehensive environmental effects monitoring program, the establishment of the Marine Environment Working Group (MEWG), and specific requirements for additional analyses related to potential effects on the marine environment (i.e., tidal data, potential risks of invasive species from ballast water, ship wakes, sediment redistribution, fuel spill modelling response).

Stakeholder Feedback

The marine environment has been a key focus of stakeholder interest and concern. This includes marine mammals (discussed in Section 3.4.11) as well as marine biota, the effects of ballast water discharge, and the risk of fuel spills (discussed below). A key community concern in both Pond Inlet and Igloolik was the potential for the Project to impact the fisheries resources on both Steensby Inlet and Milne Inlet, should the communities decide to pursue development of commercial fisheries in these areas in the future. Key stakeholders focused on the marine environment include local communities, the QIA, and agencies with jurisdictional responsibility for the marine environment: DFO, ECCC, Transport Canada and the Canadian Coast Guard. Baffinland continues to engage these groups through the Marine Environment Working Group. In 2016, the Mittimatalik Hunters and Trappers Organization was added as a member of the working group. To date, the group has focused primarily on marine mammals, and to a lesser extent other aspects of the marine environment. A robust marine environment monitoring framework is the focus of the group in 2017.

Monitoring

Marine biota and the physical environment (water and sediment quality) is subject to a marine environmental effects monitoring (EEM) program, which includes the following components:

- Benthic Habitat - Underwater videography to characterize benthic habitat substrate type/class and detect changes over time.
- Sediment - Sampling sediment for particle size analysis (to detect changes in sediment composition) the presence of hydrocarbons, and iron concentrations as a function of distance from the ore dock.
- Water Quality - Sampling measuring total suspended solids, salinity, temperature, pH, metals, nutrients and hydrocarbon concentrations over time.
- Epibenthic Community - Underwater videography to enumerate benthic epifauna and compare changes over time.
- Fish - Opportunistic sampling of contaminants in fish flesh of both sculpin species and arctic char.
- Aquatic Invasive Species - Sampling for the presence/absence of aquatic organisms (zooplankton, benthic infauna, benthic infauna, macroflora, encrusting epifauna, fish).

In addition, monitoring of the ore carriers is undertaken to verify that the vessels exchanged ballast water mid-ocean in accordance with the Ballast Water Management Regulations.

Table 4.18 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

To the extent that Project impacts on the marine environment can be evaluated, the effects of the Project appear to be within FEIS predictions.

Table 4.18 Marine Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Water and Sediment Quality	Changes in water and sediment quality due to prop wash, ballast water discharge, and ore dust deposition	The marine EEM program did not detect any meaningful changes in water quality. Minor changes to sediment particle size and minor increases in sediment iron concentrations were detected in proximity to the dock.	Effect within FEIS predictions
	Changes in water and sediment quality due to sewage effluent discharge	Weekly monitoring of effluent as required by water licence. Monitoring results complied with all water licence limits	Effect within FEIS predictions
	Accidental fuel spill from marine shipping of fuel and other supplies	Inspections and visual monitoring during ship to land fuel transfers and sealift deliveries. No accidents or malfunctions occurred that had the potential for effects	Effect did not occur
Marine Habitat	Disruption and loss of marine coastal habitat due to dock structure	There is considerable evidence of use of the offsetting area by all tropic levels	Effect within FEIS predictions
Marine Biota	Potential changes to marine biota from the introduction of aquatic invasive species due to shipping (ballast water discharges, etc.)	Statistically significant changes in epifauna abundance and macroflora coverage were detected. Additional monitoring is required, however, given the high variability in the system coupled with the difficulty in collecting data over the same area year to year.	Effect within FEIS predictions

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect the marine environment. Baffinland will continue to seek input and review monitoring results trends from technical members of the MEWG. Reporting on each PC condition follow.

Project Certificate Condition No. 76

Category	Marine Environment - General
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate potential impacts to the marine environment
Term or Condition	The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and identify potential impacts of the Project on the marine environment
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Marine Environmental Effects Monitoring Plan (Baffinland, 2016r)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A marine environmental effects monitoring (EEM) plan was developed following the completion baseline studies of 2013 and 2014. The marine EEM program includes monitoring of sediment quality, benthic infaunal communities, mobile epifauna, fish, and habitat. Sampling designs are based on EEM guidance from Environment Canada (2012), and include statistical approaches to detecting project impacts to the marine environment.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The results of the marine EEM program will continue to be presented to the MEWG on an annual basis, and adjustments to the program will be made as needed.

Project Certificate Condition No. 77

Category	Marine Environment - Working Group
Responsible Parties	The Proponent, Environment Canada, Fisheries and Oceans Canada, the Government of Nunavut, the Qikiqtani Inuit Association and interested parties
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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 authority by appropriate government agencies and departments.
Term or Condition	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 Mittimatalik 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 for the MEWG filed in the Final Hearing, but they are not bound by them.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Baffinland established a MEWG in 2013. Members include: Environment and Climate Change Canada, Department of Fisheries and Oceans Canada, Qikiqtani Inuit Association, Government of Nunavut, Parks Canada, Makivik and Baffinland with technical experts as required. The Mittimatalik Hunters and Trappers Organization joined the group in 2016. The World Wildlife Fund-Canada and Oceans North participate as observers.

The Terms of Reference for the group were first developed in March of 2013. In November of 2016, with three years of experience, Baffinland and the MEWG began revisions to the Terms of Reference (revision 2). Major revisions include adding the Mittimatalik Hunters and Trappers Organization to the membership list, clarifying reporting and meeting structures and the roles and responsibilities of the organizations of the working group.

The group meets at two in-person meetings annually, rotating between Iqaluit and Ottawa. In 2016, the group has added at least two conference calls in between in-person meetings and to take advantage of smaller expert focused sub-group meetings.

Draft technical annual reports and other documentation are provided to the group in advance of meetings and an on-going basis to allow for review, comment and advice to be provided by all members. Baffinland and their technical experts take into consideration comments received by the working group in the finalization of documents and planning of monitoring programs.

RESULTS

The MEWG reviews the annual marine environment monitoring reports and provides comments to Baffinland for consideration in the final version.

All meeting minutes of the working group are provided in Appendix C2.

TRENDS

The MEWG has provided input into the Baffinland marine monitoring programs annually.

RECOMMENDATIONS / LESSONS LEARNED

Based on three years of experience, Baffinland in conjunction with the MEWG and other technical experts is re-visiting the marine environment monitoring programs to develop a more holistic monitoring approach. Meetings will be structured to allow for more open dialogue between members and technical experts to guide the development of the marine monitoring approach and mitigate strategies. More time will be provided to discuss relevant monitoring programs different organizations are undertaking to optimize a collaborative approach to monitoring.

Baffinland with support from the QIA and the MEWG has a strong emphasis on continuing existing and developing more diverse community based monitoring programs.

Project Certificate Condition No. 78

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To obtain accurate and current ice information
Term or Condition	The Proponent shall update the baseline information for land fast 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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Ice Conditions and Ship Access to the Milne Inlet Port Site Mary River Iron Ore Project - Final Report (ENFOTEC, 2015)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A 2011 ice study by ENFOTEC was included in the Final Environmental Impact Statement, Appendix 3G. This ice study report is updated periodically to incorporate new information on Ice conditions and ship access to the Milne Inlet port with a focus on planning for open water shipping by tracking dates for ice break up and re-freeze. The most recent update was provided in 2015.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The Ice condition study for Milne Inlet will be updated periodically as new data becomes available. The ice condition study for Steensby Inlet will be updated prior to the construction and operation of the Steensby Port.

Project Certificate Condition No. 79

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent, Canadian Hydrographic Services
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assist in the development of nautical charts for Canadian waters
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Completed
Stakeholder Review	Canadian Hydrographic Service (CHS)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland entered into a collaborative cost-sharing agreement with CHS for their nautical charting program. The CHS collected additional detailed bathymetry around the ore dock in 2016.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 80

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent, Canadian Hydrographic Services
Project Phase(s)	Construction
Objective	To identify areas of risk along the shipping route
Term or Condition	Prior to commercial shipping of iron ore, the Proponent shall conduct a detailed risk assessment for Project-related shipping accidents, noting areas along the ship tracks where vessels may be particularly vulnerable to environmental conditions such as sea ice, and any seasonal differences in risk. This assessment shall inform mitigation and adaptive management plans.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Deferred
Stakeholder Review	Canadian Hydrographic Service
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

This risk assessment will be conducted prior to ice breaking from Steensby Port.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 81

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate potential shoreline effects from shipping
Term or Condition	The Proponent shall reassess the potential for ship wake impacts to cause coastal change following any further changes to the proposed shipping routes
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Ship wake effects on shorelines were assessed in the Final Environmental Impact Statement (FEIS; Baffinland, 2012) and the FEIS Addendum for the Early Revenue Phase (Baffinland, 2013a), and it was concluded that no measurable changes would occur. There have been no changes to the shipping route since this assessment.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

This condition will be re-evaluated if changes to the current shipping routes are proposed.

Project Certificate Condition No. 82

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To mitigate potential shoreline effects from shipping
Term or Condition	The Proponent is strongly encouraged to have its ore carriers subjected to sea trials to measure wake characteristics at various vessel speeds and distances from the vessel
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland understands that the intent of this condition was to address concerns related to potential erosional effects of ship wakes on shorelines along the southern shipping route. The phase of the project which uses the southern shipping route from Steensby Port included purpose built Baffinland ore carriers. In this case, the same vessel would be conducting repeated voyages and wake effects could be compared to the FEIS predictions. During the Early Revenue Phase (ERP) of the Project, ore is shipped via the northern shipping route out of Milne Port using commercially contracted vessels. Sea trials to measure wake characteristics of the commercial vessels were not conducted for the ERP because there is less concern related to the wake effects along the northern shipping route.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will review the requirement for wake characteristics when purpose-built ore carriers are commissioned for the southern shipping route.

Project Certificate Condition No. 83(a)

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To identify potential for and conduct monitoring to identify effects of sediment redistribution associated with construction and operation of the Milne Port
Term or Condition	The Proponent shall conduct hydrodynamic modelling in the Milne Inlet Port area to determine the potential impacts arising from disturbance to sediments including re-suspension and subsequent transport and deposition of sediment. The modelling results shall be used to update the marine water and sediment quality monitoring and mitigation program to include activities associated with the construction and operation of the Milne Inlet Port. The monitoring program shall include an ongoing assessment of the potential introduction of metals that bio-accumulate in the marine food chain.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 Marine Environmental Effects Monitoring Program and Aquatic Invasive Species Monitoring, Milne Inlet Marine Ecosystem (Sikumiut Environmental Management Ltd., 2017b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The marine environmental effects monitoring (EEM) program was undertaken at Milne Port again in 2016. Water and sediment quality monitoring as well as monitoring of metals in fish are components of this program.

The sampling design for the Marine EEM Program is based on several key principles used for the design of environmental effects monitoring programs. Firstly, the design was based on repeated measures regression analyses where the same replicates (stations) will be re-sampled at specific time intervals (years). A gradient study design has been employed that enables physical, chemical and biological changes to be assessed as a function of distance from a point source, so that issues such as the spatial scale of impacts can more effectively be addressed. As data is compiled over the longer term, trend analyses can be included to provide an additional level of interpretation and corroboration. The design for the Milne Port Marine EEM Program requires data collection over multiple years along four transects, three of which radiated out from the Milne Port ore dock as the point source of potential contaminants and as the primary source of physical impacts associated with shipping activities.

RESULTS

Monitoring activities in 2016 involved implementation of the second year of monitoring under the Marine EEM Program for the Mary River Project, as specifically related to activities associated with the Milne Port.

Operational shipping was initiated in late July 2015, and at a reduced level in comparison to full operations, and as such Project related effects would not be expected to be discernable at this early stage of Project operations.

Conductivity/temperature/depth profiles were collected throughout Milne Inlet and profiles indicated a consistent pattern with a well-defined vertical gradient in salinity, increasing from the surface to the bottom, and a similar consistent gradient in temperature, declining from the surface layer to 65-85 m in depth. Surface water samples collected during five sampling events

indicated samples were comparable between stations with most variability occurring between events, with most of the variability related to major ion concentration (reflected through conductivity). Water was clear with low TSS, low turbidity and colour, and nutrients were either very low or non-detected. Most metals were un-detectable excepting aluminum, barium, boron, cadmium, molybdenum, strontium, titanium, uranium and zinc. Hydrocarbons were not detected in any water samples collected in 2016.

Sediment samples were collected from each of four transects and there was considerable spatial variability in particle size characteristics within and among sampling sites. The North Transect demonstrated increasing fines (clay and silt) with increasing depth while the Coastal Transect had highest percentages of clay. The sand component was highest in the West and East Transects related to proximity to stream and river mouths (i.e., Phillips Creek). The East Transect demonstrated a weak positive relationship between percent fines and distance from the ore dock while the North and Coastal Transects demonstrated a very weak relationship. The West Transect, although demonstrating a positive relationship in 2014 and 2015, no longer displayed a relationship with distance. As such, the ANCOVA statistical analyses indicated that significant differences in the regression relationships between baseline (2014) and the second year of operations was only present for the West Transect as opposed to no significant difference in 2015.

Conventional metals in sediment were in low concentrations, with the exception of aluminum and iron, with concentrations of these elements highest from the North and Coastal Transects related to higher fines and organic carbon. Two stations exceeded the Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guideline (ISQG) for arsenic, while one exceeded the guideline for zinc. Hydrocarbons were mostly undetectable with only trace amounts of petroleum hydrocarbons in the lube oil ranges (C16-C32) detected in a few samples. The West Transect showed a slight decrease in iron concentrations with distance from the ore dock, as in previous years, while only the East Transect showed a significant difference from baseline.

Habitat surveys were completed by underwater video to assess substrate (type and distribution); macroflora (class and distribution); and epifauna (presence and abundance). A comparison of regression slopes for %macroflora and epifauna abundance coverage with distance from the Milne Port indicated significant differences between baseline (2014) and year two (2016) for the West, East and Coastal Transects, but not for the North Transect for macroflora and significant differences for West, East and North Transects but not for the Coastal Transect for epifauna abundance. These differences must be interpreted cautiously given high variability and sampling replication difficulty. Data collection in future years will increase the power of analysis.

Finfish and mobile epifauna were captured from the Milne ore dock and eastern shore at traditional Inuit fishing areas. Opportunistic sampling of incidental mortalities collected flesh for contaminant analyses from 13 Arctic char. Char were between nine and 19 years in age and had relatively low body burden contamination. None of the fish exceeded Health Canada's guideline for mercury and fish consumption (0.5 mg/kg). Resident fish in the vicinity of Milne Port were dominated by sculpin species and a mark-recapture survey was conducted to estimate relative population size. Lack of recaptures and low catch-per-unit-effort in all years since inception indicated resident sculpin are not present in numbers adequate to support sampling requiring fish sacrifice.

TRENDS

More years of monitoring are required to establish trends in the data.

RECOMMENDATIONS / LESSONS LEARNED

Year 3 of EEM monitoring will be completed in 2017 consistent with the schedule identified in the MEEMP. The use of fewer replicates with a larger number of sampling stations will be explored in order to increase the power of analysis. Hydrocarbons in sediment will be monitored at a surveillance level to examine for any increase in hydrocarbon levels above baseline levels.

As the MEEMP evolves and additional data become available for analyses, the design and approach to analyses should be continuously revisited to optimize the statistical power for interpreting change. As indicated, modifying the sampling design to include more stations along transects with less replication, may increase the statistical power of the analyses without adding to the cost of the program. Other approaches to interpreting the statistical relationships beyond linear regression should be explored. Some of the analyses of baseline relationships in 2014 (e.g. iron concentration data along West and Coastal transects) suggest non-linear models (polynomial quadratic regressions) may better describe the data.

Currently, a proposed expansion to the Mary River Project (Phase 2) is under consideration and will be subject to environmental assessment. The Phase 2 expansion will include construction of a second ore dock and the radial gradient basis for the MEEMP design may need to be refined to include this second point source for environmental perturbation.

Project Certificate Condition No. 84

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent sediment redistribution along the shipping route
Term or Condition	The Proponent shall update its sediment redistribution modeling once ship design has been completed and sampling should be undertaken to validate the model and to inform sampling sites and the monitoring plan
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland understands that the intent of this condition was to address concerns related to potential ship-induced sediment redistribution in Steensby Port and along the southern shipping corridor. A monitoring plan to verify predictions of sediment redistribution resulting from propeller wash in shallow locations along the shipping route will be completed when ore carriers are commissioned for the southern shipping route.

Sediment redistribution modeling will be completed when purpose-built ore carriers are commissioned for the southern shipping route.

Project Certificate Condition No. 85

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent sediment redistribution along the shipping route
Term or Condition	The Proponent shall develop a monitoring plan to verify its impact predictions associated with sediment redistribution resulting from propeller wash in shallow water locations along the shipping route. If monitoring detects negative impacts from sediment redistribution, additional mitigation measures will need to be developed and implemented.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland understands that the intent of this condition was to address concerns related to potential ship and/ or tug propeller wash effects in shallow-water areas along the southern shipping route. A monitoring plan to verify predictions of sediment redistribution resulting from propeller wash in shallow locations along the shipping route will be completed when ore carriers are commissioned for the southern shipping route.

Project Certificate Condition No. 86

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To update ballast water discharge impact predictions.
Term or Condition	Prior to commercial shipping of iron ore, the Proponent shall use more detailed bathymetry collected from Steensby Inlet and Milne Inlet to model the anticipated ballast water discharges from ore carriers. The results from this modeling shall be used to update ballast water discharge impact predictions and should account for density dependent flow and annual timescales over the project life. Additional sampling should also be undertaken to validate the model and to inform sampling sites and the monitoring plan.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	2014/2015 Oceanography Data Collection: Project Report – Oceanographic Data Processing – Baffinland Ballast Water Study, Milne Inlet 2014-15 (Appendix D of the 2015 Marine Environmental Effects Monitoring Report presented as Appendix N1 of the 2015 Annual Report to the NIRB) Draft Report - 2016 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Monitoring - Milne Inlet Marine Ecosystem (Sikumiut Environmental Management Ltd., 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Additional baseline data has been collected over the period of 2014 to 2016 to support the development of an updated ballast water dispersion model. This includes the following:

- Initial oceanography data was collected in 2014-2015; instrumentation problems did not provide a complete record, and therefore a full year of data was collected from August 2015 to August 2016
- The Canadian Hydrographic Service collected additional detailed bathymetry around the ore dock in 2016
- The marine environmental effects monitoring program has been collecting additional water and sediment quality data over the period of 2013 to 2016.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The above data will be used to generate an updated ballast water model in 2017 to evaluate ballast water dispersion from cape sized vessels associated with the Phase 2 Expansion Project.

Project Certificate Condition No. 87

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent invasive species introductions resulting from Project shipping
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	MEWG - The MEWG has reviewed previous years' reports but not the 2016 report as yet
Reference	Marine Environmental Effects Monitoring Plan (Baffinland, 2016r) 2016 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Monitoring - Milne Inlet Marine Ecosystem (Sikumit Environmental Management Ltd., 2017b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The marine environmental effects monitoring (EEM) program was undertaken at Milne Port again in 2016. Water and sediment quality monitoring as well as monitoring of metals in fish are components of this program.

The sampling design for the Marine EEM Program is based on several key principles used for the design of environmental effects monitoring programs. Firstly, the design was based on repeated measures regression analyses where the same replicates (stations) will be re-sampled at specific time intervals (years). A gradient study design has been employed that enables physical, chemical and biological changes to be assessed as a function of distance from a point source, so that issues such as the spatial scale of impacts can more effectively be addressed. As data is compiled over the longer term, trend analyses can be included to provide an additional level of interpretation and corroboration. The design for the Milne Port Marine EEM Program requires data collection over multiple years along four transects, three of which radiated out from the Milne Port ore dock as the point source of potential contaminants and as the primary source of physical impacts associated with shipping activities.

RESULTS

Monitoring activities in 2016 involved implementation of the second year of monitoring under the Marine EEM Program for the Mary River Project, as specifically related to activities associated with the Milne Port.

Operational shipping was initiated in late July 2015, and at a reduced level in comparison to full operations, and as such Project related effects would not be expected to be discernable at this early stage of Project operations.

Conductivity/temperature/depth profiles were collected throughout Milne Inlet and profiles indicated a consistent pattern with a well-defined vertical gradient in salinity, increasing from the surface to the bottom, and a similar consistent gradient in temperature, declining from the surface layer to 65-85 m in depth. Surface water samples collected during five sampling events indicated samples were comparable between stations with most variability occurring between events, with most of the

variability related to major ion concentration (reflected through conductivity). Water was clear with low TSS, low turbidity and colour, and nutrients were either very low or non-detected. Most metals were un-detectable excepting aluminum, barium, boron, cadmium, molybdenum, strontium, titanium, uranium and zinc. Hydrocarbons were not detected in any water samples collected in 2016.

Sediment samples were collected from each of four transects and there was considerable spatial variability in particle size characteristics within and among sampling sites. The North Transect demonstrated increasing fines (clay and silt) with increasing depth while the Coastal Transect had highest percentages of clay. The sand component was highest in the West and East Transects related to proximity to stream and river mouths (i.e., Phillips Creek). The East Transect demonstrated a weak positive relationship between percent fines and distance from the ore dock while the North and Coastal Transects demonstrated a weak relationship. The West Transect, although demonstrating a positive relationship in 2014 and 2015, no longer displayed a relationship with distance. As such, the ANCOVA statistical analyses indicated that significant differences in the regression relationships between baseline (2014) and the second year of operations was only present for the West Transect as opposed to no significant difference in 2015.

Conventional metals in sediment were in low concentrations, with the exception of aluminum and iron, with concentrations of these elements highest from the North and Coastal Transects related to higher fines and organic carbon. Two stations exceeded the Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guideline (ISQG) for arsenic, while one exceeded the guideline for zinc. Hydrocarbons were mostly undetectable with only trace amounts of petroleum hydrocarbons in the lube oil ranges (C16-C32) detected in a few samples. The West Transect showed a slight decrease in iron concentrations with distance from the ore dock, as in previous years, while only the East Transect showed a significant difference from baseline.

Habitat surveys were completed by underwater video to assess substrate (type and distribution); macroflora (class and distribution); and epifauna (presence and abundance). A comparison of regression slopes for %macroflora and epifauna abundance coverage with distance from the Milne Port indicated significant differences between baseline (2014) and year two (2016) for the West, East and Coastal Transects, but not for the North Transect for macroflora and significant differences for West, East and North Transects but not for the Coastal Transect for epifauna abundance. These differences must be interpreted cautiously given high variability and sampling replication difficulty. Data collection in future years will increase the power of analysis.

Finfish and mobile epifauna were captured from the Milne ore dock and eastern shore at traditional Inuit fishing areas. Opportunistic sampling of incidental mortalities collected flesh for contaminant analyses from 13 Arctic char. Char were between nine and 19 years in age and had relatively low body burden contamination. None of the fish exceeded Health Canada's guideline for mercury and fish consumption (0.5 mg/kg). Resident fish in the vicinity of Milne Port were dominated by sculpin species and a mark-recapture survey was conducted to estimate relative population size. Lack of recaptures and low catch-per-unit-effort in all years since inception indicated resident sculpin are not present in numbers adequate to support sampling requiring fish sacrifice.

TRENDS

More years of monitoring are required to establish trends in the data.

RECOMMENDATIONS / LESSONS LEARNED

Year 3 of EEM monitoring will be completed in 2017 consistent with the schedule identified in the MEEMP. The use of fewer replicates with a larger number of sampling stations will be explored in order to increase the power of analysis. Hydrocarbons in sediment will be monitored at a surveillance level to examine for any increase in hydrocarbon levels above baseline levels.

As the MEEMP evolves and additional data become available for analyses, the design and approach to analyses should be continuously revisited to optimize the statistical power for interpreting change. As indicated, modifying the sampling design to include more stations along transects with less replication, may increase the statistical power of the analyses without adding to the cost of the program. Other approaches to interpreting the statistical relationships beyond linear regression should be explored. Some of the analyses of baseline relationships in 2014 (e.g. iron concentration data along West and Coastal transects) suggest non-linear models (polynomial quadratic regressions) may better describe the data.

Currently, a proposed expansion to the Mary River Project (Phase 2) is under consideration and will be subject to environmental assessment. The Phase 2 expansion will include construction of a second ore dock and the radial gradient basis for the MEEMP design may need to be refined to include this second point source for environmental perturbation.

Project Certificate Condition No. 88

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent invasive species introductions resulting from Project shipping
Term or Condition	<p>Prior to commercial shipping of iron ore and in conjunction with the Marine Environment Working Group, the Proponent shall provide an updated risk analysis regarding ballast water discharge to assess the adequacy of treatment and implications on the receiving environment. This risk analysis shall consider, but not be limited to:</p> <ol style="list-style-type: none"> Invasive species Seasonal oceanography Ballast water quality and quantity Receiving water quality; e. Residual physical, chemical, and/or biological effects Any risk assessment analysis regarding ballast water exchange and treatment efficacy in arctic waters
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	<p>Risk Assessment for the Potential Introduction of Aquatic Nonindigenous Species through Ballast Water Discharge at Milne Port (Sikumiut Environmental Management Ltd., 2013a)</p> <p>Risk Assessment for the Introduction of Aquatic Nonindigenous Species through Hull Fouling at Milne Port (Sikumiut Environmental Management Ltd., 2013b)</p>
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

A risk assessment was completed in 2013 and, as noted in the update on PC Condition 86, Baffinland has been undertaking additional baseline data over the period of 2014 to 2016 to support an updated ballast water discharge model.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

An updated ballast water discharge model will be developed in 2017 in support of the shipping associated with the Phase 2 Expansion project. Using the 2017 updated ballast water discharge model, Baffinland will undertake an updated risk analysis regarding ballast water discharge in relation to the Phase 2 Expansion project.

Project Certificate Condition No. 89

Category	Marine Environment — Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine water quality resulting from ballast water exchange
Term or Condition	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 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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In progress
Stakeholder Review	Transport Canada, Marine Environment Working Group
Reference	Shipping and Marine Wildlife Management Plan
Ref. Document Link	http://www.baffinland.com/shareddocuments/

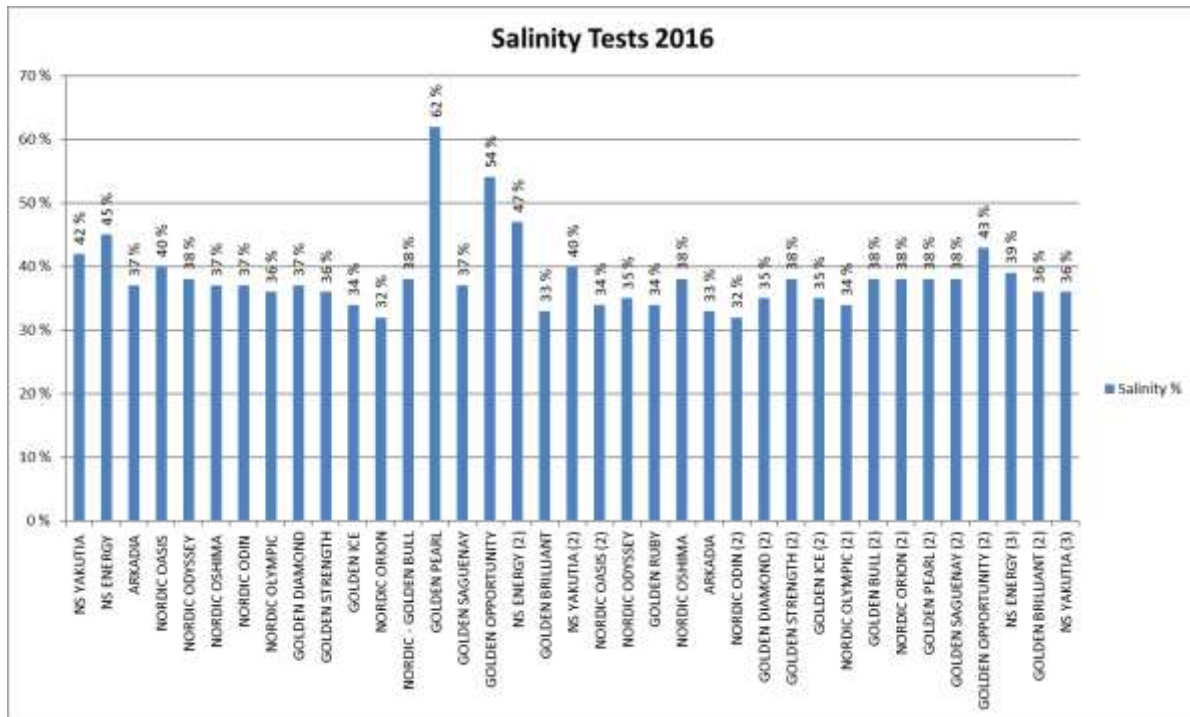
METHODS

All bulk carriers that loaded at Milne Port during the 2016 shipping season had their ship's log inspected to confirm mid-ocean ballast water exchange was conducted as required by Canada's Ballast Water Control and Management Regulations. A single ballast tank of each vessel was also tested for salinity content with a refractometer, prior to being authorized by the port captain to release ballast water from the vessel. In instances in which the refractometer test result was inconsistent, the ballast water was also tested by hydrometer.

RESULTS

Measures of salinity concentrations of the random selected tanks for each of the ore carriers that called on Milne Port in 2016 are plotted on Figure 4.8. All measured salinity concentrations exceeded 30 ‰ (parts per thousand), which is consistent with the mid-ocean exchange requirements for vessels conducting a transoceanic voyage, however, some salinities measured at Milne Port in 2016 are unrealistically high and indicative of a measurement error. Salinities up to 62 ‰ were recorded, but the salinity of mid-Atlantic seawater (i.e., the geographic coordinates where the exchanges were reported to have taken place) is typically in the range of 34-35 ‰. The higher than expected salinity results indicate a potential problem with the measuring technique or equipment that will need to be assessed in 2017 to confirm that the ballast water testing procedure is effective.

Figure 4.8 2016 Ballast Water Salinity Test Results



TRENDS

Unable to determine.

RECOMMENDATIONS / LESSONS LEARNED

Following a review of the 2016 data, Baffinland is reviewing the ballast water sampling and measurement procedures and will update the Shipping and Marine Wildlife Management Plan (SMWMP) in 2017 prior to the start of the shipping season to reflect improvements to salinity sampling and testing methodologies and to clearly indicate the action to be taken in the event of a salinity reading that is lower or higher than the expected range. The SMWMP will also be updated to clearly indicate what actions should be taken if a vessel is found to contain ballast water that is non-compliant with federal regulations.

Project Certificate Condition No. 90

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine water quality resulting from ballast water exchange
Term or Condition	The Proponent shall incorporate into its Shipping and Marine Mammals Management Plan provisions to achieve compliance with the requirements under the International Convention for the Control and Management of Ship's Ballast Water and Sediment (2004) or its replacement and as implemented by the Canadian Ballast Water and Control Regulations as may be amended from time to time
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Section 5.5.1 of the SMWMP describes Baffinland's commitment and steps taken to verify that the vessels meet the legal requirements around ballast water management, including IMO Ballast Water Convention Regulation D-1, and Section 6(1) of the Canadian Ballast Water Control and Management Regulations. For each vessel that calls on Milne Port, this includes inspection of the ship's log to verify that mid-ocean ballast water exchange was undertaken, and measurement of salinity in one random ballast tank.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 91

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine water quality in Steensby Inlet and Milne Inlet
Term or Condition	The Proponent shall develop a detailed monitoring plan for Steensby Inlet and Milne Inlet for fouling that complies with all applicable regulatory requirements and guidelines as issued by Transport Canada, and includes sampling areas on ships where antifouling treatment is not applied such as the areas where non-native species are most likely to occur
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Fouling has been monitored in Milne Port and Ragged Island using two methods: annually collected underwater video of the habitat offset area adjacent to the ore dock and natural benthic habitat (Milne Port only), and from settlement baskets (filled with native rocks to provide a surface for the settlement of fouling species) deployed in Milne Port and Ragged Island in 2014 and 2016 to detect settlement that would occur over two years.

To date, no fouling monitoring has taken place on vessel hulls. Section 5.5.2 of the SMWMP outlines a method for collecting fouling organisms detected on vessels, incidental to a collection method for testing the anti-fouling paint of newly built vessels. Since Baffinland has not commissioned any purpose-built vessels that method has not been implemented.

RESULTS

Settlement baskets deployed at Milne Port in 2014 could not be located in 2016 and it is thought they were lost due to ice scour. They were visually inspected in 2015 and little or no fouling was detected. At that time, they were replaced in the water in hopes that an additional year of deployment would provide better data on settlement. Baskets retrieved from Ragged Island in 2016 after two years of deployment supported a number of macroscopic organisms, which were scraped from the rocks and sent to a laboratory for identification. The results are not yet available.

Underwater video results collected in Milne Port in 2016 are in process of analysis and are not yet available.

TRENDS

No trends in fouling in the marine environment of Milne Inlet have been reported to date (based on 2014 and 2015 data). The available time series (2016) will not permit evaluation of trends in fouling at Ragged Island. There has been no sampling conducted to date to monitor hull fouling.

RECOMMENDATIONS / LESSONS LEARNED

Transport Canada has not issued regulations or guidelines regarding monitoring of fouling on hulls or in the aquatic environment.

Underwater video of benthic habitat as a means of monitoring aquatic invasive species (fouling organisms) will be continued in 2017 and is planned to include monitoring of bottom habitats of Ragged Island as well as Milne Port.

Settlement sampling of fouling organisms is planned to continue at Milne Port and Ragged Island, but will use a different settlement sampler (e.g., PVC plate sampler) for comparability to aquatic invasive species monitoring programs being conducted by the Department of Fisheries and Oceans nationally. Additionally, whole monitoring plates will be preserved and returned to the laboratory for analysis under a microscope without scraping, as this can damage organisms and increase the difficulty of taxonomic identification.

In most DFO programs conducted across Canada, settlement plates attract sufficient organisms for analysis of fouling after one growing season, but the Baffinland program is among the first to conduct such a study in the Arctic and in the cold water may require a longer deployment (e.g., 2 years). A deployment method that would reduce ice damage or loss of the settlement sampling device is under consideration.

The settlement baskets deployed in 2016 will be retrieved and photographed in 2017, and retrieved and sampled in 2018.

A SCUBA-based monitoring program for detection of fouling on the hulls of project vessels moored at Milne Port is proposed for 2017. This monitoring would involve underwater video of the hull (including areas at high risk of fouling such as chain lockers, bulbous bow and stem, sea-chest grating, stern tube, rope guard, propeller nose cone and blades, rudder side, bottom, leading, and trailing edges) and scraping representative areas of the hull for taxonomic identification of the fouling species.

Project Certificate Condition No. 92

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure adequate spill response capacity
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	Emergency Response Plan (Baffinland, 2016s) Spill Contingency Plan (Baffinland, 2016t) Milne Port Oil Pollution Emergency Plan (OPEP; Baffinland, 2016u) Spill at Sea Response Plan (Baffinland, 2015c)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland has developed and maintained appropriate contingency plans to respond to spills on land, at the port, and at sea. The plans outline the equipment to be used in the event of a spill, as well as the roles and responsibilities and training necessary to maintain appropriately trained personnel. Spill response exercises have been conducted annually during ship to shore fuel transfers at Milne Port. In 2016, training of Baffinland staff on its OPEP was conducted by spill response consultant Navenco Marine on July 29-31, 2016.

Baffinland also maintains a contract with Oil Spill Response Ltd. (OSRL), for emergency response in the event of a marine spill.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Annual spill response training will be continued prior to the arrival of fuel vessels and unloading of fuels.

Project Certificate Condition No. 93

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment at Steensby Inlet
Term or Condition	Prior to construction, based on vessel selection and if so required, the Proponent shall reassess the risk analysis of using vessel-based fuel storage, including the potential environmental impacts of containment failure under a range of winter ice conditions, how a spill might spread and the impact of fuel if it does not volatilize to the atmosphere
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The use of vessel-based fuel storage is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 94

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To promote public awareness of Project activities
Term or Condition	The Proponent shall consult directly with affected communities regarding its plans for over-wintering of fuel in Steensby Inlet, with discussion topics to include descriptions of the duration of proposed activities, vessel type, spill preparedness and emergency response protocols, environmental impact predictions and answers to community member questions
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Deferred
Stakeholder Review	Communities of Hall Beach and Igloolik
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

This condition will be re-visited if overwintering of fuel at Steensby Inlet is proposed.

Project Certificate Condition No. 95

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent, Transport Canada
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment at Steensby Inlet
Term or Condition	The Proponent shall meet or exceed all regulatory regulations and requirements as apply to the practice of overwintering a fuel vessel at Steensby Inlet, with reporting to the NIRB and Transport Canada
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Deferred
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

This condition will be re-visited if overwintering of fuel in Steensby Inlet is proposed.

Project Certificate Condition No. 96

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To ensure adequate oversight of Project activities is occurring
Term or Condition	The Proponent will update the NIRB on the results of all compliance monitoring and site inspections undertaken by government agencies for the overwintering of a fuel vessel in Steensby Inlet
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Deferred
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

This condition will be revisited if overwintering of fuel in Steensby Inlet is proposed.

Project Certificate Condition No. 97

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment along the shipping route.
Term or Condition	<p>Prior to the commercial shipping of iron ore, the Proponent shall conduct fuel spill dispersion modeling that will, at a minimum, consider:</p> <ol style="list-style-type: none"> a. Modeling of oil spills for both the Northern and Southern Shipping Routes, in representative locations, identified by the Proponent, in consultation with the Marine Environment Working Group along both Shipping Routes, and including: <ol style="list-style-type: none"> i. Pinch points; ii. The approaches into Steensby Inlet and Milne Inlet; iii. Shallow water and shorelines; and, iv. Areas that have been identified as having high flows and/or high concentrations of marine mammals, marine fish or seabirds. b. Open water and, where applicable, ice-covered conditions c. Spill volumes up to and including loss of a full tanker cargo d. Differences in the quantity and properties of each type of bulk fuel transported by vessels when they are at, or in transit to, the ports at Steensby Inlet and Milne Inlet
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Transport Canada Marine Safety, Canadian Coast Guard
Reference	<p>Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season - Milne Inlet, Eclipse Sound, Pond Inlet (AMEC, 2015)</p> <p>Spill at Sea Response Plan (Baffinland, 2015c)</p>
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Revised oil spill modelling was conducted for shipping from Milne Port in 2015. Leading up to this modelling, a fuel spill preparedness workshop was held in April 2014 with Transport Canada and the Canadian Coast Guard. This workshop established the following credible spill scenarios for modelling:

- For arctic diesel - two compartments of a double-hull, multi-compartment fuel tanker, which amounts to 4,000 m³ (4 ML). The expected maximum size of the fuel tanker is 15 ML.
- For IFO - half of the IFO fuel remaining in the ship when sailing into Milne Inlet which amounts to 2,000 m³ (2 ML) of IFO.

The spill assessment considered the open water season, and the month of September was selected as representative in terms of meteorological and oceanographic conditions. Five potential spill locations along the shipping route were selected considering community recommendations.

Two scenarios were modelled at each of the five locations using the software OST, which computes spill probability distributions to indicate geographical regions (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet) which might be affected as a result of a spill, how frequently and how soon.

In addition, 10 (two fuel types x five locations) simulations were run with a September 'P50' wind condition defined as the average wind speed conditions and the associated most frequent wind direction. Finally, a sensitivity run considering a full fuel tanker loss of 15 ML arctic diesel cargo at a location in Eclipse Sound was also prepared. For these scenarios, RPS ASA's OILMAP (RPS 2014) was used to provide additional estimation of spill weathering and fate. This includes slick characteristics, estimate of fuel concentrations in the surface layer, amounts evaporated and that have reached shore, and remaining amounts of fuel, and fuel and water (mousse) volume. The spill modelling completed in this study assumes no intervention, response or containment and that the slick is assumed to freely discharge (during a very short duration) from the damaged vessel.

The OILMAP oil spill model and response system introduced above was used to provide additional estimates of spilled fuel fate, in particular, slick characteristics and weathering. OILMAP calculates the evaporation, dispersion and remaining percentage for a given spill scenario where the user defines a fuel product type, weather conditions, properties of the receiving water, and the amount of fuel released.

The fate or weathering processes considered were evaporation, the conversion of liquid fuel into gaseous component, and natural dispersion, the breakup of a fuel slick into small droplets that are mixed into the sea by wave action. These are two important weathering processes that typically occur over the first five days following a spill and act to remove fuel from the sea surface. Fuel will also be brought to shore depending on the prevailing currents and winds at the time as well as the type and amount of fuel, and type of shoreline. Consideration of the amounts lost due to these processes yields an estimate of the remaining amount of fuel on the surface at any time. These are the key fates modeled and tracked by OILMAP. No containment or recovery of spilled fuel was assumed in the simulations.

RESULTS

The modelling results were presented in a series of figures showing expected spill trajectories after 1 day and 5 days. The spill model informed the development of Baffinland's Spill at Sea Response Plan.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

There have been no changes to the shipping practices since the spill modelling was conducted, therefore no updates are required.

Project Certificate Condition No. 98

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment along the shipping route
Term or Condition	The Proponent shall incorporate the results of revised fuel spill dispersion modeling into its impact predictions for the marine environment and its spill response and emergency preparedness plans
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Transport Canada Marine Safety, Canadian Coast Guard
Reference	Mary River Project - Fuel Spill Modelling: Northern Shipping Route Open Water Season - Milne Inlet, Eclipse Sound, Pond Inlet (AMEC, 2015) Spill at Sea Response Plan (Baffinland, 2015c)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

The revised fuel spill modelling completed in 2015 was used to revise the company's spill response and emergency preparedness plans, including the development of a Spill at Sea Response Plan.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.5.11 Marine Wildlife (PC Conditions 99 through 128)

Thirty-one (31) PC conditions (including 125 and 125a) relate to the potential impacts of the Project on marine wildlife. These conditions require the collection of supplemental baseline data prior to the shipping of ore, provide direction on mitigation and monitoring programs to be included in Baffinland's Shipping and Marine Wildlife Management Plan (SMWMP), and identify shipping information to be communicated to potentially affected communities regarding shipping activities.

Stakeholder Feedback

Marine mammals have been and continue to be a key environmental issue with Baffinland's stakeholders. Stakeholders focused on the Project's effects to marine mammals includes local communities, the QIA, and agencies with jurisdictional responsibility for the marine environment: DFO, ECCC, Transport Canada and the Canadian Coast Guard. Baffinland continues to engage these groups through the MEWG. The communities have expressed concerns about impacts to marine mammals, mainly narwhal in Pond Inlet and walrus in Igloodik; community awareness of shipping activities; and the potential for the Project to impact fisheries resources in Steensby and Milne Inlets that could be subject to the development of a commercial fishery at some point in the future. Nunavik, represented by the Makivik Corporation, expressed concern over potential impacts of shipping on marine mammal populations in Hudson Strait.

Monitoring

Baffinland implements a number of marine mammal monitoring programs, as prescribed in the Project Certificate and described in the Shipping and Marine Wildlife Management Plan (SMWMP):

- Aerial marine mammal surveys (Baffinland now supports DFO-led surveys)
- Acoustical (underwater noise) monitoring
- Shore-based monitoring
- Shipboard observers (discontinued in 2016; see PC condition 106)

Construction monitoring during ore dock construction (not applicable in 2016).

Baffinland discontinued the shipboard observers program in 2016 due to safety concerns; market vessels are not equipped with a safe location from which the observer can make observations. Discontinuing the program and potential alternatives to this program were discussed with the MEWG in 2016. Baffinland is targeting to have an alternative program developed in 2017. Depending upon the outcome of discussions with the MEWG and identified alternatives, Baffinland may approach the NIRB to discuss changes to this PC Condition.

Table 4.19 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.19 Marine Mammals Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Ringed Seals, Bearded Seals, Walrus, Beluga Whales, Narwhal, Bowhead Whales, Polar Bear	Habitat change resulting from icebreaking and/or ice management	No project interactions to monitor in 2016	N/A
	Hearing impairment and/or damage caused by sound from construction activities	No in-water construction in 2016	N/A
	Disturbance caused by airborne and/or underwater sound from construction, shipping and aircraft	Bruce Head shore-based monitoring pilot study, underwater sound monitoring. No significant change in relative abundance and distribution of marine wildlife noted.	Effects within FEIS predictions
Narwhal	Masking of environmental sounds caused by vessel and construction sound	Bruce Head shore-based monitoring study, underwater sound monitoring. No significant change in relative abundance and distribution of marine wildlife noted.	Effects within FEIS predictions
Bowhead Whales	Mortality from collisions with vessels and blasting during construction	Shipboard observers; no collisions were noted by shipboard observers or ship crew	Effects within FEIS predictions
Polar Bears	Mortality from human-bear interactions	Polar bear monitors look for polar bears entering camps and remote work areas. No polar bear incidents occurred in 2016.	Effects within FEIS predictions

To the extent that Project impacts on marine mammals can be evaluated, the effects of the Project appear to be within FEIS predictions.

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect marine mammals. Baffinland will continue to seek input and review monitoring results trends from technical members of the MEWG. Reporting on each PC condition follow.

Project Certificate Condition No. 99

Category	Marine Environment - Supplemental Baseline Assessments
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To supplement baseline information and improve predictions for potential impacts to marine wildlife
Term or Condition	<p>The Proponent, working with the Marine Environment Working Group, shall consider and identify priorities for conducting the following supplemental baseline assessments:</p> <ol style="list-style-type: none"> a. Establish shipping season, inter-annual baseline in Steensby Inlet and Milne Inlet that enables effective monitoring of physical and chemical effects of ballast water releases, sewage outfall, and bottom scour by ship props, particularly downslope and downstream from the docks. This shall include the selection and identification of physical, chemical, and biological community/indicator components. The biological indicators shall include both pelagic and benthic species but with emphasis on relatively sedentary benthic species (e.g., sculpins). b. The collection of additional baseline data: <ol style="list-style-type: none"> i. in Steensby Inlet on walrus, beluga, bearded seal anadromous Arctic Char abundance, distribution ecology and habitat use ii. In Milne Inlet on narwhal, bowhead and anadromous Arctic Char abundance, distribution ecology and habitat use c. Enhance baseline data on marine wildlife (fish, invertebrates, birds, mammals, etc.) and to provide more details on species abundance and distribution found in the Project area. This shall include, but not be limited to the following: <ol style="list-style-type: none"> i. Aerial surveys for basking ringed seals throughout the landfast ice of Steensby Inlet and at an appropriate control location ii. Shore-based observations of pre-Project narwhal and bowhead whale behavior in Milne Inlet that continues at an appropriate frequency throughout the Early Revenue Phase and for not less than three consecutive years d. Enhance the baseline for affected freshwater systems, which includes control sites to detect Project-related changes before they cause significant harm.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable in 2016
Stakeholder Review	Marine Environment Working Group
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h) Shore-Based Monitoring of Narwhals and Vessels at Bruce Head, Milne Inlet, 2016 (LGL, 2017) 2016 Aerial Survey (report under preparation)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

- a. Monitoring protocols and study designs were established to collect chemical, physical and biological samples in relation to the sewage outfall and the ore dock, as well as in reference locations in Milne Inlet. Sampling was conducted to obtain information on: water quality (collection of water samples for chemical analysis, and vertical physical profiles of the water column); dust deposition, bottom scour and sediment redistribution (benthic samples were collected to investigate

chemical and physical characteristics of the sediment, using iron concentration and particle size as indicators of potential Project-induced changes in seabed habitat; biological changes (assessed using underwater video surveys to monitor the presence and distribution of epibenthos and marine flora communities); aquatic invasive species (assessed using zooplankton, benthic invertebrate and fish sampling, underwater video surveys of epibenthos and marine flora communities, and collection of encrusting epifauna from settlement baskets); and marine fish and Arctic char (sampled using gillnets and Fukui trapnets to determine presence and relative abundance of fish species, and tissue sampling of mortalities to characterize fish health). These samples have been collected annually from 2013 through 2016.

- b. (i) This phase of the program is inactive.
- (ii) Abundance, distribution, ecology and habitat use data have been investigated in Milne Inlet for narwhal and bowhead by means of aerial surveys and shore-based surveys. Aerial surveys provided abundance and distribution data for the Eclipse Sound population of narwhals. Aerial surveys were conducted by Baffinland over Milne Inlet, Pond Inlet, Eclipse Sound, Tremblay Sound, and Navy Board Inlet in 2013, 2014, and 2015 and were obtained for these areas from the DFO High Arctic Narwhal survey via a data-sharing agreement in 2016. Abundance and distribution patterns in the portion of Milne Inlet visible from Bruce Head, as well as ecology (behaviour) and habitat use data, were obtained from shore-based surveys conducted in 2013, 2014, 2015, and 2016.

Abundance, distribution, ecology and habitat use of Arctic char in the marine environment of Milne Inlet were investigated by sampling fish with gillnets and Fukui trapnets in 2013, 2014, 2015 and 2016. Sampling locations were based on traditional fishing areas for Arctic char, according to IQ. Additional information was obtained from underwater towed videos of the project area.

- c. (i) This phase of the project is currently inactive.
- (ii) Behavioural observations on narwhal have been made from the Bruce Head shore-based marine monitoring program in 2013, 2014, 2015 and 2016. Operational shipping for the Early Revenue Phase (ERP) of Baffinland's Mary River Project commenced in 2015 and continued in 2016. A team of marine biologists and Inuit observers collected data on narwhals and shipping from the observation site on Bruce Head from 30 July to 30 August 2016; the team collected data on narwhals during 18 ore carrier and 2 cargo vessel one-way transits. Three primary types of narwhal data were collected: relative abundance and distribution (RAD) data, group composition data, and behaviour data. Additionally, all observers made general observations (ad lib) of narwhal activity. Besides data on shipping, ancillary information about tide, weather, and other anthropogenic activity, particularly hunting, were also collected (narwhal hunting is conducted regularly at the base of Bruce Head). Data on the ancillary variables were used to investigate their influences on narwhals and to help in distinguishing effects of ore carriers from those of other factors influencing local numbers and distribution of narwhals.

Statistical analysis was conducted on the combined 2014, 2015 and 2016 RAD data using a generalized linear mixed model (GLMM) to examine the effect of human activities (shipping, hunting) and natural factors (tide, time of day date, location within the SSA, and sighting condition) on the relative number and distribution of narwhals in the Stratified Survey Area (SSA).

RESULTS

- a. Preliminary results from the 2016 monitoring studies are available for field-collected fish data; other samples are still being analysed in the laboratory. In 2016, Arctic char, fish doctor, fourhorn sculpin, longhorn sculpin and shorthorn sculpin were captured.

In 2015, mercury exceedances were observed during one water quality sampling event. The reasons for the elevated mercury levels could not be determined. There was no change in sediment fines, indicating that sediment deposition had not changed from 2014 to 2015. The relationship of iron concentration in the sediments versus distance from the ore dock had not changed between 2014 and 2015. Exceedances of arsenic were found in sediments at two stations, and aluminum and iron concentrations were relatively high in some transects, but may be natural occurrences due to high clay, silt and organic carbon content of the sediment. Hydrocarbons were below detection or in trace amounts. Epifauna abundance and % macroflora coverage changed on some transects between 2014 and 2015 but must be interpreted cautiously due to high variability in these biological communities. Low numbers of six species of sculpin were captured near the ore dock. Arctic char ranging from 8 to 12 years of age were captured. Incidental mortalities were sampled for tissue analysis. Arsenic, mercury, and zinc were found in all fish, along with some that contained aluminum or copper. None of the fish exceeded Health Canada's guideline for mercury and fish consumption.

- b. and c.) The aerial survey data for 2016 are still being analyzed. In 2016, a total of 301.6 hours of observation effort was conducted for the Bruce Head shore-based observation survey over the course of 27 days at the observation site from 30 July to 30 August 2016.

Relative Abundance and Distribution (RAD) - In 2016, as observed in 2013–2015, most narwhals during RAD counts of the Stratified Study Area (SSA) were consistently observed in the south near Koluktoo Bay and were more often observed in the eastern and middle portions of the SSA. The northernmost portion of the SSA was often observed to contain no narwhals. During ad lib observations, narwhals were frequently observed south of the SSA in the general vicinity of Koluktoo Bay and the entrance to Assumption Harbour (and Milne Port). A similar distribution was observed during aerial surveys conducted over 25 years ago and it is thought that Koluktoo Bay may serve as a refuge for narwhals.

The number of narwhal counted in the SSA were significantly (statistically) related to tide, time of day, and date. Relatively more narwhals were observed in the SSA during ebb tides. Ad lib observations made in 2016 corroborate this finding. On several occasions in 2016, narwhals were observed to move north into the SSA, usually from Koluktoo Bay, and then reverse direction and head south again for no obvious reason. Examination of daily tidal flow in the area revealed that some of these movements and direction reversals coincided with the tide. In the study area, narwhal numbers began increasing around 11 August, peaked at about 22 August, and began decreasing about a week later. Highest counts of narwhals in the SSA occurred around 14:00 EDT.

Habitat Use - Narwhal observed in the SSA and adjacent waters were most often engaged in travelling behavior; although were also observed engaged in nursing, rubbing, tussing, foraging, and mating behaviour—illustrating the many uses of the inlet by narwhals. Narwhal calves were present in the SSA and adjacent areas, supporting the hypothesis that the area is important for calf rearing.

In 2016, narwhals were observed foraging on Arctic cod schooling close to the Bruce Head shore on 9 days during the first half of August. Mother-calf pairs were observed to engage in foraging behaviours although the majority of these feeding groups did not include calves or yearlings. Based on an analysis of narwhal stomach contents in the 1960s, narwhals have been previously shown to consume Arctic cod in the area. However, most narwhal foraging is thought to occur during winter in Davis Strait.

Behaviour and Group Composition - Behavioral and group composition effects of large vessels (ore carriers plus other vessels >100 m in length, e.g., sealift and ecotourism vessels) on narwhal behaviour and group composition were assessed based on pooled data from 2013 to 2016.

Narwhals and Hunting Activity - The rocks at the base of the cliff at Bruce Head, immediately below the observation site, are commonly used by local Inuit for hunting narwhals and seals. Most of the hunting (i.e., shooting) activity observed during the shore-based studies at Bruce Head was conducted from the shore. Narwhals were observed to respond to shooting by diving and increasing their swim speed. Despite repeatedly being shot at from the same location, narwhals were always observed to return to the area at the base of Bruce Head, though the time until they returned was variable (30 minutes to >5 hours). The GLMM analysis supports observations made by the study team at Bruce Head—a significant “time since shooting” effect was found. Following a shooting event, narwhal counts tended to be zero or low during the first 2–3 hours, when narwhals left the area, but counts subsequently tended to increase as narwhals returned 4 to ~9 hours after a shot was fired.

SUMMARY OF RESULTS - In 2016, despite increased shipping traffic, narwhals were regularly observed in the SSA and adjacent areas of Milne Inlet throughout the 30 July–30 August study period. Results of analyses of narwhal relative abundance, distribution, and behaviour in southern Milne Inlet indicated narwhals responded to ore carrier transits by exhibiting temporary and localized displacement and related changes in behaviour. However, there was no overall decrease in the abundance of narwhals in the area.

TRENDS

- a. No significant changes in monitored parameters were detected from 2014 to 2016.
- b. (And c.) There has been no significant change in the abundance of narwhals in Milne Inlet, comparing observations from 2014, 2015 and 2016. Results of analyses of narwhal relative abundance, distribution, and behaviour in southern Milne Inlet indicated narwhals responded to ore carrier transits by exhibiting temporary and localized displacement and related changes in behaviour.

RECOMMENDATIONS / LESSONS LEARNED

- a. No specific recommendations.
- b. (And c.) The Bruce Head shore-based survey provides valuable information on the distribution, abundance and behaviour of narwhals relative to shipping and other anthropogenic and natural environmental conditions. Based on the success of the program, Baffinland intends on continuing the shore-based study in 2017 which is beyond the requirements of the Condition which specifies that the program be continued for “not less than three consecutive years”. Recommendations that will be considered in the development of the 2017 program include: improving visibility of narwhals in the ‘blind spot’ directly below Bruce Head, comparison of the responses of narwhal to different classes of large vessels and developing a more complete record of hunting activity so that this activity can be properly accounted for in statistical models.

Project Certificate Condition No. 100

Category	Marine Environment - Supplemental Baseline Assessments
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To supplement baseline information and improve predictions for potential impacts to marine wildlife
Term or Condition	The Proponent shall update its Shipping and Marine Wildlife Management Plan, to include avoidance of polynyas and mitigation measures designed for potential fuel spills along the shipping lane during the winter months, with consideration for the impact of spilled fuel on marine mammals when they might be less mobile or able to avoid contact with spilt fuel or fumes
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable in 2016
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

There is currently no winter shipping or ice breaking occurring as part of the Mary River Project so there is no need to address fuel spills during winter months in the SMWMP.

RESULTS

Not applicable in 2016.

TRENDS

Not applicable in 2016.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will update the Shipping and Marine Wildlife Management Plan, in consultation with the MEWG, prior to any winter shipping.

Project Certificate Condition No. 101

Category	Marine Environment - Monitoring
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operations
Objective	To monitor for potential impacts to marine wildlife and marine habitat
Term or Condition	<p>The Proponent shall incorporate into the appropriate monitoring plans the following items:</p> <ol style="list-style-type: none"> a. A monitoring program that focuses on walrus use of Steensby Inlet and their reaction to disturbance from construction activities, aircraft, and vessels; b. Efforts to involve Inuit in monitoring studies at all levels; c. Monitoring protocols that are responsive to Inuit concerns; d. Marine monitoring protocols are to consider the use of additional detecting devices to ensure adequate monitoring through changing seasonal conditions and daylight; e. Schedule for periodic aerial surveys as recommended by the Marine Environment Working Group; f. Periodic aerial surveys for basking ringed seals throughout the landfast ice of Steensby Inlet, and a suitable control location. Surveys shall be conducted at an appropriate frequency to detect change inter-annual variability; g. Shore-based observations of pre-Project narwhal behavior in Milne Inlet, that continues at an appropriate frequency throughout the Early Revenue Phase (not less than three years); h. Conduct landfast ice monitoring for the duration of the Project Operations phase, which will include: <ol style="list-style-type: none"> i. The number of ship transits that are able to use the same track; and, ii. The area of landfast ice disrupted annually by ship traffic; and iii. Monitoring strategy focused on assessing and mitigating interaction between humans and wildlife at the port site(s).
Reporting Requirement	To be provided in the Annual Report to the NIRB
Status	Applicable items are Complete for 2016. Some items are Not Applicable in 2016
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h) Shore-Based Monitoring of Narwhals and Vessels at Bruce Head, Milne Inlet, 2016 (LGL, 2017) 2016 Aerial Survey (report under preparation)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

- a. No activity took place at Steensby Port in 2016. This phase of the project is currently inactive.
- b. Inuit are involved in planning and execution of the monitoring of marine mammals and environment, as well as review of the results. Plans for monitoring take into account community concerns as well as discussions with the MEWG, in which Inuit organizations actively participate, monitoring results are reviewed annually by MEWG, and Inuit are employed by Baffinland to assist with programs such as the shore-based marine mammal monitoring program at Bruce Head.
- c. Development of monitoring protocols takes into account input from local communities (e.g., concerns that are communicated through community workshops) as well as discussions with the Marine Environment Working Group (MEWG), in which Inuit organizations actively participate. For example, the Qikiqtani Inuit Association (QIA) has been a

member of MEWG since its inception and the Pond Inlet Hunters and Trappers Organization (Pond Inlet HTO) joined MEWG in 2016.

- d. Additional detecting devices were not used in 2016.
- e. Baffinland entered into a data-sharing agreement with Fisheries and Oceans Canada (DFO) with respect to aerial surveys conducted for marine mammals in the area including the northern shipping route. Baffinland is analysing photographic aerial surveys of Pond Inlet, Eclipse Sound, Milne Inlet and Tremblay Sound undertaken by DFO in August 2016.

In 2016, Baffinland engaged consultants to undertake a third party review of the 2015 aerial survey report, as required by the Shipping and Marine Wildlife Management Plan. This requirement was triggered by conclusions reported in the 2015 draft aerial survey report indicating that shipping affected the abundance of marine mammals in the project area. The third party review concluded that the experimental design and statistical analysis reported in the 2015 aerial survey were flawed, and that there was no basis for concluding that shipping had affected the abundance of marine mammals in 2015.

- f. No activity took place at Steensby Inlet in 2016. This phase of the project is currently inactive.
- g. Shore-based observations of narwhal behaviour took place in 2016, following protocols developed during similar monitoring that was conducted in 2013, 2014 and 2015.
- h. No ship transits took place during the landfast ice period in 2016. This phase of the project is currently inactive.

RESULTS

- a. Not applicable in 2016.
- b. Baffinland conducted a series of community workshops and consultations in six Northern Baffin Island Inuit communities in 2015-2016, including targeted discussions about the marine environment, marine mammals and shipping. The QIA participated in MEWG meetings in April and December 2016. Six Inuit were employed as marine mammal observers or polar bear monitors for shore-based monitoring of marine mammals at Bruce Head in 2016. Representatives of the QIA and Pond Inlet HTO participated in the November 2016 MEWG meeting.
- c. The Bruce Head shore-based marine mammal monitoring program, which has been conducted each year since 2013, originated from a proposal by the QIA to develop a community-based monitoring protocol and has been operated with a team of up to 6 Inuit marine mammal observers and polar bear monitors each year.
- d. Not applicable in 2016.
- e. Analysis of the 2016 aerial survey is ongoing and results will be presented to the MEWG in April 2017.
- f. Not applicable in 2016.
- g. The 2016 shore-based survey collected data on narwhals and shipping from Bruce Head from 30 July to 30 August 2016. Over 27 days of observation, there was a total of 301.6 hours of observation effort. Observations were not possible on 5 days due to weather. On the other days, daily observation effort averaged 11.2 hours (range 0.9-16.6 hours). There were 27,888 narwhal sightings, including repeat sightings. Daily totals ranged from 0 to 3764 narwhals, and totals exceeded 1000 narwhals on 11 days. There were 5 days when observations were conducted but no narwhals were observed. Peak abundances were observed around 22 August.

The hunting camp at the base of Bruce Head was occupied on 22 of the 27 observation days in 2016. Hunting activity was observed on 18 days, with 71 shooting events. Hunting activity mainly took place from the shore, but boat-based hunting was observed on three occasions. In addition, a narwhal net was set on numerous occasions from 15 to 27 August.

One bowhead whale was observed travelling north on 11 August. A polar bear was observed swimming from west to east on 10 August. It is likely this bear remained in the area for 10 days, when it was observed feeding on a narwhal carcass on shore. There were numerous sightings of ringed, harp, and unidentified seals. No walrus or killer whales were observed in 2016.

h. Not applicable in 2016.

TRENDS

a. Not applicable in 2016.

b. Inuit have been involved in monitoring studies at all levels since the inception of the program. The addition of the Pond Inlet HTO as members of the MEWG in 2016 has increased the participation of Inuit in this process.

c. Inuit participation has increased over the duration of the monitoring program.

d. Additional detecting devices (passive acoustic monitoring) were used in 2014 and 2015 but not in 2016.

e. Not available at this time.

f. Not applicable in 2016.

g. The total numbers of narwhal counted in the area did not differ in 2014, 2015 and 2016 despite increasing vessel traffic over the three years (as 2013 was a preliminary study of shorter duration it was not included in this analysis). Results of the analysis of narwhal relative abundance, distribution and behaviour indicated narwhals responded to ore carrier transits by exhibiting temporary and localized displacement and related changes in behaviour.

h. Not applicable in 2016.

RECOMMENDATIONS / LESSONS LEARNED

a. Not applicable in 2016.

b. Marine monitoring protocols will be reviewed in 2017, with the intention of increasing Inuit involvement if possible.

c. Marine monitoring protocols will be reviewed in 2017, with the intention of increasing responsiveness to Inuit concerns if possible.

d. Marine monitoring protocols will be reviewed in 2017 and discussed with the MEWG, and will consider the use of additional detecting devices.

e. For the 2016 aerial survey data, Baffinland has implemented updated protocols for data analysis (e.g., use of distance analysis methods) as recommended in the third party review of the 2015 aerial survey.

f. Not applicable in 2016.

g. Shore-based monitoring from Bruce Head is an effective method for monitoring of narwhals and shipping. Recommendations for the 2017 program include: improving visibility of narwhals in the 'blind spot' directly below Bruce Head, comparison of the responses of narwhal to different classes of large vessels and developing a more complete record of hunting activity so that this activity can be properly accounted for in statistical models.

h. Not applicable in 2016.

Project Certificate Condition No. 102

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To promote public awareness of Project shipping activities for the general public
Term or Condition	The Proponent shall ensure that routing of project vessels is tracked and recorded for both the southern and northern shipping routes, with data made accessible in real time to communities in Nunavut and Nunavik
Reporting Requirement	To be provided in the Annual Report to the NIRB
Status	Complete
Stakeholder Review	None
Reference	Baffinland corporate website - Ship Locations
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland has contracted exactAIS[®], a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The vessel tracking information is available on Baffinland's web site to allow communities to check on vessel coordinates, which direction it is moving, and its destination. In addition, access to a tracking portal was provided to the QIA and Parks Canada in Pond Inlet.

The vessel locations plotted on the map are not "real-time", but are a regularly updated snap shot of vessel movement in the North Baffin region.

RESULTS

Baffinland has made vessel routing accessible to the public.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactAIS[®] to be beneficial in providing information related to ship routing to the public. Baffinland will continue to use this service.

Project Certificate Condition No. 103

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor effectiveness of mitigation of shipping impacts to marine wildlife
Term or Condition	<p>The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including:</p> <ol style="list-style-type: none"> A record of all ship tracks taken along both shipping routes covering the entire shipping season; When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; A comparison of recorded ship tracks to the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.
Reporting Requirement	To be provided in the Annual Report to the NIRB
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Baffinland has contracted exactAIS[®], a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The ship tracks are publicly accessible through the Baffinland website during the shipping season and a log of the ship tracks is provided in Appendix H.

Shipping is currently restricted to the open water season (July-October), therefore items b and e are not currently applicable.

RESULTS

The 2016 ship tracks are plotted on Figure 4.9. There were no significant deviations from the nominal shipping route in 2016.

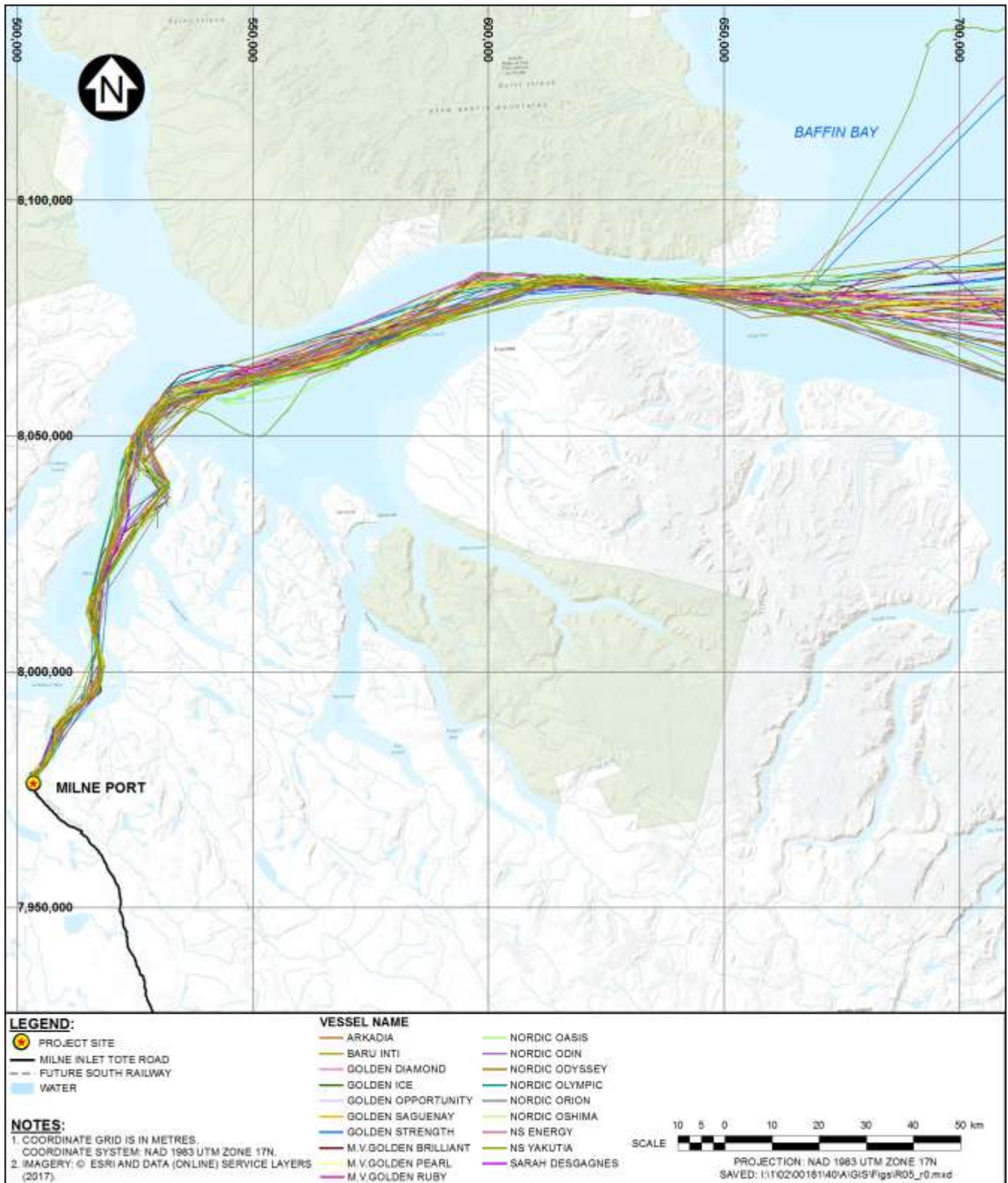
TRENDS

No significant deviations from the nominal shipping route have occurred in the first two years of iron ore shipping (2015 and 2016).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor ship tracks with the use of the exactAIS[®] service.

Figure 4.9 2016 Ship Tracks



Project Certificate Condition No. 104

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To prevent impacts to marine wildlife from Project shipping activities
Term or Condition	<p>Subject to safety considerations and the potential for conditions as determined by the crew of transiting vessels, to result in route deviations:</p> <ol style="list-style-type: none"> The Proponent shall require, for shipping to/from Steensby Port, project vessels to maintain a route to the south of Mill Island to prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island. Where project vessels are required to transit to the north of Mill Island owing to environmental or other conditions, an incident report is to be provided to the Marine Environment Working Group and the NIRB within 30 days, noting all wildlife sightings and interactions as recorded by shipboard monitors. The Proponent shall summarize all incidences of significant deviations from the nominal shipping routes for traffic to/from Milne Port and Steensby Port as presented in the FEIS and FEIS Addendum to the NIRB annually, with corresponding discussion regarding justification for deviations and any observed environmental impacts.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Shipping to/from the Steensby Port is not a currently active part of the project, therefore 104a is not currently applicable. No significant deviations from nominal shipping routes to/from Milne Port were made in 2016.

RESULTS

The 2016 ship tracks are plotted on Figure 4.9. There were no significant deviations from the nominal shipping route in 2016.

TRENDS

No significant deviations from the nominal shipping route have occurred in the first two years of iron ore shipping (2015 and 2016).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor ship tracks with the use of the exactAIS[®] service.

Project Certificate Condition No. 105

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine wildlife from Project shipping activities
Term or Condition	<p>The Proponent shall ensure that measures to reduce the potential for interaction with marine mammals, particularly in Hudson Strait and Milne Inlet, are identified and implemented prior to commencement of shipping operations. These measures could include, but are not limited to:</p> <ol style="list-style-type: none"> Changes in the frequency and timing (including periodic suspensions) of shipping during winter months in Hudson Strait and during the open water season in Milne Inlet, i.e., when interactions with marine mammals are likely to be the most problematic Reduced shipping speeds where ship-marine mammal interactions are most likely Identification of alternate shipping routes through Hudson Strait for use when conflicts between the proposed routes and marine mammals could arise. Repeated winter aerial survey results showing marine mammal distribution and densities in Hudson Strait would greatly assist in this task.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

- No activity took place at Steensby Port in 2016. This phase of the project is currently inactive. In Milne Inlet, ship-mammal interactions are monitored by the shore-based marine mammal monitoring program at Bruce Head.
- Baffinland's SMWMP identifies that "Project vessels will travel at a speed of 7-10 knots when transiting through Eclipse Sound and Milne Inlet" (page 25).
- Not applicable in 2016.

RESULTS

- To date, ship-marine mammal interactions in Milne Inlet involving project vessels appear to be limited to localized and temporary displacement behaviour as observed in the vicinity of Bruce Head.
- Some ship speeds observed from Bruce Head were in excess of the required 7-10 knots. Ore vessels travelled at a maximum of 8.9 knots. However, freight vessel speeds were measured in the 12-13 knot range. In addition, ecotourism vessels in the project area travelled at 12-13 knots.
- Not applicable in 2016.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

- a. An experiment to observe narwhal reactions to varying shipping speeds in Milne Inlet is under consideration for 2017.
- b. In 2017, freight vessels will be provided with instruction to approach Milne Inlet with speeds limited to 7-10 knots similar to the requirements for ore vessels.
- c. None.

Project Certificate Condition No. 106

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that interactions with marine mammals and Project shipping activities are effectively monitored
Term or Condition	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.
Reporting Requirement	As needed
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Baffinland's Ship-based Observer Program was initiated in 2013 and continued through 2015. The Ship-based Observer Program was conducted during construction activities and shipping in Milne Port, NU. Baffinland has not designed or constructed purpose-built ore carriers, therefore there was reliance on placing ship-based observers aboard market vessels. Fuel tanker and sealift vessel traffic in and out of Milne Port provided the opportunity to conduct ship-based observations focused on the study area between Pond Inlet and Milne Port. Ship-based observers surveyed the shipping route through the Regional Study Area (RSA), embarking at Pond Inlet and disembarking at Milne Port. Marine mammal surveys typically lasted throughout daylight hours with scheduled breaks to avoid observer fatigue.

RESULTS

No vessel collisions with marine mammals were recorded over the 3 years of monitoring. Very few sightings of marine mammals were observed over the 3-year period (65 marine mammals in 2013, 12 in 2014 and 16 in 2015). Seabird observations declined over the 3-year period (172 sightings in 2013, 1 in 2014 and 1 in 2015.).

The Ship-based Observer program was put on hold in 2016 due to safety concerns about the on-boarding of the observers.

TRENDS

No vessel collisions with marine mammals or bird colonies, or other notable observations were made during the monitoring program. A decline in marine mammal and seabird observations occurred over the three years despite slightly increased observation time spent in 2014 and 2015. A large contributor to this is that in 2014 and 2015 the observation program was reduced to the regional study area rather than having observers complete the entire journey with the ship.

RECOMMENDATIONS / LESSONS LEARNED

A number of safety concerns have been raised in regard to this program which led to the postponement of the program in 2016. Originally, there were plans to have purpose built ore carriers to accommodate the Inuit observers to conduct regular marine mammal and sea bird watches. In practice, the observation efforts have been conducted only on fuel carriers as they transit to Milne Port as these were the only vessels that have berthing space for the observers. In the previous two seasons actual observation times have been limited to just a few hours per transit and little or no useful data has been collected. The situation is further complicated by the considerable safety risk associated with placing personnel on and, if the need arises extracting personnel from, the vessels as they steam by Pond Inlet.

Based on the lack of useable information collected and considering the need to mitigate personnel safety risk, Baffinland discussed with the MEWG the potential to suspend the program and to seek alternative means of community-based monitoring for interactions of vessels with marine mammals. MEWG representatives acknowledged that the program is not achieving meaningful results despite best efforts on the part of Baffinland to execute the Ship Based Observer Program. In July 2016, Baffinland notified the MEWG that Ship Based Observer Program will be discontinued and that Baffinland would be evaluating alternative approaches for marine mammal monitoring that will provide for the safe, practical collection of useful information to assess marine mammal response to shipping in Milne Inlet including the potential to develop community-based environmental monitoring programs in cooperation with QIA and Pond Inlet.

Without a safe methodology, Baffinland will not continue the ship board observation program. Baffinland will continue discussions with the MEWG to identify an alternative approach to this condition however Baffinland may approach the NIRB to discuss changes to this condition.

Project Certificate Condition No. 107

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To determine the presence of, and ensure that interactions with marine mammals, seabirds and seaducks are effectively monitored for, along the northern and southern shipping routes, as applicable
Term or Condition	The Proponent shall revise the proposed “surveillance monitoring” to improve the likelihood of detecting strong marine mammal, seabird or seaduck responses occurring too far ahead of the ship to be detectable by observers aboard the ore carriers. A baseline study early in the shipping operations could employ additional surveillance to detect potential changes in distribution patterns and behavior. At an ambitious scope, this might be achieved using unmanned aircraft flown ahead of ships, or over known areas of importance for seabirds or haul-out sites in the case of walruses, in accordance with the requirements of their Special Flight Operations Certificate.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Ship-based surveillance monitoring was conducted in 2013, 2014 and 2015, but was discontinued in 2016. It was found that very few marine mammals were visible to observers on board the vessels, and there were safety concerns about having observers board the vessels at sea, which was accomplished by transferring the observers onto the ship from a smaller vessel based in Pond Inlet.

Unmanned aerial vehicle (UAV) field tests were conducted in 2014 using DJI Phantom 2 rotary-wing UAVs. Environmental conditions such as cold temperatures, high winds and wind gusts limited the ability to fly the UAV ahead of the ship during at-sea transits, and battery life restricted the maximum flight time to 13 minutes. Autonomous flight control failed, possibly due to issues with the magnetic compass, and the onboard GPS data was not logged by the Groundstation flight controller. No marine mammal or seabird sightings were recorded during the flights.

RESULTS

Not applicable in 2016.

TRENDS

No marine mammal ship strikes or near misses occurred in the three years of the program.

RECOMMENDATIONS / LESSONS LEARNED

The ship-based surveillance monitoring program was discontinued after three years because neither observers nor UAV technology were demonstrated to be effective in detecting marine mammal, seabird or seaducks ahead of the ship, and there were safety issues for transfer of observers to the ship. Baffinland is continuing discussions with the MEWG to identify alternative programs to meet the intent of this condition.

Project Certificate Condition No. 108

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To ensure that interactions with marine mammals, seabirds, and seabirds are effectively monitored for along the southern and northern shipping routes, as applicable
Term or Condition	The Proponent shall ensure that data produced by the surveillance monitoring program is analysed rigorously by experienced analysts (in addition to being discussed as proposed in the FEIS) to maximize their effectiveness in providing baseline information, and for detecting potential effects of the project on marine mammals, seabirds and seabirds in the Regional Study Area. It is expected that data from the long-term monitoring program be treated with the same rigor.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable in 2016
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Ship-based surveillance monitoring was conducted in 2013, 2014 and 2015, but was discontinued in 2016. It was found that very few marine mammals were visible to observers on board the vessels, and there were safety concerns about having observers board the vessels at sea, which was accomplished by transferring the observers onto the ship from a smaller vessel based in Pond Inlet.

RESULTS

Not applicable.

TRENDS

No marine mammal ship strikes or near misses occurred in the three years of the program.

RECOMMENDATIONS / LESSONS LEARNED

The ship-based surveillance monitoring program was discontinued after three years because neither observers nor UAV technology were demonstrated to be effective in detecting marine mammal, seabird or seabirds ahead of the ship, and there were safety issues for transfer of observers to the ship. Baffinland is continuing discussions with the MEWG to identify alternative programs to meet the intent of this condition.

Project Certificate Condition No. 109

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine mammals from Project shipping activities.
Term or Condition	The Proponent shall conduct a monitoring program to confirm the predictions in the FEIS with respect to disturbance effects from ships noise on the distribution and occurrence of marine mammals. The survey shall be designed to address effects during the shipping seasons, and include locations in Hudson Strait and Foxe Basin, Milne Inlet, Eclipse Sound and Pond Inlet. The survey shall continue over a sufficiently lengthy period to determine the extent to which habituation occurs for narwhal, beluga, bowhead and walrus.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h) Integration Report: Marine Mammals in Eclipse Sound, Milne Inlet and Pond Inlet (Golder, 2016c)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Response of marine mammals to disturbance by ships noise has been studied in Milne Inlet in 2013 through 2016. In 2013, 2014, 2015, and 2016, the shore-based marine mammal observation study at Bruce Head recorded the behaviour of narwhals in relation to the position of commercial and other vessels, including relative abundance and distribution, direction of movement of the narwhals toward or away from the vessel, swimming speeds, and occurrence of a suite of behaviours in the presence and absence of vessels.

In 2015, a series of aerial photographic surveys was conducted by LGL on behalf of Baffinland, with the intent of comparing narwhal abundance and distribution before, during and after the passage of commercial vessels through Milne Inlet (LGL, 2016). Narwhal surveys were to be conducted in Milne Inlet and Tremblay Sound for comparison of 'before' and 'after' distributions.

Studies focused on Milne Inlet due to higher concentrations of marine mammals in this area during the shipping season, compared to Eclipse Sound and Pond Inlet. No studies were conducted in Hudson Strait or Foxe Basin, as this phase of the project is currently inactive.

RESULTS

In 2016, a Marine Mammal Integration Report was prepared to compile the existing information regarding the disturbance effects from ships noise on the distribution and occurrence of marine mammals.

Distribution, abundance and behaviour of narwhals in relation to vessels observed from Bruce Head suggest that the effect of shipping on narwhals may be localized and temporary. There was some displacement of narwhals, especially during northbound passages of vessels, but the total number of narwhals observed in the area did not change significantly in 2014, 2015 and 2016 despite increased shipping activity.

The 2015 photographic aerial survey experiment was unsuccessful due to logistical challenges of conducting surveys before and after ship passages of Milne Inlet. The effects of high natural variability in narwhal distribution and abundance also affected the ability to conduct this study.

TRENDS

No significant change in number of narwhals using Milne Inlet, but some changes in distribution during ship passages which appear at this time to be localized and temporary.

RECOMMENDATIONS / LESSONS LEARNED

The Bruce Head shore-based monitoring appears to be one of the best options available for behavioural observations of narwhals in close proximity to shipping. This monitoring approach will be continued with particular attention to data collection to investigate narwhal-shipping interactions. Note that Bruce Head observations cannot provide information on larger-scale movements of whales.

Additional monitoring programs are currently being discussed with the MEWG with the objective of updating the 2017 monitoring strategy and the SMWMP to incorporate improvements to existing programs and the addition of new programs that may be able to improve the understanding of narwhal response to vessel traffic.

Project Certificate Condition No. 110

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine mammals from Project shipping activities
Term or Condition	The Proponent shall immediately develop a monitoring protocol that includes, but is not limited to, acoustical monitoring, to facilitate assessment of the potential short term, long term, and cumulative effects of vessel noise on marine mammals and marine mammal populations. The Proponent is expected to work with the Marine Environment Working Group to determine appropriate early warning indicator(s) that will ensure rapid identification of negative impacts along the southern and northern shipping routes.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h) Integration Report: Marine Mammals in Eclipse Sound, Milne Inlet and Pond Inlet (Golder, 2016c)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Passive underwater acoustic monitoring was conducted by Greeneridge on behalf of Baffinland at sites adjacent to Bruce Head and the mouth of Koluktoo Bay during ice-free periods of 2014 and 2015 (Early Revenue Phase of the project). The two acoustic sites quantified vessel noise and detected the acoustic presence of marine mammal calls.

No early warning indicators of negative impacts of vessel noise have been developed.

RESULTS

Acoustic characteristics of southern Milne Inlet were monitored over 2 ice-free seasons. Effects on marine mammals and marine mammal populations were not assessed.

TRENDS

Similar noise levels were measured in the two years of the study.

RECOMMENDATIONS / LESSONS LEARNED

Additional information is required as to received levels of noise by marine mammals. No early warning indicators of negative impacts of vessel noise have been developed. Baffinland has engaged a marine consultant as well as holding discussions with the MEWG to determine the best approach to meet this condition.

Project Certificate Condition No. 111

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine mammals from Project shipping activities
Term or Condition	<p>The Proponent shall develop clear thresholds for determining if negative impacts as a result of vessel noise are occurring. Mitigation and adaptive management practices shall be developed to restrict negative impacts as a result of vessel noise. This shall include, but not be limited to:</p> <ul style="list-style-type: none"> a. Identifications of zones where cumulative noise could be mitigated due to biophysical features (e.g., water depth, distance from migration routes, distance from overwintering areas etc.) b. Vessel transit planning, for all seasons, to determine the degree to which cumulative sound impacts can be mitigated through the seasonal use of different zones
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	None
Ref. Document Link	None

METHODS

Not completed.

RESULTS

Not available.

TRENDS

Not available.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is exploring the possibility of conducting experiments with vessel speed and reactions of mammals. This study will assist in determining whether speed restrictions are an effective adaptive management tool for potential application in higher density narwhal areas.

In preparation for the Phase 2 Expansion Project, Baffinland has retained a consultant to conduct underwater noise modelling and undertake an assessment of Project-generated underwater noise on marine mammals in the study area with consideration of both incremental and cumulative noise effects. These study components will employ the most current acoustic thresholds for marine mammal injury and disturbance (NMFS, 2016), which incorporate marine mammal auditory weighting functions into the derivation of the acoustic thresholds. These acoustic thresholds, which apply dual metrics of cumulative sound exposure level (SELcum) and peak sound level (PK) for impulsive sounds (e.g. pile driving noise) and SELcum for non-impulsive sounds (such as shipping noise), reflect the current state of scientific knowledge regarding the characteristics of sound that have the potential to impact marine mammal hearing sensitivity.

Project Certificate Condition No. 112

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine mammals from Project shipping activities
Term or Condition	<p>Prior to commercial shipping of iron ore, the Proponent, in conjunction with the Marine Environment Working Group, shall develop a monitoring protocol that includes, but is not limited to, acoustical monitoring that provides an assessment of the negative effects (short and long term cumulative) of vessel noise on marine mammals. Monitoring protocols will need to carefully consider the early warning indicator(s) that will be best examined to ensure rapid identification of negative impacts. Thresholds shall be developed to determine if negative impacts as a result of vessel noise are occurring. Mitigation and adaptive management practices shall be developed to restrict negative impacts as a result of vessel noise. This shall include, but not be limited to:</p> <ol style="list-style-type: none"> Identification of zones where noise could be mitigated due to biophysical features (e.g., water depth, distance from migration routes, distance from overwintering areas etc.) Vessel transit planning, for all seasons A monitoring and mitigation plan is to be developed, and approved by Fisheries and Oceans Canada prior to the commencement of blasting in marine areas
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	None
Ref. Document Link	None

METHODS

Passive underwater acoustic monitoring was conducted by Greeneridge on behalf of Baffinland at sites adjacent to Bruce Head and the mouth of Koluktoo Bay during ice-free periods of 2014 and 2015 (Early Revenue Phase of the project). The two acoustic sites quantified vessel noise and detected the acoustic presence of marine mammal calls.

No early warning indicators of negative impacts of vessel noise have been developed.

RESULTS

Not available.

TRENDS

Not available.

RECOMMENDATIONS / LESSONS LEARNED

No blasting is planned near marine environments in 2017.

In preparation for the Phase 2 Expansion Project, Baffinland has retained a consultant to conduct underwater noise modelling and undertake an assessment of Project-generated underwater noise on marine mammals in the study area with consideration of both incremental and cumulative noise effects. These study components will employ the most current acoustic thresholds for marine mammal injury and disturbance (NMFS, 2016), which incorporate marine mammal auditory weighting functions into

the derivation of the acoustic thresholds. These acoustic thresholds, which apply dual metrics of cumulative sound exposure level (SELcum) and peak sound level (PK) for impulsive sounds (e.g. pile driving noise) and SELcum for non-impulsive sounds (such as shipping noise), reflect the current state of scientific knowledge regarding the characteristics of sound that have the potential to impact marine mammal hearing sensitivity.

Project Certificate Condition No. 113

Category	Marine Environment - Arctic Char
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	2016 Milne Ore Dock Fish Offset Monitoring (Sikumiut Environmental Management Ltd., 2017a) 2016 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Monitoring Milne Inlet Marine Ecosystem (Sikumiut Environmental Management Ltd., 2017b)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Arctic char has been monitored each year from 2013 to 2016 by gill netting and Fukui trapping in Milne Inlet. The sampling areas were developed based on traditional fishing areas (from IQ) and sites in proximity of the ore dock. Incidental mortalities are sampled for tissue (body burden analysis for metal and hydrocarbon concentrations using a sample from the dorsal musculature), gut contents (diet analysis) and age is determined (otoliths).

RESULTS

In 2016, 149 Arctic char were captured. Fork length ranged from 300 to 890 mm (mean 560 mm). Weights of 300-7,300 g were recorded (mean 2,445 g). Body burden analysis, gut content analysis, and age determination are ongoing.

TRENDS

No trends in abundance, population characteristics, or fish health changes have been detected to date.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue monitoring for Arctic Char stock size and health condition in Milne Inlet in 2017.

Project Certificate Condition No. 114

Category	Marine Environment - Arctic Char
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

No commercial fishery was developed in the vicinity of the two port areas in 2016.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 115

Category	Marine Environment - Arctic Char
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.
Term or Condition	The Proponent is encouraged to continue to explore off-setting options in both the freshwater and marine environment to offset the serious harm to fish which will result from the construction and infrastructure associated with the Project.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Department of Fisheries and Oceans Canada (DFO)
Reference	2016 Milne Ore Dock Fish Offset Monitoring (Sikumiut Environmental Management Ltd., 2017a)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland was issued a Fisheries Authorization from the DFO in 2014 to allow for construction of the current ore dock. A fish habitat off-setting plan was included with Baffinland's application for an authorization under the *Fisheries Act*. This includes fish habitat enhancement measures constructed around the ore dock.

RESULTS

The ore dock was constructed in 2014, and the offsetting plan was implemented. The 2016 Milne Ore Dock Fish Offset Monitoring Annual Report was submitted to the DFO in January 2017. The annual report demonstrates that the off-setting plan has been supporting biological activity at all trophic levels as expected.

TRENDS

The off-setting plan has been effective in supporting biological activity.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor the success of fish habitat off-setting measures and will provide the results of the annual monitoring program to DFO and other interested stakeholders.

Project Certificate Condition No. 116

Category	Marine Environment - Blasting
Responsible Parties	The Proponent, Fisheries and Oceans Canada
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives
Term or Condition	Prior to construction, the Proponent shall develop mitigation measures to minimize the effects of blasting on marine fish and fish habitat, marine water quality and wildlife that includes, but is not limited to compliance with the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) as modified by Fisheries and Oceans Canada for use in the North and as revised from time to time
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Blasting in the marine environment has not occurred on site to date. In the event it is required, Baffinland will provide operational control procedures in consultation with the MEWG that prescribe the requirements for the use of explosives in or near marine water bodies to ensure the activity is carried-out in accordance with Fisheries and Oceans Canada (DFO) guidance and best practice.

RESULTS

Blasting in the marine environment has not occurred on site to date.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 117

Category	Marine Environment - Blasting
Responsible Parties	The Proponent, Fisheries and Oceans Canada
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives
Term or Condition	The Proponent shall ensure that blasting in, and near, marine water shall only occur during periods of open water. Blasting in, and near, fish-bearing freshwaters shall, to the greatest degree possible, only occur in open water. If blasting is required during ice-covered periods, it must meet requirements established by Fisheries and Oceans Canada.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2016m) Operations Blasting Procedure (Nuna Contracting Ltd., 2013)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Blasting in the marine environment has not occurred on site to date. In the event it is required, Baffinland will provide operational control procedures in consultation with the MEWG that prescribe the requirements for the use of explosives in or near marine water bodies to ensure the activity is carried-out in accordance with Fisheries and Oceans Canada (DFO) guidance and best practice, including requirement that blasting in, and near, marine water shall only occur during periods of open water.

For freshwaters, Baffinland's SWAEMP and Operations Blasting Procedure have been developed to include the requirements for the use of explosives (blasting) in or near freshwater bodies. The requirements were developed in accordance with Fisheries and Oceans Canada (DFO) guidance, including the *Guidelines for Use of Explosives In or Near Canadian Fisheries Water, 1998* (Wright and Hopky, 1998), in order to mitigate possible effects on fish habitat and fish health.

RESULTS

Blasting in the marine environment has not occurred on site to date.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 118

Category	Marine Environment - Blasting
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives
Term or Condition	The Proponent shall incorporate into the appropriate mitigation plan prior to construction, thresholds for the use of specific mitigation measures meant to prevent or limit marine wildlife disturbance, such as bubble curtains for blasting, and nitrate removal
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	None
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

A detailed mitigation plan was developed for dredging and vibratory pile driving that was undertaken during construction of the ore dock (Ruskin Construction, 2014). Monitoring was undertaken during dock construction to confirm the effectiveness of the mitigation measures (ERM, 2015).

RESULTS

Ore dock construction activities were fully compliant with marine environment monitoring thresholds for disturbance from noise and turbidity, according to the data collected in the environmental monitoring program. Turbidity measurements near the Works were similar to baseline and reference conditions, and were less than the long-term CCME guideline threshold. Noise verification surveys demonstrated that noise levels outside of the exclusion zone were below harmful thresholds for marine mammals for both fill placement and sheet pile installation activities. The marine mammal surveys verified that marine mammals were generally not in the exclusion zone, and confirmed the exit of animals prior to the start of construction activities.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The methodology and execution of ore dock construction including the implementation of mitigation measures was successful in meeting environmental monitoring thresholds.

Project Certificate Condition No. 119

Category	Marine Environment - Ringed Seals
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To prevent impacts to ringed seals from icebreaking associated with Project shipping
Term or Condition	The Proponent shall, in conjunction with the Marine Environment Working Group, monitor ringed seal birth lair abundance and distribution for at least two years prior to the start of icebreaking to develop a baseline, with continued monitoring over the life of the project as necessary to test the accuracy of the impact predictions and determine if mitigation is needed. Monitoring shall also include a control site outside of the Project's zone of influence.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable in 2016
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Not applicable. Ice breaking has not been required in the Early Revenue Phase of the project.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

A monitoring study of ringed seal lairs in Eclipse Sound is being considered for winter 2017-2018 to support the potential for winter sealifts associated with the Phase 2 Expansion Project.

Project Certificate Condition No. 120

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals associated with Project shipping.
Term or Condition	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: <ol style="list-style-type: none"> Wildlife will be given right of way Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior 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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h) Shore-based Monitoring of Narwhals and Vessels at Bruce Head, Milne Inlet, 2016 (LGL, 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Given the difficulty in observing marine mammals from ore vessels and the distance required to stop an ore vessel, the primary mitigation procedure has been to maintain a straight course and constant speed through Milne Inlet and Eclipse Sound. Ship tracks and ship speed records are collected from ship board GPS locators and reported in the 2016 Shore Based Marine Mammal Study. The SMWMP provides guidance on ship speeds and ship tracks that should be followed. The requirements are provided to ore vessel contractors prior to entry to Eclipse Sound.

RESULTS

Ore vessels travelled at a maximum speed of 8.9 knots which is within the required 7-10 knots. However, cargo vessel speeds were measured in the 12-13 knot range.

TRENDS

None.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to record and monitor ship tracks and ship speeds to ensure compliance with the SMWMP. In 2017, freight vessels will be provided with instruction to approach Milne Inlet with speeds limited to 7-10 knots similar to the requirements for ore vessels.

Project Certificate Condition No. 121

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent, Fisheries and Oceans Canada, Environment Canada
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping
Term or Condition	<p>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:</p> <ol style="list-style-type: none"> Date, time and location of the incident; Species of marine mammal or seabird involved; Circumstances of the incident; Weather and sea conditions at the time; Observed state of the marine mammal or sea bird colony after the incident; and, Direction of travel of the marine mammal after the incident, to the extent that it can be determined.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In Progress
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Memo to the Marine Environment Working Group (Baffinland, 2016) MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

In 2013 with the transport of fuel and supplies, a Ship-based Observer Program was initiated to monitor interactions of marine mammals and seabird colonies with Project shipping activities. As part of the surveying efforts, accidental contact by Project vessels with marine wildlife was also recorded. The program was conducted through 2014 and 2015 but was halted in 2016 due to safety concerns.

RESULTS

There were no observations of accidental contact between project vessels and marine mammals or seabird colonies during the three years that the ship board observer program was run. No notifications of accidental contact were reported by Baffinland in 2016 from vessel operators, observers at the Bruce Head Shore Based Observer station or local hunters.

TRENDS

In 2013 through 2015, no notifications of accidental contact were reported.

RECOMMENDATIONS / LESSONS LEARNED

The safety concerns related to the Ship-based Observer Program have been raised in the Marine MEWG meetings. Baffinland is looking to identify an alternative program that incorporates an accidental strikes reporting protocol and may engage with NIRB to discuss changing this condition.

Project Certificate Condition No. 122

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.
Term or Condition	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.
Reporting Requirement	To be provided in the Annual Report to the NIRB
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland's SMWMP mandates the recording of any contact that occurs between project vessels and marine mammals or seabird colonies.

RESULTS

No contacts reported.

TRENDS

No contacts have been reported in any year.

RECOMMENDATIONS / LESSONS LEARNED

No specific recommendations.

Project Certificate Condition No. 123

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable in 2016 (discontinued)
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Ship-based surveillance monitoring was conducted in 2013, 2014 and 2015, but was discontinued in 2016. It was found that very few marine mammals were visible to observers on board the vessels, and there were safety concerns about having observers board the vessels at sea, which was accomplished by transferring the observers onto the ship from a smaller vessel based in Pond Inlet.

RESULTS

Not applicable in 2016.

TRENDS

No marine mammal ship strikes or near misses occurred in the three years of the program.

RECOMMENDATIONS / LESSONS LEARNED

The ship-based surveillance monitoring program was discontinued after three years because neither observers nor UAV technology were demonstrated to be effective in detecting marine mammal, seabird or seaducks ahead of the ship, and there were safety issues for transfer of observers to the ship. Baffinland is continuing discussions with the Marine Environment Working Group to identify alternative programs to meet the intent of this condition.

Project Certificate Condition No. 124

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and marine fish populations from increased harvesting pressures in Project areas
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Department of Fisheries and Oceans (DFO), Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association (QIA)
Reference	Hunting and Harvesting Policy (Baffinland, 2013c) Environmental Protection Plan (Baffinland, 2016n)
Ref. Document Link	Appendix F1 (EPP only) http://www.baffinland.com/shareddocuments/

METHODS

Site orientation includes cultural awareness and goes over the policies outlined in the Hunting and Fishing (Harvesting) Policy. The policy states no employee or contractor will be permitted to hunt or fish (harvest) on lands leased to Baffinland. Baffinland does not interfere with rights of public hunting or fishing near or on the Project Development Area. All visitors and visitor activities are tracked through a human use log, provided in the Baffinland Terrestrial Annual Monitoring Report.

Upon approval from the Department of Fisheries and Oceans Canada (DFO), fishing activities and fish population health surveys do occur annually for the collection of environmental data and fish population health metrics by trained contracted professionals. Required Scientific permits are applied for and received before sampling or fish population health programs occur. Results are published under various annual reports.

RESULTS

No incidences of project personnel hunting or fishing within lands leased to Baffinland occurred in 2016.

Three consulting groups; Sikumiut Environmental Management Limited, Minnow Environmental Inc. and North/South Consultants Inc. completed various fish surveys over the course of 2016 to collect environmental data and fish population health metrics. The purpose was to gather information on distribution, relative abundance, size distribution and other biological characteristics to evaluate potential mine related affects as required under Fishery Authorisations and applicable management plans.

TRENDS

Over past years no project personnel have participated in hunting or fishing on the Project Development Area unless approved by scientific permit and have not interfered with public rights to fish or hunt in or near the Project Development Area.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to monitor and implement the policy banning all employees and contractors from hunting and fishing within the Project Development Area.

Project Certificate Condition No. 125

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assess acceptability of acoustic deterrent devices for the general public.
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

No acoustic deterrents have been considered for use on the Project to date.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 125(a)

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure public acceptability of project vessel anchor sites and reduce potential conflicts between project marine shipping and local harvesting
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group
Reference	Section 3.3 of the Shipping and Marine Wildlife Management Plan
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

The Qikiqtani Inuit Association (QIA) and the Mittimatalik Hunters and Trappers Organization (HTO) were consulted during emergency response planning for the northern shipping route, which included the establishment of anchor sites and potential temporary refuge areas. If required, anchor sites are discussed in Marine Environment Working Group (MEWG) meetings of which the QIA and MHTO are members.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

No concerns related to the selected anchor sites have been raised during public engagement or through the MEWG.

Project Certificate Condition No. 126

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To incorporate local input into monitoring data collection
Term or Condition	The Proponent shall design monitoring programs to ensure that local users of the marine area in communities along the shipping route have opportunity to be engaged throughout the life of the Project in assisting with monitoring and evaluating potential project-induced impacts and changes in marine mammal distributions
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes Shore-based Monitoring of Narwhals and Vessels at Bruce Head, Milne Inlet, 2016 (LGL, 2017)
Ref. Document Link	Appendix C2 http://www.baffinland.com/shareddocuments/

METHODS

The Mittimatalik Hunters and Trappers Organization (MHTO) sits on the MEWG with two members of the MHTO participating in the November 2016 MEWG meeting.

During meetings held in the communities of Arctic Bay, Clyde River, Hall Beach, Igloodik and Pond Inlet, in November 2016, outcomes of the marine mammal monitoring program were presented.

Baffinland incorporates community-based monitoring strategies into a number of environmental monitoring programs including the Shore-Based Marine Mammal Monitoring Study located at Baffinland's Bruce Head observation station since 2013. The study aims to determine if narwhal behaviour and/or their distribution changes in Koluktoo Bay and Milne Inlet in response to Iron Ore vessel transits.

Baffinland involves and trains residents from Pond Inlet to act as observers and who provide invaluable Inuit Qaujimagatuqangit (Inuit Traditional Knowledge) to the program. The results of the annual program are provided to the MEWG, whose mandate is to act as an advisory board to make recommendations on appropriate management approaches related to the project.

RESULTS

The Bruce Head observation program has been a successful example of community based environmental monitoring providing tangible results that contribute to Baffinland's overall marine environment monitoring efforts. The MHTO has provided invaluable advice regarding marine mammal behaviour through the MEWG.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The Bruce Head observation program has been very successful. Baffinland will continue the program in 2017. The results of marine monitoring programs will be communicated to Pond Inlet via the MHTO and to the North Baffin communities during public meetings.

Based on the success of the Bruce Head program, Baffinland is evaluating other community-based monitoring programs that can be developed for marine mammal programs.

Project Certificate Condition No. 127

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote public awareness and engagement with Project shipping activities
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mittimatalik Hunters and Trappers Organization, Marine Environment Working Group
Reference	None
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

To ensure that the public is made aware of shipping related activities, Baffinland has enlisted exactAIS[®], a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The information is readily available on the Baffinland website.

Information on ships such as: last reported coordinates of the vessel, whether the vessel is moving, the direction of vessel movement and destination of the vessel are provided.

The vessel locations plotted on the map are not “real-time”, but are a regularly updated snap shot of vessel movement in the North Baffin region. Baffinland encourages all land and water users to continue to practice safe boating, hunting, and other travel activities, and be aware of your surroundings at all times.

Further, Makivik is a member of the Marine Environment Working Group where any proposed changes to shipping activities would be discussed.

RESULTS

Baffinland has made vessel routing accessible to the public.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactAIS[®] to be beneficial in providing information related to ship routing to the public. Baffinland will continue it’s use of this service. Information on project shipping activities will be continue to be shared with the Marine Environment Working Group.

Project Certificate Condition No. 128

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure habitat compensation is acceptable to local communities
Term or Condition	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)
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Department of Fisheries and Oceans Canada, Pisiksik Working Group and the Mittimatalik HTO
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland and the Department of Fisheries and Oceans Canada (DFO) consulted the community of Pond Inlet in 2013 and 2014 regarding the development of off-setting measures for the ore dock. This included discussions during the final hearing for the Early Revenue Phase, as well as meetings with both the Pisiksik Working Group and the Mittimatalik HTO on May 13-14, 2014. DFO attended these meetings and described the Fisheries Act requirements for the protection of fish habitat, and Baffinland described its proposed habitat offset plan.

RESULTS

The consultation activities described above did not identify any objections to the undertaking or the habitat offset measures implemented during construction of the ore dock.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

None.

4.6 PERFORMANCE ON SOCIO-ECONOMIC CONDITIONS

4.6.1 Population Demographics (PC Conditions 129 through 134)

Six (6) PC conditions are listed under the heading of Population Demographics in the Project Certificate. Three of these describe the NIRB’s expectations with respect to working with the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and establishing a smaller working group to meet Project-specific monitoring requirements. Three PC conditions relate to mitigating the potential for demographic changes or monitoring and reporting of demographic change within the communities due to Project employment.

Stakeholder Feedback

Key stakeholders focused on the socio-economic environment include the communities, the QIA, various departments of the GN, and INAC. These agencies are active members of the Mary River Socio-economic Monitoring Working Group (MRSMWG). The PC conditions focused on mitigation, monitoring and reporting of potential demographic changes due to employment opportunities from the Project, which reflect a key concern expressed by several of these stakeholders: whether or not employment opportunities presented by the Project will induce in- or out-migration from North Baffin direct-hire communities.

Monitoring

Baffinland conducts monitoring of population demographics by reviewing government population statistics, tracking employee origin information, and tracking worker changes in address. Table 4.20 provides an evaluation of the Project’s impacts on population demographics, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.20 Population Demographics Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Mine Employment	In-migration of a small number of workers from the south or other Nunavut communities will have an effect on the demographic make-up of communities	Baffinland’s 2016 Socio-economic Monitoring Report, which includes a review of population statistics, BCLO tracking of worker changes in address, and results from the Employee Information Survey. Population numbers continue to increase within the LSA and across the territory. The percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant. Based on annual information received from BCLOs, a net of zero known non-Inuit employees/contractors have in-migrated to the North Baffin LSA, and a net of three known Inuit employees/contractors have out-migrated from the North Baffin LSA since 2015. Results from the most recent Employee Information Survey (43 surveys received) indicated 3 respondents had moved to a different community in the past 12 months, 2 of whom moved from a North Baffin LSA community to outside the North Baffin LSA. In 2016, no meaningful in- or out-migration related to employment at Mary River was observed.	Effect did not occur
	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 North Baffin		

Effects to population demographics as a result of Project employment have not occurred.

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the MRSMWG and QSEMC. Reporting on each PC condition follows.

Project Certificate Condition No. 129

Category	Population Demographics - Qikiqtaaluk Socio-Economic Monitoring Committee
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Description of the general monitoring framework to be developed in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee
Term or Condition	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 endeavour 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
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
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METHODS

Baffinland continues to engage with the QSEMC, and participates in the SEMWG, a sub-set of the QSEMC whose members include Baffinland, the Government of Nunavut, the Government of Canada, and the QIA. A Terms of Reference for the Mary River SEMWG (which identifies socio-economic monitoring priorities and objectives for the Project) has been finalized and provided in the 2015 Annual Report to NIRB (Baffinland, 2016w). Baffinland incorporated feedback from Mary River SEMWG members in 2016 to finalize the Project's socio-economic monitoring plan. The 2016 Socio-Economic Monitoring Report presents this plan and assesses the socio-economic performance of the Project in 2016.

RESULTS

Socio-economic performance of the Project in 2016 was assessed using socio-economic indicators for a number of Valued Socio-Economic Components (VSECs) included in the Final Environmental Impact Statement (FEIS; Baffinland, 2012). The information presented in the 2016 Socio-Economic Monitoring Report supports many of the FEIS predictions for these VSECs and identifies a number of positive effects the Project has had. The report also highlights areas where Project activities didn't fully match FEIS predictions in 2016 (e.g. LSA employment hours) and describes steps being taken by Baffinland to address these areas. Various Project Certificate conditions pertaining to socio-economic monitoring are also reported on throughout the report.

TRENDS

Where appropriate, trends have been described for the indicators assessed in the 2016 Socio-Economic Monitoring Report. These trends (i.e. pre development, post development, and since the previous year) demonstrate whether an indicator has exhibited change and describes the direction of that change. Trend analyses are useful for assessing potential Project influences on an indicator. In some cases, additional data and monitoring will be necessary before the FEIS predictions presented in the

report can be fully verified. In others, correlations between the Project and data trends were either unable to be identified or were unclear. The process of socio-economic monitoring often requires many years of data in order to effectively discern trends and causality. Even then, various factors may be found to influence causality and some of these may not be easy to measure. Successful socio-economic monitoring for the Project will require appropriate long-term data, the regular input of all Project stakeholders, and a focus on continual improvement.

RECOMMENDATIONS / LESSONS LEARNED

With the finalization of the Project's socio-economic monitoring plan and Baffinland's ongoing engagement with the QSEMC and Mary River SEMWG, Baffinland is in compliance with this Project Certificate condition. The information contained in the 2016 Socio-Economic Monitoring Report suggests the mitigation and management measures established by Baffinland are functioning largely as anticipated. However, LSA employment and Inuit employee turnover are areas Baffinland will continue to address in 2017. Implementation of a new Inuit Human Resources Strategy (IHRS) and Inuit Procurement Strategy (IPS), and establishment of a Minimum Inuit Employment Goal (MIEG) with the QIA for 2017 should assist with increasing LSA employment. Continued monitoring of LSA employment hours, causes of employee turnover, and the initiatives described in the IHRS and IPS will be necessary to ensure successful socio-economic outcomes. Opportunities for potential performance improvements in these areas will also be assessed throughout 2017.

While additional monitoring will be required to confirm the findings presented in this report over the long-term, no need has been identified in 2017 to update any of the FEIS predictions or to significantly modify Baffinland's existing management approach. However, Baffinland will continue to use adaptive management as a tool for improving the Project's overall socio-economic performance in the future.

Project Certificate Condition No. 130

Category	Population Demographics - Project-specific monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Recognizing that some Project-specific socio-economic monitoring initiatives may be best addressed in smaller more focused working groups, this is encouraged where possible
Term or Condition	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
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
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Baffinland continues to work with the QSEMC and the SEMWG on socio-economic monitoring initiatives. In addition, Baffinland regularly engages the Pond Inlet-based Mary River Community Group and other committees which operate under provisions of the IIBA, on various socio-economic topics.

RESULTS

Baffinland continues to engage with the QSEMC and participates in the Mary River SEMWG, a sub-set of the QSEMC whose members include Baffinland, the Government of Nunavut, the Government of Canada, and the QIA. A Terms of Reference for the SEMWG (which identifies socio-economic monitoring priorities and objectives for the Project) has been finalized. Baffinland incorporated feedback from SEMWG members in 2016 to finalize the Project's socio-economic monitoring plan. Baffinland's meetings with the SEMWG and QSEMC in 2016 included:

- July 19, 2016 - In-person meeting held with members of the SEMWG (i.e. Baffinland, QIA, INAC, and GN) in Iqaluit. The focus of the meeting was to review Baffinland's 2015 Socio-Economic Monitoring Report, and to discuss the proposed scope of its 2016 report.
- July 20-21, 2016 - In person meeting held with members of the QSEMC in Iqaluit. The focus of the meeting was to review and discuss regional socio-economic monitoring initiatives and findings. Baffinland also provided a review of its 2015 Socio-Economic Monitoring Report, and discussed the proposed scope of its 2016 report.

TRENDS

Baffinland continues to engage with the QSEMC and participates in the Mary River SEMWG.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to engage with the QSEMC and participate in the Mary River SEMWG in the future and will consider establishing smaller, focussed socio-economic working groups to address specific community issues or project challenges.

Project Certificate Condition No. 131

Category	Population Demographics - Monitoring demographic changes
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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.
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
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Baffinland has provided demographic change information in the 2016 Socio-Economic Monitoring Report. This includes data on population estimates, known in-migrations of non-Inuit Project employees and contractors, known out-migrations of Inuit Project employees and contractors, percentage of Inuit vs. non-Inuit residents in the North Baffin local study area (LSA), and Nunavut annual net migration. Baffinland also implemented a revised voluntary Employee Information Survey in 2017, which collected information related to employee changes of address, housing status, and migration intentions.

RESULTS

See 'Trends' below for summarized results. Detailed results are presented in the 2016 Socio-Economic Monitoring Report.

TRENDS

Table 4.21 2016 Monitoring of Key Indicators of Demographic Change

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Known in-migrations of non-Inuit Project employees and contractors	n/a	No change	No change	N. Baffin LSA	Since 2015, a net of zero known non-Inuit employees/contractors have in-migrated to the North Baffin LSA
In-migration of non-Inuit to the North Baffin LSA	n/a	n/a	n/a	N. Baffin LSA	Limited data are available. However, the percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant.
Known out-migrations of Inuit Project employees and contractors	n/a	↑	↑	N. Baffin LSA	Since 2015, a net of three known Inuit employees/contractors have out-migrated from the North Baffin LSA
Out-migration of Inuit from the North Baffin LSA	n/a	n/a	n/a	N. Baffin LSA	Limited data are available. However, the percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant.
Population estimates	↑ ↑	↑ ↑	↑ ↑	N. Baffin LSA Iqaluit	Population numbers continue to increase across the territory
Nunavut annual net migration	↓	↓	↓	Territory	A downward trend in Nunavut annual net migration is occurring
Employee changes of address, housing status, and migration intentions	n/a	n/a	n/a	Project	Baffinland Employee Information Survey results are presented in the 2016 Socio-Economic Monitoring Report (see also PC condition Nos. 133 and 140)

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide demographic change information through its socio-economic monitoring program. However, only limited government data are currently available for the indicators 'in-migration of non-Inuit to the North Baffin LSA' and 'out-migration of Inuit from the North Baffin LSA'. Baffinland will continue to discuss with the Mary River SEMWG how improved indicator data may be obtained for these.

Project Certificate Condition No. 132

Category	Population Demographics - Training programs
Responsible Parties	The Proponent, North Baffin Hamlets, Municipal Training Organization, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Prior to initiating construction in 2013, Baffinland deployed a Work Ready Program in the five North Baffin communities that informed participants about work expectations and camp life, and included training in household budgeting and other useful skills. Between 2014 and 2016, the Work Ready Program was delivered to new hires only. In 2015, Baffinland offered a Light Vehicle Training Program to 25 North Baffin Inuit (approximately 5 per community); participants received certification for a Class 5 driver's licence. In 2016, Baffinland once again contracted the Ilisaqsivik Society (the group that developed and delivered the initial program) to update the Work Ready Program.

RESULTS

The training programs delivered within the communities had high levels of participation. The work ready program was very well received when initially deployed in the communities.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The Work Ready Program was a successful endeavour and Baffinland intends to deliver the program again within the five North Baffin communities and Iqaluit in 2017.

Project Certificate Condition No. 133

Category	Population Demographics - Monitoring demographic changes
Responsible Parties	The Proponent, members of QSEMC, Government of Nunavut, Nunavut Housing Corporation
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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 Baffin communities to the larger centre of Iqaluit
Term or Condition	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 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.
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Members of the Mary River Socio-Economic Monitoring Working Group (SEMWG) were provided with an opportunity to comment on a draft version of the revised survey in early 2017
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

In early 2017, Baffinland implemented a revised voluntary Employee Information Survey, which collected information related to employee changes of address, housing status, and migration intentions (amongst other topics). This survey was offered to all Inuit employees residing in Nunavut, Inuit employees residing outside of Nunavut, and non-Inuit employees residing in Nunavut. It was not offered to contractors. Moving forward, this survey will be offered on an annual basis. A teleconference with members of the Mary River SEMWG (including GN, QIA, and INAC representatives) was held on February 2, 2017 to discuss a draft version of the revised survey and solicit feedback. Baffinland integrated feedback provided by SEMWG members before finalizing the survey.

RESULTS

A total of 43 surveys were completed. Table 4.22 summarizes results pertaining to changes in employee housing situation and/or address. Of the 43 surveys received, 9 individuals (20.9%) indicated their housing situation had changed in the past 12 months. Of these 9 individuals, 7 (16.3% of the total) indicated they had recently moved (either to different housing or a different community). 3 individuals (7.0%) indicated they had moved to a different community in the past 12 months, 2 of whom (4.7%) moved from a North Baffin LSA community to outside of the North Baffin LSA. No individuals moved from outside the North Baffin LSA to a North Baffin LSA community. Of the 9 individuals who indicated their housing situation had changed

in the past 12 months, 2 indicated 'rent increase' when explaining the nature of this change although it's unclear what exactly they were referring to. 1 individual did not provide an explanation for how their housing situation had changed.

Table 4.22 Changes in Employee Housing Situation and/or Address (2017 employee information survey results)

Changes in Employee Housing Situation and/or Address (2017 Employee Information Survey Results)	
Type of Change	Number of Individuals (43 Surveys Received)
Housing situation has changed in the past 12 months	9
Moved to a different community in the past 12 months	3
Moved from North Baffin LSA to outside of North Baffin LSA	2
Moved from outside of North Baffin LSA to North Baffin LSA	0

NOTES:

1. Source: 2017 Employee Survey.

Table 4.23 summarizes results pertaining to employee housing status. Of the 43 surveys received, 1 individual (2.3%) indicated they lived in a private dwelling owned by them, 4 individuals (9.3%) indicated they lived in a private dwelling owned by another individual, 6 individuals (14.0%) indicated they were renting from a private company, 29 individuals (67.4%) indicated they were living in public housing, and results were unclear/unknown for 3 individuals (7.0%).

Table 4.23 Current Employee Housing Status (2017 employee information survey results)

Current Employee Housing Status (2017 Employee Information Survey Results)	
Current Housing Status	Number of Individuals (43 Surveys Received)
Privately owned - Owned by you	1
Privately owned - Owned by another individual	4
Renting from a private company	6
Public housing	29
Government of Nunavut staff housing	0
Other staff housing	0
Other/unknown	3

NOTES:

1. Source: 2017 Employee Survey.

Table 4.24 summarizes results pertaining to employee migration intentions. Of the 43 surveys received, 7 individuals (16.3%) indicated they intended to move to a different community in the next 12 months. 3 of these individuals (7.0% of the total) were intending to move from a North Baffin LSA community to outside of the North Baffin LSA. No individuals indicated they intended to move from outside the North Baffin LSA to a North Baffin LSA community, and 1 individual indicated they were still determining where they would move to.

Table 4.24 Employee Migration Intentions

Employee Migration Intentions (2017 Employee Information Survey Results)	
Migration Intentions	Number of Individuals (43 Surveys Received)
Intend to move to a different community in the next 12 months	7
Intend to move from North Baffin LSA to outside of North Baffin LSA	3
Intend to move from outside of North Baffin LSA to North Baffin LSA	0

NOTES:

- Source: 2017 Employee Survey.

TRENDS

2017 was the first year this revised survey was administered; as such, no long-term trends are yet apparent. However, Baffinland will continue to administer this survey on an annual basis and report on any observed future trends.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to administer this survey on an annual basis. Baffinland and the QIA are also currently investigating the possibility of developing a more comprehensive, jointly-administered employee survey for future years. This survey would continue address the requirements of this Project Certificate condition, in addition to a number of other topics.

Project Certificate Condition No. 134

Category	Population Demographics - Employee origin
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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.
Term or Condition	<p>The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows:</p> <ol style="list-style-type: none"> The number of Inuit and non-Inuit employees hired from each of the North Baffin communities, specifying the number from each The number of Inuit and non-Inuit employees hired from each of the Kitikmeot and Kivalliq regions, specifying the number from each 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 The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Data on the origin, number, and ethnicity of Project employees and contractors in 2016 are presented in the 2016 Socio-Economic Monitoring Report. This information was obtained from internal Baffinland Human Resources records.

RESULTS

An average of 1,180 individuals worked at the Project in 2016, of which 182 were Inuit. In 2016, the majority of the Project's Inuit employees and contractors were based in the North Baffin LSA communities. The vast majority of the Project's non-Inuit employees and contractors were based in Canadian locations outside of Nunavut, with Ontario having the greatest number. However, some non-Inuit employees and contractors were based in the North Baffin LSA communities and Iqaluit, and a small number of Inuit employees and contractors resided outside of Nunavut. There were a small number of non-Inuit international contractors, and various employees and contractors whose origin was unknown. Within the North Baffin LSA, Hall Beach had the greatest average number of employees and contractors (37), while Igloolik had the fewest (26). A number of employees and contractors also resided in Iqaluit (52).

TRENDS

Similar to previous years, the majority of the Project's Inuit employees and contractors were based in the North Baffin LSA communities. This is a likely reflection of the Inuit hiring commitments Baffinland has made in those locations and the access to the mine work locations provided by weekly flights from the 5 North Baffin communities and Iqaluit directly to the site. The vast majority of the Project's non-Inuit employees and contractors were based in Canadian locations outside of Nunavut. A mine as large and complex as Mary River requires a large number of employees with various skill sets. Individuals with advanced mining and/or more technical skill sets are in limited supply in Nunavut. The large number of Baffinland employees and contractors from outside of Nunavut would at least partly reflect this skills gap.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information regarding employee origin in future socio-economic monitoring reports.

4.6.2 Education and Training (PC Conditions 135 through 141)

The Project will deliver training programs and may induce community members to achieve higher levels of education. With effective implementation, these benefits may be significant.

Seven (7) PC conditions relate to education and training, mostly encouraging Baffinland to maximize education and training benefits to Nunavummiut in the local communities. This includes the development of recognizable and transferable skills that can be used outside of the mining industry. The NIRB required Baffinland to conduct a labour market analysis, which was updated for the Early Revenue Phase. The NIRB is also interested to understand if new employees are abandoning the pursuit of education to work on the Project, which if it occurs would be a negative effect of the Project on education and training.

Stakeholder Feedback

As noted in Section 3.5.1, the key stakeholders focused on the socio-economic environment include the communities, the QIA, various departments of the GN, and INAC. There is an obvious interaction between the Project and the Government of Nunavut, which is responsible for delivering most education and training programs in Nunavut. Commitments to education and training are contained in the IIBA that Baffinland has with the QIA. The SEMWG and QSEMC also regularly discusses this element of the Project. Aside from employment (discussed in Section 3.5.3), Baffinland's stakeholders have viewed education and training opportunities as a key opportunity of the Project. The focus is on maximizing this benefit for local communities.

Monitoring

Baffinland tracks and reports on the amount of training delivered each year (including the amount of training delivered to Inuit workers), government educational attainment statistics, and results from an Employee Information Survey. Table 4.25 provides an evaluation of the Project's impacts on education and training, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.25 Education and Training Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Life Skills	Training of workers and contractors, resulting in improved life skills amongst LSA residents. Training in 2016 included general site orientation; ore haul truck training; heavy and mobile support equipment operation; first aid/CPR; WHMIS; TDG; hoisting and rigging; job-specific and task-specific training; and other forms of training. The elder-in-residence counsels Inuit workers as requested.	All Inuit training hours for Baffinland staff are tracked and reported quarterly and annually to the QIA. Baffinland reports on its training programs annually in its socio-economic monitoring report	Positive effects consistent with FEIS predictions
Education and Skills	Training programs as described above; incentives related to school attendance and success (i.e., laptop program, scholarships); opportunities to gain skills on the job	In 2016, a total of 27,966 hours of training were completed at the Project site, of which 2,434 hours (or 8.7%) were provided to Inuit. There has been a total of 79,553 hours of training provided since Project development, of which 11,843 hours (or 14.9%) were provided to Inuit	Positive effects consistent with FEIS predictions

Positive effects with respect to life skills and to education and work skills have accrued as a result of Project employment.

Path Forward

Baffinland will continue to implement and refine its training programs, in consultation with the SEMWG, QSEMC, and the Project's workforce. Reporting on each PC condition follows.

Project Certificate Condition No. 135

Category	Education and Training - Employee work/study programs
Responsible Parties	The Proponent, Qikiqtani Inuit Association
Project Phase(s)	Construction and Operations
Objective	Recognizing the 12-hour work days inherent with work at the Project site, it is not clear how employees would successfully engage in a work/study program offered by the Proponent
Term or Condition	The Proponent is encouraged to consider offering additional options for work/study programs available to Project employees (in addition to study programs at project sites that would be offered to employees when off shift)
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Employee education is a key focus of Baffinland's training initiatives. In late 2016, Baffinland hired an IIBA Education and Training Specialist with the mandate to assess current training programs and to develop new educational and training initiatives. Since his appointment, the IIBA Education and Training Specialist has been engaged in outreach to other mining companies, local and territorial governments and educational institutions to compile an inventory of training and educational resources. The Specialist is also working with QIA and with the communities to determine skills levels, training needs and interests. A variety of training and educational initiatives, such as a revamped Work Readiness Program, upgraded onboarding and orientation training and apprenticeship programs are currently under development and scheduled for implementation over 2017.

Currently, employee training begins at arrival on site. Orientation training includes initial formal introduction to the Project, the Project site, general site health and safety procedures, cultural considerations, environmental management systems and archeological areas. An online orientation training program has also been developed.

Baffinland has identified a short term development project for the Baffinland Community Liaison Officers; providing them with training on presentations and public speaking to prepare them to take on a more active role in the communities during Company tours. Planning for the training commenced in late 2016 with a target for delivery of Q2 2017.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Plans were made in early 2016 to have adult educators on site to institute a GED program as well as develop programs on site to officially license operators. Progress on these initiatives was limited due to employee turnover at the executive level and a lack of resources. However, these programs have been identified as a priority for 2017 and are under consideration.

Baffinland is in the process of identifying apprenticeship programs suitable for Baffinland's operations. To date, Baffinland has identified apprenticeship opportunities for those who are a registered apprentice in the following trades:

- Electrical
- Millwright
- Welding
- Heavy duty mechanics

Project Certificate Condition No. 136

Category	Education and Training - Transferable skills and training
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Government of Nunavut, Municipal Training Organization
Project Phase(s)	Construction and Operations
Objective	Offering training which results in certifications that are valid for employment at more than one site or in different fields provides an investment in the long-term employability of Nunavummiut.
Term or Condition	The Proponent is encouraged to work with training organizations and/or government departments offering mine-related or other training in order to provide additional opportunities for employees to gain meaningful and transferable skills, credentials and certifications especially where such training of employees offered by the Proponent remains valid only at the Mary River Project sites
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

In late 2016, Baffinland hired an IIBA Training and Education Specialist with the mandate to assess current training programs and to develop new educational and training initiatives. Since his appointment, the IIBA Education and Training Specialist has been engaged in outreach to other mining companies, local and territorial governments and educational institutions to compile an inventory of training and educational resources. The Specialist is also working with QIA and with the communities to determine skills levels, training needs and interests.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

A variety of training and educational initiatives, such as a revamped Work Readiness Program, upgraded onboarding and orientation training and apprenticeship programs are currently under development and scheduled for implementation over 2017.

Baffinland will continue to develop and implement new initiatives that will support education and capacity-building for the North Baffin region. This will ensure that Inuit beneficiaries particularly from the North Baffin and across Nunavut continue to develop new skillsets for advancement.

Project Certificate Condition No. 137

Category	Education and Training - Transferable skills and training
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	Offering training which results in certifications that are valid for employment at more than one site or in different fields provides an investment in the long-term employability of Nunavummiut
Term or Condition	Prior to construction, the Proponent shall develop an easily referenced listing of formal certificates and licences that may be acquired via on-site training or training during employment at Mary River, such listing to indicate which of these certifications and licences would be transferable to a similar job site within Nunavut. This listing should be updated on an annual basis, and is to be provided to the NIRB upon completion and whenever it is revised.
Reporting Requirement	The initial listing should be provided to the NIRB at least 60 days prior to the start of construction, an annually thereafter or as may otherwise be required.
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	None

METHODS

On-site and on-the-job training is delivered in all job sectors. Many of the resultant certificates or licenses are transferable to other jobs within Nunavut. A summary of the transferable skills/certificates delivered includes:

<ul style="list-style-type: none"> • Fall Arrest • First Aid (Standard) • Mine Rescue Training (MRT); including, but not limited to: Cold Water Rescue, Small Vessel Operation and High Angle Rescue • Bear Awareness • Fire Extinguisher • Light Vehicle Training and Fuelling • Mobile Support Equipment (Machine Specific, I.E., Skid Steer, Aerial Lift, etc.) • Ore Truck (B-Train) • Ship Loader Operations • Hoisting and Rigging Basics • Defensive Driving • Mine Licence • Transportation of Dangerous Goods (TDG) 	<ul style="list-style-type: none"> • Fall Arrest Evaluation • Standard Safety Training; (Field Level Risk Assessments (FLRA), Job Hazard Analysis (JHA), etc.) • Spill Response • Environmental Protection Plan • Zero Energy State Lock Out / Tag Out • Power Mobile Equipment Operation (Machine Specific, I.E., CAT 740, CAT 777, etc.) • WHMIS (Workplace Hazardous Materials Information System) • Crusher Operation • Aerial Work Platform • 5-S System • Aircraft De-Icing • Six-Sigma Green Belt and Yellow Belt
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Baffinland also delivered training in management and advanced skill development. In May of 2016, Baffinland launched Courageous Leadership Action (CLA) training. The course was developed by ArcelorMittal and customized to meet the needs of Baffinland. CLA is a leadership training program with safety as a central theme. The course was delivered to the senior management team at Baffinland and focused on aligning departmental initiatives with the company's safety strategy in order to foster a corporate culture with safety as a core value. The participants were taught skills and provided with tools to assist

them with increasing active presence in work areas and increased interaction with frontline workforce. The goal is to use interaction and active participation to review a worker's understanding of safety standards and practices, and provide guidance to correct bad behaviours.

In addition to the CLA training, Baffinland provided training on Due Diligence to all employees in a supervisory position (supervisors, superintendents, managers and executives). The training was based on government regulations for safety, ArcelorMittal standards for human rights and territorial standards and policies on environmental impact and social responsibility.

RESULTS

A total of 27,966 hours of training were delivered in 2016, including 2,434 hours to Inuit workers.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has recognized the need for pre-employment training for Inuit who are new to the mining sector. As such, Baffinland is scheduled to deliver a 5-day Work Ready Program in the latter part of 2017. The program will provide participants with skills and knowledge to assist them with adapting to a rotational work schedule based at a fly-in fly-out mining operation. The program will be offered in the 5 North Baffin communities and Iqaluit.

Project Certificate Condition No. 138

Category	Education and Training - Inuit employee training
Responsible Parties	The Proponent, Qikiqtani Inuit Association (QIA)
Project Phase(s)	Construction
Objective	Working together with the QIA to prepare effective training programs developed specifically for Inuit will assist in employee preparedness and may improve employee retention
Term or Condition	The Proponent is encouraged to work with the QIA to ensure the timely development of effective Inuit training and work-ready programs
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association (QIA), Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland and the QIA work closely through the IIBA Joint Management Committee and Joint Executive Committee to address Inuit training needs, including programs directed at work readiness.

RESULTS

In 2016, QIA and Baffinland worked in collaboration on the development of an Inuit Human Resources Strategy and the identification of an associated action plan. The plan will be circulated to the Joint Executive Committee for approval in the first half of 2017 and implementation will begin following receipt of approval.

In late 2016, Baffinland hired an IIBA Education and Training Specialist with responsibilities for the identification and design of Inuit-specific training programs at both the pre-employment and employment stages. The Specialist has developed a revamped work readiness program which will be implemented in each of the 5 North Baffin communities in 2017 and has engaged in outreach to other relevant stakeholders, including the Government of Nunavut, Arctic College and Kakivak Association, to explore opportunities for collaboration and cooperation in the delivery of training and educational programs.

In July, 2017, QIA, with the support of Baffinland in the form of a commitment of approximately \$9.4 million, comprising both cash and in-kind contributions, applied for the funding under the Skills Partnership Fund administered by Employment and Social Development Canada. If the application is successful, funding will be applied to the Q-STEP program developed by QIA. Q-STEP is a four-year initiative intended to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. The program will consist of both work readiness measures as well as targeted training programs directed at apprenticeships, skills development, supervisor training and formal certification in heavy equipment operation. The program will be implemented through the joint efforts of Baffinland and QIA.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 139

Category	Education and Training - Hiring southern Canadians and foreign employees
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	With the unknown availability of labour from the North Baffin region and Nunavut as a whole to provide employment to the Project, the need to employ southern Canadians or foreign workers may implicate the Proponent's on-site language, cross-cultural awareness, and other programming. Having information available regarding the sourcing of labour for the Project is important to ensuring the Proponent and others are prepared for any influx of southern or foreign employees
Term or Condition	Prior to commencing construction, the Proponent is requested to undertake and provide the results of a detailed labour market analysis which provides quantitative predictions of the number of employees that may reasonably need to be sourced from southern Canada and from foreign markets, identifying where applicable, the country of origin for the foreign labour. Within 90 days of the issuance of the Project Certificate, the Proponent is required to submit an updated Labour Market Analysis which considers requirements of the ERP as well as hiring points within Nunavut and outside of the North Baffin region and RSA.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group (SEMWG)
Reference	Labour Market Analysis (Wilkinson, 2014a)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

A revised labour market analysis was presented in the 2014 Annual Report to the NIRB (Baffinland, 2015b).

RESULTS

The 2014 analysis concluded the following:

- After preference is given to local Inuit and local non-Inuit employees, there will be a requirement to source talent from the rest of Nunavut.
- After this, it will be necessary to source talent from a broader region. The remainder of the talent required can be sourced from the fly in/fly out hub of Waterloo, Ontario and from additional locations across Canada, if necessary.
- There will be sufficient talent available in the Greater Toronto Area to fill all of the corporate office positions.
- It will not be necessary to source employees internationally.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

A revised labour market analysis is being undertaken in 2017 for submission in a future Phase 2 Expansion Project Environmental Impact Statement.

Project Certificate Condition No. 140

Category	Education and Training - Survey of Nunavummiut employees
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	Monitoring the number of employees who leave previous employment in their home communities or who leave some type of formal education in pursuit of employment with the Project is important to evaluate predictions made and the potential impacts to North Baffin communities and education rates
Term or Condition	The Proponent is encouraged to survey Nunavummiut employees as they are hired and specifically note the level of education obtained and whether the incoming employee resigned from a previous job placement or educational institution in order to take up employment with the Project
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

In early 2017, Baffinland implemented a revised voluntary Employee Information Survey, which collected information related to employee level of education obtained and whether the employee resigned from a previous job placement or educational institution in order to take up employment with the Project (amongst other topics). This survey was offered to all Inuit employees residing in Nunavut, Inuit employees residing outside of Nunavut, and non-Inuit employees residing in Nunavut. It was not offered to contractors. Moving forward, this survey will be offered on an annual basis. A teleconference with members of the SEMWG (including GN, QIA, and INAC representatives) was held on February 2, 2017 to discuss a draft version of the revised survey and solicit feedback. Baffinland integrated feedback provided by SEMWG members before finalizing the survey.

RESULTS

A total of 43 surveys were completed. Table 4.26 summarizes results pertaining to the highest level of education obtained by survey respondents. Of the 43 surveys received, 16 individuals (or 37.2%) had no certificate, diploma, or degree. 10 individuals (or 23.3%) had a high school diploma or equivalent, 7 individuals (or 16.3%) had an apprenticeship or trades certificate or diploma, and 8 individuals (or 18.6%) had a college, CEGEP, or other non-university certificate or diploma. There were no individuals who indicated they had any type of university certificate, diploma, or degree, and 2 individuals (or 4.7%) had unknown educational levels.

Table 4.27 summarizes results pertaining to whether survey respondents resigned from a previous job placement or educational institution in order to take up employment with the Project. Of the 43 surveys received, 9 individuals (or 20.9%) indicated they resigned from a previous job placement in order to take up employment with the Project and no individuals indicated they resigned from an academic or vocational program in order to take up employment at the Project.

Table 4.26 Highest Level of Education Obtained

Highest Level of Education Obtained (2017 Employee Information Survey Results)	
Highest Level of Education	Number of Individuals (43 Surveys Received)
No certificate, diploma or degree	16
High school diploma or equivalent	10
Apprenticeship or trades certificate or diploma	7
College, CEGEP or other non-university certificate or diploma	8
University certificate or diploma below bachelor level	0
University certificate, diploma or degree - Bachelor's degree	0
University certificate, diploma or degree above bachelor level	0
Unknown	2

NOTES:

1. Source: Baffinland's 2017 Employee Survey.

Table 4.27 Resignation from a Previous Job Placement or Educational Institution

Resignation from a Previous Job Placement or Educational Institution (2017 Employee Information Survey Results)	
Pre-Employment Status	Number of Individuals (43 Surveys Received)
Resigned from a previous job placement in order to take up employment at the Project	9
Resigned from an academic or vocational program in order to take up employment at the Project	0

NOTES:

1. Source: Baffinland's 2017 Employee Survey.

TRENDS

2017 was the first year this revised survey was administered; as such, no long-term trends are yet apparent. However, Baffinland will continue to administer this survey on an annual basis and report on any observed future trends.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland and the QIA are also currently investigating the possibility of developing a more comprehensive, jointly-administered employee survey for future years. This survey would continue to address the requirements of this Project Certificate condition, in addition to a number of other topics.

Project Certificate Condition No. 141

Category	Education and Training - Training of Inuit
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To ensure that effective training is available in a timely manner
Term or Condition	The Proponent is encouraged to work with the Qikiqtani Inuit Association prior to construction in order to prioritize the provision of training of Inuit to serve as employees in monitoring or other such capacities
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

This PC Condition is focused on Baffinland working cooperatively with the Qikiqtani Inuit Association (QIA) to prepare the local workforce for mine construction. Mine construction was last undertaken in 2013 and 2014 but a new construction phase is anticipated subject to regulatory approval of the Phase 2 Expansion Project.

Baffinland continues to work collaboratively with the QIA to promote Inuit training, education and employment, consistent with the provisions of the Inuit Impact Benefit Agreement (IIBA). The Inuit Training and Employment Coordinators from Baffinland and the QIA are to work closely with the Joint Management Committees to ensure the timely development of training.

In 2016, QIA and Baffinland worked in collaboration on the development of an Inuit Human Resources Strategy and the identification of an associated action plan. The plan will be circulated to the Joint Executive Committee for approval in the first half of 2017 and implementation will begin following receipt of approval.

In late 2016, Baffinland hired an IIBA Education and Training Specialist with responsibilities for the identification and design of Inuit-specific training programs at both the pre-employment and employment stages. The Specialist has developed a revamped work readiness program which will be implemented in each of the 5 North Baffin communities in 2017 and has engaged in outreach to other relevant stakeholders, including the Government of Nunavut, Arctic College and Kakivak Association, to explore opportunities for collaboration and cooperation in the delivery of training and educational programs.

In July, 2017, QIA, with the support of Baffinland in the form of a commitment of approximately \$9.4 million, comprising both cash and in-kind contributions, applied for the funding under the Skills Partnership Fund administered by Employment and Social Development Canada. If the application is successful, funding will be applied to the Q-STEP program developed by QIA. Q-STEP is a four-year initiative intended to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project during both construction and operations as well as other employment opportunities in the region. The program will consist of both work readiness measures as well as targeted training programs directed at apprenticeships, skills development, supervisor training and formal certification in heavy equipment operation. The program will be implemented through the joint efforts of Baffinland and QIA.

Baffinland's commitment to education is also reflected in its scholarship program. In 2016, 7 scholarships (\$5,000 each) were awarded to post-secondary students. Baffinland also donated 46 laptops to communities during 2016.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland recognizes the need to institute training programs at the earliest stage to ensure that potential Inuit employees are equipped with the necessary skills to take advantage of employment opportunities at the Mary River Project. Baffinland's new Inuit Human Resources Strategy prioritizes pre-employment skills development which will be advanced through the delivery of a revised Work Readiness program. In addition, Baffinland has identified on-site apprenticeship training, adult education and skills upgrading as key initiatives for 2017. Finally, assuming a positive response to QIA's application for Skills Partnership Funding, Baffinland anticipates the implementation of targeted training programs (both pre-employment and employment) directed at maximizing Inuit workforce participation at the Mary River Project.

4.6.3 Livelihood & Employment (PC Conditions 142 through 147)

The Project provides direct and indirect employment opportunities to residents of the North Baffin and other Nunavummiut. With effective intervention through education and training (Section 3.5.2) including work ready programs, as well as effective recruitment strategies and progressive employment policies, these benefits may be significant.

Six (6) PC conditions relate to potential impacts of the Project on livelihood and employment. The conditions identify actions that the company and other parties (the GN, QIA and the Nunavut Housing Corporation) should undertake to remove barriers to employment of Inuit, including those barriers faced by Nunavummiut with limited or no previous wage employment experience; women; those living in social housing (the majority of Nunavummiut); and Inuktitut-only speakers.

Baffinland and the QIA initiated the development of an Inuit Human Resources Strategy (IHRS) in 2016. At the time of writing, the strategy is expected to receive approval by the IIBA Joint Executive Committee for implementation by mid-2017, for implementation shortly thereafter.

Stakeholder Feedback

The same community and government stakeholders noted in previous sections are key stakeholders with an interest in maximizing the employment of Nunavummiut as a result of the Project. This topic continues to be a key focus of comments when Baffinland hosts public meetings in the communities. The MRSMWG and QSEMC also regularly discuss this element of the Project. Commitments to employment are contained in the IIBA, and Baffinland and the QIA establish an annual Minimum Inuit Employment Goal (MIEG).

Monitoring

Baffinland tracks and reports on the Inuit employment levels reached each year. This information is presented in quarterly IIBA reports to the QIA, and annually in the socio-economic monitoring report. Furthermore, Baffinland has provided information on potential barriers to employment for women in the 2016 Socio-Economic Monitoring Report for the Mary River Project. This includes indicator data on hours worked by female employees and contractors, and information on childcare availability and costs. Table 4.28 provides an evaluation of the Project's impacts on employment, relative to predictions presented in the FEIS and to the 2016 MIEG.

Significant positive effects have accrued as a result of Project employment. The level of Inuit participation in the Project's workforce (approximately 15% of the total hours worked in 2016) though largely consistent with FEIS predictions (e.g. consistent with North Baffin LSA predictions, but slightly lower than LSA predictions) was below the 2016 MIEG.

Path Forward

Baffinland continues to refine its Inuit human resources programs and remains committed to meeting Inuit employment targets. Furthermore, it will likely take many years to fully realize the Project's Inuit employment potential (mine production only began in late 2014). The establishment of an annual Minimum Inuit Employment Goal (MIEG) with the QIA (which is 25% in 2017) and finalization of Baffinland's Inuit Human Resources Strategy (IHRS) and Inuit Contracting and Procurement Strategy (ICPS) should assist in increasing LSA employment over time. The IHRS and ICPS will describe goals and initiatives designed to increase Inuit employment and contracting at the Project. Baffinland will continue to monitor LSA employment for future trends. Reporting on each PC condition follows.

Table 4.28 Livelihood and Employment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Wage Employment	Employment of LSA residents	<p>Direct employment in 2016 included 305,836 hours worked by LSA residents (Inuit and non-Inuit), representing 16.3% of total worked in Nunavut (1,881,506 hours). This is slightly lower than FEIS predictions for the total labour supply potential of 342,000 h/a.</p> <p>Of this, 230,732 hours were worked by North Baffin LSA residents (representing 12.3% of the total). This is consistent with FEIS predictions of 230,000 h/a for the North Baffin LSA labour supply potential.</p> <p>This represents an increase over 2015 hours for North Baffin LSA residents, and a decrease in hours worked by Iqaluit residents. Inuit individuals worked 277,454 Project hours in 2016 (representing 14.7% of the total). An average of 1,180 individuals worked at the Project in 2016, of which 182 (15.4%) were Inuit. This is below the 2016 MIEG of 25% set by Baffinland and the QIA.</p>	Positive effects consistent with FEIS predictions
	Creation of indirect jobs within the LSA	<p>Spending on Inuit businesses is an indicator of potential indirect employment: In 2016, nine contracts worth approximately \$64.4 million were awarded to Inuit-owned businesses and joint ventures. All of the contracts were awarded to Inuit-owned businesses and joint ventures in the LSA. Procurement values in 2016 were lower than in 2015 (i.e. by \$39.1 million). Total procurement (with Inuit and non-Inuit firms) in 2016 totaled \$190.7 million. Since Project development, a total of \$431.9 million worth of contracts have been awarded to Inuit-owned businesses and joint ventures.</p>	Positive effects consistent with FEIS predictions
Job Progression and Career Advancement	Expanded employment and career development options	A total of 14 Inuit workers received promotions in 2016	Positive effects consistent with FEIS predictions

Project Certificate Condition No. 142

Category	Livelihood and Employment - Employee Cohesion
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To promote cohesion between employees on site, and between employees and their families
Term or Condition	The Proponent is encouraged to address the potential direct and indirect effects that may result from Project employees' on-site use of various Inuktitut dialects as well as other spoken languages, specifically paying attention to the potential alienation of some employees that may occur as a result of language or other cultural barriers
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	None

METHODS

Baffinland's Inuktitut in the Workplace Policy outlines the corporate position respecting support for the use of Inuktitut at all sites in Nunavut and ensures that, while the working language of the mine and port sites is English, a lack of proficiency in English will not be a barrier to Inuit employment, subject to considerations of health and safety. The Inuktitut in the Workplace Policy has been shared with the QIA at both the Executive and Management Committees and is scheduled to be reviewed and updated in 2017.

Although the working language at the Mine and Port Sites is English, the Company supports the principle of increased use of Inuktitut in the workplace over the lifetime of the Project. Baffinland is looking to further reduce barriers associated with language through increased use of bilingual signs and documents, and the use of graphics and symbol where possible. While on-site training is delivered in English, 2 site Elders are available to provide ongoing support for Inuit employees and to provide translation and interpretation services when required as outlined in the Inuktitut in the Workplace Policy

Pursuant to Article 11.6 of the IIBA, Baffinland provides Inuit employees with access to professional career counselling and professional counselling for personal problems on an as-needed basis. Services are available from Inuktitut speaking counselors. Baffinland is also in the process of updating the company website with news articles and other information related to the Project. It is intended that the website will be bilingual (English and Inuktitut).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 143

Category	Livelihood and Employment – Employee family contact
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To enable and foster connection and contact between employees and family members
Term or Condition	The Proponent is encouraged to consider the use of both existing and innovative technologies (e.g. community radio station call-in shows, cell phones, video-conferencing, Skype, etc.) as a way to ensure Project employees are able to keep in contact with family and friends and to ward off the potential for feelings of homesickness and distance to impact on employee retention and family stability
Reporting Requirement	As needed
Status	Complete
Stakeholder Review	To be developed following approval of the Project by the Minister
Reference	Not applicable
Ref. Document Link	None

METHODS

Internet and telephone access is available free of charge to employees in the bunkhouse rooms at site, and in some common areas. Bandwidth and utilization levels may limit the use of some applications.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 144

Category	Livelihood and Employment – Requirements for employment
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To ensure that the prerequisites and requirements for employment are clear and well known in work readiness programs.
Term or Condition	The Proponent is encouraged to make requirements for employment clear in its work-readiness and other public information programs and documentation, including but not limited to: education levels, criminal records checks, policies relating to drug and alcohol use and testing, and language abilities.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	None

METHODS

Baffinland Community Liaison Officers (BCLOs) communicate these requirements to individuals who drop off their résumés to Baffinland. Job postings also identify many of these requirements. Employment requirements are made clear to potential employees during pre-screening for Work Ready training. They are also reviewed during pre-screening for new hiring. These requirements (background check, criminal record check and medical) are included in the employment agreement that new employees receive and sign.

In November 2016, Baffinland held open-houses and public presentations in each of the 5 North Baffin Communities. Information was included on employment requirements and the process required for employment at Baffinland.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

In 2017, Baffinland will be undertaking a number of initiatives including a Career and Training informational tour in the 5 communities as well as implementing a revised work ready program.

Project Certificate Condition No. 145

Category	Livelihood and Employment – Barriers to employment for women
Responsible Parties	The Proponent, Government of Nunavut, members of QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor and understand the existence of barriers to employment for women specifically relating to childcare availability and costs
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland has provided information on potential barriers to employment for women in the 2016 Socio-Economic Monitoring Report. This includes indicator data on hours worked by female employees and contractors, and information on childcare availability and costs. Furthermore, specific reference is made in the Mary River Project Inuit Impact and Benefit Agreement (IIBA) to women in the workplace and the associated barriers they may face. This topic is addressed by Baffinland and QIA through Section 7.15 of the IIBA.

RESULTS

Table 4.29 presents the hours (and percentage of hours) worked by women and men in Nunavut on the Project from 2013 to 2016. In 2016, approximately 8.0% of hours worked on the Project were worked by women, which is 1.1% less than percentages documented for Q4 2015. The percentage of hours worked by Inuit and non-Inuit women in 2016 were similar (i.e. 3.7% and 4.4%, respectively). However, the percentage of hours worked by Inuit women compared to Inuit males on the Project (24.8%) was much higher than non-Inuit women compared to non-Inuit males (5.1%) in 2016. A similar trend was noted from 2013-2015.

Appropriate community-level indicator data are currently not available for the topic of ‘childcare availability and costs’. As such, this topic continues to be tracked through the QSEMC process and Baffinland’s community engagement program (and is reported on in the annual socio-economic monitoring report). Baffinland acknowledges securing access to adequate childcare remains an issue in some parts of Nunavut and can act as a barrier to employment for women. While Baffinland will continue to track this issue in future socio-economic monitoring reports, it is apparent that women continue to face barriers to employment in the Canadian mining industry as a whole. Further details on this are provided in the 2016 Socio-Economic Monitoring Report.

TRENDS

While Baffinland has continued to encourage the employment of women at the Project, women work considerably fewer hours on the Project than their male counterparts. Baffinland will continue to track this issue in future socio-economic monitoring reports.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on potential barriers to employment for women through its socio-economic monitoring program. However, only limited data are available for the topic of 'childcare availability and costs'. As such, this topic continues to be tracked through the QSEMC process and Baffinland's community engagement program. Baffinland will also continue discussing with the SEMWG how improved indicator data may be obtained for this.

Table 4.29 Hours Worked from 2003 to 2016 by Ethnicity and Gender

Hours Worked by Project Employees and Contractors in Nunavut, by Ethnicity and Gender									
Employee Ethnicity & Gender		2013		2014		Q4 2015 ¹		2016	
		Hours Worked	% of total (863,177)	Hours Worked	% of total (1,867,882)	Hours Worked	% of total (430,244)	Hours Worked	% of total (1,881,506)
Inuit	Male	124,754	14.5%	267,169	14.3%	54,794	12.7%	208,592	11.1%
	Female	49,611	5.8%	112,437	6.0%	20,732	4.8%	68,862	3.7%
Non-Inuit	Male	639,468	74.1%	1,394,204	74.6%	336,124	78.1%	1,521,786	80.9%
	Female	49,200	5.7%	94,072	5.0%	18,594	4.3%	82,266	4.4%
TOTAL		863,177	—	1,867,882	—	430,244	—	1,881,506	—

NOTES:

1. Source: Baffinland records¹

¹ As Baffinland's human resources data management system was in the process of being developed, some information gaps were unable to be reconciled in 2015. In 2015, gender data related to hours worked was only available for Q4.

Project Certificate Condition No. 146

Category	Livelihood and Employment - Availability of childcare for Project Employees
Responsible Parties	Government of Nunavut and Qikiqtani Inuit Association
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To lessen the barriers to employment as relating to the availability of childcare.
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group
Reference	None
Ref. Document Link	None

METHODS

This PC Condition is not directed at Baffinland. See PC Condition 145 for Baffinland's work with the SEMWG in this area.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 147

Category	Livelihood and Employment – Affordability of housing
Responsible Parties	The Proponent, Government of Nunavut and Nunavut Housing Corporation
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To lessen the barriers to maintaining employment as relating to the availability and costs of housing
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Government of Nunavut (Nunavut Housing Corporation; Community and Government Services; Economic Development and Transportation); Mary River Socio-economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	None

METHODS

Baffinland discusses housing related issues with the Mary River Socio-economic Monitoring Working Group, of which the Government of Nunavut (including Nunavut Housing Corporation) are active participants.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Housing in Nunavut is the responsibility of the Government of Nunavut and the Nunavut Housing Corporation (NHC). Baffinland will continue to participate with these parties on related housing issue discussions and as requested and can advocate for more work-friendly social housing policies for its workers.

4.6.4 Economic Development, Self-Reliance, Contracting and Business Opportunities (PC Conditions 148 through 152)

The Project delivers economic development benefits within the LSA by contracting Inuit firms, and induces economic development through local spending by its Inuit workforce. With effective implementation, these benefits may be significant.

Five (5) PC conditions relate to the potential impacts of the Project on economic development and self-reliance, and contracting and business opportunities. The conditions encourage Baffinland to investigate measures to encourage home ownership; promote the contracting of Inuit firms by contracting with smaller work packages; undertake collaborative monitoring to evaluate the Project's interactions with harvesting and food security; and to meet certain requirements to minimize impacts on park users; and to complete an assessment of the risk presented by temporary mine closure on local employment and economic development.

Stakeholder Feedback

With respect to economic development, local communities, the QIA, the GN, and the federal government are all key stakeholders. As with employment, these stakeholders are interested to see the Project deliver and induce economic development in the region. Conversely, concerns were expressed regarding the negative effects that could be realized if the Project temporarily closed after becoming accustomed to the employment and economic development benefits of the Project. Parks Canada indicated concern that the presence of the Project, and in particular an increased frequency of aircraft and shipping, could adversely affect the wilderness experience of users of Sirmilik National Park. Commitments and contracting guidelines are contained in the IIBA to encourage contracting of Inuit firms, and an Inuit Contracting and Procurement Strategy (ICPS) is currently being developed by Baffinland.

Monitoring

Baffinland tracks and reports on the amount spent contracting with Inuit firms each year and on LSA payroll amounts. Baffinland has also presented information on Project harvesting interactions and food security, household income and food security, and land user-Project interactions in the 2016 socio-economic monitoring report. Table 4.30 provides an evaluation of the Project's impacts on economic development and self-reliance, and contracting and business opportunities based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Positive effects with respect to economic development have accrued as a result of Project employment.

Path Forward

Baffinland is developing an Inuit Contracting and Procurement Strategy (ICPS) jointly with the QIA, to further enhance business opportunities to Inuit companies in the Qikiqtani Region and within Nunavut. Baffinland expects the strategy will be approved by the QIA for implementation by mid-year. Baffinland will continue to monitor and report on Project-related economic-development effects in future years. Reporting on each PC condition follows.

Table 4.30 Economic Development Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Land	Mine operation and ongoing construction activities causing increased industrial utilization of land, may affect harvesting and travel, or result in changes to how people engage in the land-based economy	Effects are difficult to monitor and assess. However, 293 land use visitor person-days were recorded at Project sites in 2016, which indicates these sites continue to be used for land use activities.	N/A
People	Employment, training and contracting resulting in increased human capacity and well-being; opportunities for youth, improved education and training; and increased wealth and well-being	Baffinland's 2016 Socio-economic Monitoring Report presents 2016 employment and contracting statistics, discussed also in Section 3.5.3. GN (2015) also reported positive feedback from Igloolik and Pond Inlet in regard to Project employment bringing observable benefits to the communities, and GN (2016) reported positive benefits accruing to the LSA as a whole.	Positive effects consistent with FEIS predictions
Community Economy	Employment of North Baffin residents resulting in an improved ability to achieve strategic community development objectives; increased wealth in community; increased local business opportunities	Employment monitoring and results are described in Section 3.5.3. In 2016, nine contracts worth approximately \$64.4 million were awarded to Inuit-owned businesses and joint ventures. All of the contracts were awarded to Inuit-owned businesses and joint ventures in the LSA. Procurement values in 2016 were lower than in 2015 (i.e. by \$39.1 million). Total procurement (with Inuit and non-Inuit firms) in 2016 totaled \$190.7 million. Since Project development, a total of \$431.9 million worth of contracts have been awarded to Inuit-owned businesses and joint ventures. Furthermore, Baffinland's LSA employee payroll expenditures (in Canadian dollars, not including contractors, but including both Inuit and non-Inuit employees) totaled \$7,586,379.00 in 2016.	Positive effects consistent with FEIS predictions
Territorial Economy	Employment of Nunavut residents causing growth in the territorial economy Expanded economic activity (GDP) Increased diversity of territorial economy	Impacts to the territorial economy consist of employment (Section 3.5.3) and contracting within Nunavut (see above), as well as corporate and payroll taxes, mineral royalties (once they begin), and IIBA payments.	Positive effects consistent with FEIS predictions

Project Certificate Condition No. 148

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Food security
Responsible Parties	The Proponent, Members of the QSEMC
Project Phase(s)	Construction and Operations
Objective	To improve understanding of the interactions between the Project and Inuit harvesting and how this relates to food security for residents of the North Baffin.
Term or Condition	The Proponent is encouraged to undertake collaborative monitoring in conjunction with the Qikiqtaaluk Socio-Economic Monitoring Committee’s monitoring program which addresses Project harvesting interactions and food security and which includes broad indicators of dietary habits.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland has provided information on potential Project harvesting interactions and food security in the 2016 Socio-Economic Monitoring Report.

RESULTS

Appropriate community-level and/or Project-level indicator data are currently not available for this topic. As such, this topic continues to be tracked through the QSEMC process and Baffinland’s community engagement program (and is reported on in the annual socio-economic monitoring report). For example, comments on harvesting, food security, and Project-harvesting interactions continue to be received through Baffinland’s community engagement program. Some territorial-scale (but not community-level or Project-level) data are also available on rates of harvesting and food security amongst Nunavummiut. While more details are provided in the 2016 Socio-Economic Monitoring Report, it’s evident that harvesting and consumption of country food remains a valued and important part of the Inuit culture and diet. However, some concerns have been expressed about potential negative interactions between the Project and local harvesting. Concerns have also been expressed about declining rates of country food consumption and the lack of food security in Nunavut, generally.

There are indications the Project continues to improve household income and food security in the LSA, by providing LSA residents with meaningful incomes (through employment) that enable the purchasing of food and other goods, and support the participation in harvesting activities. Baffinland also contributes to various community wellness initiatives (e.g. through the Ilagiktunut Fund in the IIBA), which assist individuals not directly benefiting from Project employment. Furthermore, the Baffinland-QIA IIBA established a Wildlife Compensation Fund to help compensate Inuit for incidents where Project activities interfere with or inhibit harvesting activities. The QIA has recently begun receiving and assessing claims against the Wildlife Compensation Fund.

TRENDS

No long-term trends are yet apparent. However, Baffinland will continue to monitor issues associated with potential Project harvesting interactions and food security on an annual basis and report on any observed future trends.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information on potential Project harvesting interactions and food security through its socio-economic monitoring program. However, appropriate community-level and/or Project-level indicator data are currently not available for this topic. As such, this topic continues to be tracked through the QSEMC process and Baffinland's community engagement program. Baffinland will continue to discuss with the Mary River SEMWG how improved indicator data may be obtained for this topic.

Project Certificate Condition No. 149

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Impacts of temporary closure
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To further the understanding of how a temporary closure may impact on the well-being of the residents and businesses of the North Baffin region
Term or Condition	Prior to the commencement of operations, the Proponent is required to undertake an analysis of the risk of temporary mine closure, giving consideration to how communities in the North Baffin region may be affected by temporary and permanent closure of the mine, including economic, social and cultural effects and taking into consideration the potential drop in employment between the construction and operations phases of the Project
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association
Reference	Potential Effects of a Mine Closure (Wilkinson, 2014b)
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

The Potential Effects of a Mine Closure study was completed in 2014.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

When the Project is approaching closure, Baffinland will create partnerships with its government and community stakeholders to implement programs to support employee transition. Baffinland employees will be able to demonstrate a solid work record and a variety of on-the-job and formal training experiences, which will assist them in their transition to new endeavours.

Baffinland is working with the Qikiqtani Inuit Association to develop a Mine Closure Working Group that will include members from the local communities and will address biophysical, economic and socio-economic issues related to temporary and permanent site closure.

Project Certificate Condition No. 150

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Impacts to visitors of Sirmilik National Park
Responsible Parties	The Proponent, Parks Canada
Project Phase(s)	Construction and Operations
Objective	To limit potential of Project impacts upon visitors, researchers and/or beneficiary users of the Sirmilik National Park
Term or Condition	<p>The Proponent will ensure the following:</p> <ul style="list-style-type: none"> a. The Proponent will maintain, where possible, a minimum flying altitude of 2,000 feet over the park, except for approaches to land, take-off or for safety reasons b. The Proponent will ensure that certification of noise compliance is current, where compliance is applicable c. For the purpose of briefing Park visitors, the Proponent will provide Parks Canada (1) prior to commencing the shipping season, with planned daily shipping schedules, and (2) annually, with air traffic information, and (3) to provide updates when significant variations from these are expected d. The Proponent is strongly encouraged to provide due consideration to wilderness experience during its operations in the open water season, especially during the month of August which is typically a time of high use by sea kayakers
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Parks Canada
Reference	Not applicable
Ref. Document Link	None

METHODS

Pilots are made aware of the minimum flying altitude over the park and this condition is written into aviation contracts.

Parks Canada is made aware of the shipping schedules for each upcoming shipping season and any variations from the schedule.

In 2014, Baffinland worked directly with Parks Canada to develop a brochure on kayaking safely around large ships. The brochure was completed in French, English and Inuktitut and installed in the Pond Inlet Parks.

RESULTS

In 2016, there was one instance of non-compliance for flight height. The non-compliance occurred when Baffinland assisted in a search and rescue in the Bylot Island area in September 2016. Four people were stranded on Bylot Island near Pond Inlet. Baffinland used their chartered helicopter to extract the four individuals.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to include the minimum flying altitude in aviation contracts and notify pilots of the condition. Baffinland remains open to discussion with Parks Canada if updates to the brochure or other additional information is requested.

Project Certificate Condition No. 151

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Access to housing
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To investigate ways that economic development and self-reliance may improve access to housing by employees
Term or Condition	The Proponent is encouraged to investigate measures and programs designed to assist Project employees with homeownership or access to affordable housing options
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Government of Nunavut, Nunavut Housing Corporation, Mary River Socio-Economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	None

METHODS

Access to affordable housing in Nunavut is the responsibility of the Government of Nunavut and the Nunavut Housing Corporation. However, with the introduction of paid employment at the Project, Nunavut-based employees will be introduced to banking activities and programs, including savings and investment accounts and possible access to mortgages and similar opportunities, all of which may help employees with eventual home ownership.

Baffinland implemented a revised Employee Information Survey in early 2017, which collected data on employee changes of address, housing status, and migration intentions (amongst other topics). This survey was offered to all Inuit employees residing in Nunavut, Inuit employees residing outside of Nunavut, and non-Inuit employees residing in Nunavut. Moving forward, this survey will be offered on an annual basis. Baffinland integrated feedback from members of the Mary River Socio-Economic Monitoring Working Group (including GN, QIA, and INAC representatives) before finalizing the survey. Baffinland will report on any trends documented through this survey in future socio-economic monitoring reports.

RESULTS

Currently, there is not a clear and direct relationship between Project employment and any measures or programs undertaken by Baffinland or others, and home ownership. However, Project employment should eventually act to increase the purchasing power of local residents and decrease the number of individuals receiving income support. This is expected to occur primarily through increases in local wealth generated by Project-related employment and other economic opportunities. While the manner in which Project employees spend their incomes will ultimately be a personal choice, access to adequate housing (including private ownership) can be an important goal for many individuals. Incomes generated by the Project can help individuals accomplish this goal should they wish.

TRENDS

The First Nations Bank of Canada (FNBC) established a branch in Pond Inlet in 2014. The FNBC also has a branch in Iqaluit, and one in Baker Lake. Though FNBC has established these branches independent of any action by Baffinland, it is likely that the establishment of the Pond Inlet branch was induced by the Project, in the same way that the branch in Baker Lake was likely induced by the Meadowbank Mine.

Furthermore, the Nunavut Housing Corporation (NHC) continues to make investments in new housing units across the territory and has a number of existing programs, which support improved access to housing for Nunavut residents. These programs include recent changes made to the Public Housing Rent Scale (in 2014) to reduce disincentives to work and encourage savings (e.g. by assessing only the incomes of the two primary tenants rather than non-primary tenants, placing limits on rent increases due to income increases every year until the rent assessed total is eventually reached). The NHC also offers home purchase assistance programs (e.g. the Nunavut Downpayment Assistance Program; Tenant to Owner Program) and home renovation and repair programs to Nunavut residents (NHC 2016). Together, these programs and investments are expected to lead to improved housing circumstances for individuals, help reduce overcrowding, and address public housing deficits in the territory.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 152

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – IIBA contract requirements
Responsible Parties	The Proponent, Qikiqtani Inuit Association
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To improve ability of small businesses to access Project contract and sub-contract opportunities.
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not a Baffinland Condition
Stakeholder Review	Qikiqtani Inuit Association (QIA), Mary River Socio-economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	None

METHODS

This PC Condition is primarily directed at the QIA. However, Baffinland can offer that in 2016, the company and the QIA agreed to develop an Inuit Procurement and Contracting Strategy. Work on this strategy is ongoing in early 2017.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.6.5 Human Health & Wellbeing (PC Conditions 153 through 157)

Five (5) PC conditions relate to the potential impacts of the Project on human health and well-being. These conditions focus on the implementation of mitigation measures to alleviate potential negative effects of employment, such as the provision of employee assistance programs, addressing potential cultural conflicts at site, the provision of services or programs to benefit families in potentially affected communities to mitigate the impact of employees' absence from home, and monitoring of potential indirect effects of the Project on human health and well-being.

Stakeholder Feedback

As noted in Section 3.5.1, the key stakeholders focused on the socio-economic environment include the communities, the QIA, various departments of the GN, and INAC. There is an obvious interaction between the Project and the Government of Nunavut, which is responsible for delivering most health and social services programs in Nunavut. Key concerns relate to the effects of fly-in/fly-out employment on workers and their families. Commitments to the provision of employee assistance and counselling are contained in the IIBA. The MRSMWG and QSEMC also regularly discuss this element of the Project.

Monitoring

Baffinland tracks and reports on a number of indicators of human health and well-being. This includes reporting on the number of instances that illegal substances or alcohol are identified during security searches at the Project sites, and occupational health and safety statistics. Baffinland has also presented information on 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, proportion of taxfilers with employment income and median employment income, percentage of population receiving social assistance, and other topics (e.g. crime rates) in the 2016 socio-economic monitoring report. Table 4.32 provides an evaluation of the Project's impacts on human health and well-being, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Changes in human health and well-being are often more apparent over a longer term, and attributing cause can be challenging. As Project construction only began in 2013, there is a minimal amount of post-Project data currently available. Human health and well-being can also be influenced by many different socio-economic factors. Direct correlations between the Project and human health and well-being will only come to light with the analysis of additional annual data. However, there is currently no indication the FEIS predictions are not being met and it is expected that the Project is improving the health and well-being of some individuals and families in the LSA who participate in the Project. There were no significant injuries and no fatalities at the Project sites in 2016.

Path Forward

Baffinland will continue to deliver and refine its training and employee assistance programs, and monitor indicators of human health and well-being, in consultation with the MRSMWG, the QSEMC, and the Project's workforce. Reporting on each PC condition follows.

Table 4.31 Human Health and Well-being Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Substance Abuse	Increased substance abuse due to the transportation of substances through Project sites	Security searches of employees arriving and departing site and site searches with drug dog and trained staff.	Relevant monitoring activities for human health and well-being are longer term and conclusions will be drawn in future years.
	Increased substance abuse because Project employment makes substances more affordable	In 2016, 11 drug and alcohol related contraband infractions occurred at Project sites amongst employees and contractors. This was 9 infractions higher than in 2015. While all contraband infractions are of concern and taken seriously by Baffinland, the 11 infractions that occurred in 2016 represent only a small number of individuals from the Project workforce. All individuals who do not comply with Baffinland's no drugs/no alcohol policy are immediately removed from site and disciplinary action (up to and including termination) is commenced. Baffinland also notifies the RCMP, where appropriate, of search results.	
	The Company's focus on health and safety, and employee assistance and counselling programs will increase awareness of employees, reducing substance abuse	While there has been an increasing trend in the number of impaired driving violations in the North Baffin LSA and a decreasing trend in Iqaluit in the post-development period, these trends were also evident in the five years preceding Project development. Likewise, while there has been an increasing trend in the number of drug violations in the North Baffin LSA in the post-development period, this trend was also evident in the five years preceding Project development. This implies factors other than the Project are likely driving these trends. However, the number of drug violations in Iqaluit have experienced a decreasing trend in the post-development period, after experiencing an increasing trend in the five years preceding Project development. This implies the Project may be having a positive effect on this trend.	
Increased Well-being and Community Social Stability	Project employment resulting in increased well-being of children, and increased community social stability	<p>There are positive indications the Project is contributing to the enhanced well-being of children, by providing LSA residents (and parents) with opportunities to obtain meaningful employment and incomes. These opportunities can help reduce the various family stresses and uncertainties associated with un- and under-employment. Baffinland has also implemented an Employee and Family Assistance Program for workers and their family members who may require family-related or other forms of personal assistance. There are also positive indications the Project continues to improve household income and food security in the LSA. This has occurred through contributions to community wellness initiatives and by providing LSA residents with meaningful employment opportunities. Increased employment income facilitates the purchase of store bought food and other family goods, while also providing an improved means to participate in harvesting.</p> <p>As Project construction only began in 2013, there is a minimal amount of post-Project data currently available. Correlations between the Project the various indicators being tracked (e.g. youth crime, employment income, social assistance rates), if any, will only come to light with the analysis of additional annual data.</p>	
Lost Time Incident/fatality	Worker fatality	Occupational health and safety monitoring. There were no fatalities in 2016.	

Project Certificate Condition No. 153

Category	Human Health and Well-Being – Employee and family health and well-being
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	To provide adequate medical services on site, including those that contribute to the mental health and well-being of all employees.
Term or Condition	The Proponent is encouraged to employ a mental health professional to provide counselling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Mary River Socio-economic Monitoring Working Group
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/sharedocuments/

METHODS

Baffinland's benefit plan includes an Employee and Family Assistance Program (EFAP), which offers all permanent employees and their dependents professional short-term counselling on an as-needed basis. In addition, Inuit Elders on site are available for our Inuit employees. Furthermore, Baffinland provides its employees with regular access to an on-site Project medic.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has received informal positive feedback about the presence of Inuit Elders on site to work with and mentor Baffinland employees. Baffinland will maintain the employment of Inuit elders on site. Baffinland will continue to explore other options and opportunities to provide support for our Inuit employees.

Project Certificate Condition No. 154

Category	Human Health and Well-being – Indirect impacts to health and well-being
Responsible Parties	The Proponent, Government of Nunavut, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To understand the indirect impacts of the Project upon health and well-being
Term or Condition	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, and others as deemed appropriate
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland has provided information on potential indirect effects of the Project in the 2016 Socio-Economic Monitoring Report. This includes indicator data on 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, and other topics (e.g. crime rates).

RESULTS

See ‘Trends’ below for summarized results. Detailed results are presented in the 2016 Socio-Economic Monitoring Report.

TRENDS

A summary of monitoring results and trends is provided in Table 4.32. Detailed results are presented in the 2016 Socio-Economic Monitoring Report.

RECOMMENDATIONS / LESSONS LEARNED

None.

Table 4.32 Key Socio-economic Indicators and Trends in 2016

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Number of drug and alcohol related contraband infractions at Project sites	n/a	↑	↑	Project	There were 11 contraband infractions at Project sites in 2016
Number of impaired driving violations	↑ ↓	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the number of impaired driving violations is apparent in the North Baffin LSA, while a long-term decrease is apparent in Iqaluit. Both trends were evident prior to the Project.
Number of drug violations	↑ ↑	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the number of drug violations is apparent in the North Baffin LSA and was evident prior to the Project. A decrease in Iqaluit has occurred since the Project, after experiencing a prior increase.
Prevalence of gambling issues	n/a	n/a	n/a	Project	These topics continue to be tracked through the QSEMC process and Baffinland's community engagement program
Prevalence of family violence	n/a	n/a	n/a	Project	
Prevalence of marital problems	n/a	n/a	n/a	Project	
Percent of health centre visits related to infectious diseases	↓ ↓	↓ ↓	No change ↓	N. Baffin LSA Iqaluit	A long-term decrease in the percent of health centre visits related to infectious diseases is apparent in the LSA and was evident prior to the Project
Rates of teenage pregnancy	n/a	n/a	n/a	Project	This topic continues to be tracked through the QSEMC process and Baffinland's community engagement program
Number of secondary school graduates	↑ ↓	↓ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term decrease in graduation numbers is apparent in Iqaluit and was evident prior to the Project. A decrease in the North Baffin LSA has occurred since the Project, after experiencing a prior increase. However, a similar decrease has occurred throughout the territory as a whole.
Secondary school graduation rate	↓	↓	↑	Region	A long-term decrease in graduation rates is apparent in the region and was evident prior to the Project
Crime rate	↑ ↓	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in crime rates in the North Baffin LSA and long-term decrease in Iqaluit are apparent and were evident prior to the Project.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on potential indirect effects of the Project through its socio-economic monitoring program and is in compliance with this Project Certificate condition. In instances where appropriate community-level indicator data are not currently available (e.g. for the topics of prevalence of gambling issues, prevalence of family violence, prevalence of marital problems, and rates of teenage pregnancy), these topics continue to be tracked through the QSEMC process and Baffinland's community engagement program. Baffinland will also continue discussing with the Mary River SEMWG how improved indicator data may be obtained for these topics.

Project Certificate Condition No. 155

Category	Human Health and Well-being – Employee cohesion
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To encourage the on-site cohesion of employees through cultural-awareness and social programs.
Term or Condition	The Proponent is strongly encouraged to provide the NIRB with an updated report on its development of mitigation measures and plans to deal with potential cultural conflicts which may occur at site as these may become needed
Reporting Requirement	To be provided at least 60 days prior to the commencement of any construction activities
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association
Reference	IIBA
Ref. Document Link	None

METHODS

Baffinland is committed to promoting employee cohesion through cultural awareness and social programs. In 2016, Baffinland continued to provide cultural recognition programs such as cultural awareness, promotion of Inuktitut in the workplace and Elder support for Inuit employees. However, as a result of the economic downturn and cutbacks, Baffinland was unable to deliver on additional cultural events and cross cultural recognition initiatives.

The company is actively working to reinstitute cultural events and programs at site and in the corporate office for 2017. Planning for the programs commenced in late 2016, and the first program launched was the Cultural Awareness Presentation delivered, in partnership with the QIA, at the Baffinland Corporate Office in Oakville, Ontario in early 2017. Baffinland continues to work with the QIA and other community partners to identify and plan other cultural events (such as Nunavut Day) for delivery at site and in the corporate offices with the ultimate goal of promoting cross-cultural recognition throughout the organization.

Consistent with the provisions of the Inuit Impact and Benefit Agreement, Baffinland has also instituted measures to reduce and address potential cultural conflicts at site, including:

- Development of a revised Work Readiness program to prepare Inuit for work at a Fly-in-Fly-Out site, including a cross-cultural training component;
- Mandatory cultural awareness training provided to all new employees and contractors and the development of an on-line cultural awareness course;
- Providing culturally appropriate working conditions, including the use of Inuktitut in the workplace
- On-site Inuit elder to provide counselling services
- Providing country foods to workers at site
- Development of a new Employee Concern policy and procedure to be implemented in 2017

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland's vision is to create value through operational excellence and profitable growth while caring for our people and the environment, maintaining Safety First, Safety Always. Through this vision, Baffinland is determined to become the employer of choice in the North Baffin Region. In order to facilitate growth towards this vision and goal, Baffinland has developed an IHRS with the objective to promote a working relationship with stakeholders, create an inclusive and culturally aware workforce, and increase Inuit recruitment, succession and retention at the project. The strategy is currently under review by the QIA.

Project Certificate Condition No. 156

Category	Human Health and Well-Being - Support Initiatives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assist with fostering well-being within point-of-hire communities
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association (QIA), Mary River Socio-economic Monitoring Working Group
Reference	IIBA
Ref. Document Link	None

METHODS

An Ilagiiktunut Nunalinnullu Pivalliajutsait Kiinaujat fund has been established under Article 12 of the IIBA (Support for Communities). The objectives of the fund include:

- Creation of opportunities for community capacity building
- The fair distribution of impacts and benefits between communities and across generations
- Maintenance of consistency with community development objectives
- Promotion of mutual understanding and learning

The Fund is intended to support a wide range of activities including participation in community projects, youth and Elder programs, hunter support activities, cultural learning and revitalization, social support programs for families and individuals and counseling and healing programs.

While the fund is administered by QIA, it is jointly supported by Baffinland and QIA. Baffinland has committed to match QIA's contributions up to a maximum of \$375,000 annually for the first 6 years following signing of the IIBA and in addition to pay 30% of administrative costs for the first three years following conclusion of the IIBA. To date, Baffinland's contributions have totalled \$750,000 plus administrative funds.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 157

Category	Human Health and Well-Being – Counseling and treatment programs
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To make available, necessary treatment and counseling services for employee and family well-being
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	N/A
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland’s employee benefit plan includes an Employee and Family Assistance Program (EFAP), which offers all permanent employees and their dependents access to professional short-term counselling on an as-needed basis. Baffinland also employs on-site Elders from nearby communities to provide additional support and guidance to its Inuit employees. Furthermore, Baffinland provides its employees with regular access to an on-site Project medic.

RESULTS

Not applicable

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide employee access to an EFAP, on-site Elders, and a Project site medic. Baffinland also encourages its employees and stakeholders to provide feedback on how its various programs and initiatives can be improved in the future.

4.6.6 Community Infrastructure and Public Services (PC Conditions 158 through 161)

Four (4) PC conditions relate to the potential impacts of the Project on community infrastructure and public services. All four conditions name the GN, which is responsible for delivering public services in Nunavut communities. NIRB encourages Baffinland to work with the GN to address public service issues, particularly those that may be adversely affected by the Project.

Stakeholder Feedback

Key stakeholders focused on community infrastructure and public services include community members, communities (i.e., Hamlets), the QIA, the GN, and INAC. The GN is the primary stakeholder, since it is responsible for the delivery of many public services. The QIA is interested in the well-being of its constituents and receives funding through the IIBA that has the potential to affect community services, should the QIA direct funds to support community programs. Communities themselves have expressed an interest in the Project bringing synergistic infrastructure into the region. For example, Pond Inlet has and continues to express a desire for support from Baffinland to help fund construction of a jet strip in the community. Unfortunately, there is not a Project need for such infrastructure. Hamlets expressed concern that skilled workers may leave their workforce to work for the Project, resulting in a skills gap, at least temporarily.

Monitoring

Baffinland conducted an Employee Information Survey in early 2016, and another survey in early 2017. Results are provided in annual socio-economic monitoring reports. Baffinland also reports on indicators pertaining to competition for skilled workers, labour force capacity, pressures on existing health and social services provided by the GN that may be impacted by Project-related in-migration of employees, and on Project-related pressures on community infrastructure. Table 4.33 provides an evaluation of the Project's impacts on community infrastructure and public services, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.33 Community Infrastructure and Public Services Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Recruitment and Retention of Hamlet Employees	Competition for skilled workers may lead to temporary effects on municipal services	Based on the 2017 Employee Information Survey (43 surveys received), 9 Project employees (or 20.9%) indicated they had left positions in their communities to pursue employment at the Project. Of these, 3 were casual/part-time positions, while 6 were full-time positions.	Effect within FEIS predictions
Education and Skills	Long term improvement in labour force capacity	Since 2013, the Project has cumulatively generated 79,553 hours of training for Project employees, 11,843 hours (or 14.9%) of which were completed by Inuit employees (this does not include the additional training and experience gained by Project contractors). Likewise, 6,456,646 hours of labour have been cumulatively performed in Nunavut as a result of the Project since 2013, 1,162,333 hours (or 18.0%) of which were performed by Inuit employees and contractors.	Long-term effect to be realized over time

While some individuals have left positions in their communities to pursue employment at the Project, these are likely small in number when compared to overall community staffing needs. Community engagement conducted by Baffinland further indicates there remains a high demand for Project-related employment opportunities in the LSA. It is also expected that ongoing training and experience generated by the Project, in addition to regular employee turnover, will continue to increase the pool of skilled workers in the local labour force and negate any short-term, negative Project effects. Effects to community infrastructure and public services as a result of Project employment are consistent with FEIS predictions. An overall improvement in the capacity of the local labour force will occur and become apparent with time.

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the MRSMWG. Reporting on each PC condition follows.

Project Certificate Condition No. 158

Category	Community Infrastructure and Public Services – Impacts to health services
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor indirect Project impacts to health and social services provided by the Government of Nunavut.
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland continues to work with the QSEMC and the Mary River SEMWG on socio-economic monitoring initiatives; the Government of Nunavut (GN) actively participates in both these groups. A Memorandum of Understanding was also signed with the GN Department of Health in November 2013 regarding site health services. Baffinland has provided information on potential socio-economic effects of the Project in its 2016 Socio-Economic Monitoring Report. This includes indicator data related to pressures on existing health and social services provided by the GN that may be impacted by Project-related in-migration of employees.

RESULTS

While there have been increasing trends in the number of total and per capita health centre visits in the North Baffin local study area (LSA) and Iqaluit in the post-development period, these trends were also evident in the five years preceding Project development (and throughout Nunavut). This implies a longer-term, territory-wide trend is likely occurring rather than a Project-induced one. However, health centre utilization rates can also be influenced by many different socio-economic factors. As Project construction only began in 2013, there is a minimal amount of post-development data currently available. Correlations between the Project and health centre utilization, if any, will only come to light with the analysis of additional annual data.

In any case, the primary means through which the Project could negatively influence health service provision – in-migration of workers – has been shown not to be occurring in any significant manner. In fact, the Project may be having a positive effect on LSA health service provision, by providing employees with regular access to an on-site Project medic. This access allows LSA residents to have at least some of their health needs addressed on-site, thereby reducing demands placed on local health care providers (Table 4.34).

Table 4.34 Human Health and Well-being Indicators and Trends in 2016

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Number of health centre visits (total)	↑ ↑	↑ ↑	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the total number of health centre visits is apparent in the LSA and was evident prior to the Project
Number of health centre visits (per capita)	↑ ↑	↑ ↑	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the per capita number of health centre visits is apparent in the LSA and was evident prior to the Project
Number of visits to Project site medic	n/a	↑	↑	Project	There were 4,012 visits to the Project site medic in 2016 (801 visits by Inuit)

TRENDS

Trends are also presented in Table 4.34.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information related to pressures on existing health and social services provided by the GN that may be impacted by Project-related in-migration of employees. Baffinland will also continue to engage the Mary River SEMWG and QSEMC on this topic.

Project Certificate Condition No. 159

Category	Community Infrastructure and Public Services – Impacts to infrastructure
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor Project-related impacts to infrastructure within the Local Study Area communities
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland continues to work with the QSEMC and the Mary River SEMWG on socio-economic monitoring initiatives; the GN actively participates in both these groups. Baffinland has also provided information on potential socio-economic effects of the Project in the 2016 Socio-Economic Monitoring Report. This includes indicator data related to increased Project-related pressures to community infrastructure in the LSA communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit.

RESULTS

Like previous years, Baffinland continued to use some LSA community infrastructure to support ongoing Project operations in 2016. This use is small in comparison to other ongoing community uses and adds only minimal incremental pressure on LSA facilities. For example, Baffinland's rental of office spaces in the LSA is generally limited to small facilities (i.e. to support individual BCLOs and Northern Affairs staff), and the use of local meeting rooms and accommodations is often intermittent (e.g. community meetings may only occur a few times or less per year) and short-term in nature. Furthermore, the use of these spaces can be considered a positive economic contribution of the Project to local economies (e.g. through payments of rental fees, purchase of related goods and services).

LSA community airports also regularly accommodate various non-Project passenger, cargo, and other aircraft (both scheduled and charter). Project-related aircraft movements add only minimal incremental pressure on these facilities. For example, in 2015 (the most recent year in which data is available) there were a total of 24,458 aircraft movements in the LSA. This includes 6,056 aircraft movements at North Baffin LSA airports (Statistics Canada 2016f) and 18,402 aircraft movements at the Iqaluit airport (Statistics Canada 2016g). Project-related aircraft movements (fixed-wing only) at community airports in the LSA in 2015 represent only a small portion (5.4%) of this total. The 2016 monitoring results for indicators of the Project's effects on community infrastructure and public services is presented in Table 4.35.

Table 4.35 2016 Monitoring Results for Community Infrastructure and Services Indicators

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Baffinland use of LSA community infrastructure	n/a	↑	No change	Project	Baffinland continued to use some LSA community infrastructure to support Project operations in 2016
Number of Project aircraft movements at LSA community airports	n/a	↑	↓	Project	There were 1,254 Project fixed-wing aircraft movements at LSA airports in 2016

TRENDS

Trends are also presented in Table 4.35.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information related to increased Project-related pressures to community infrastructure in the LSA communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit. Baffinland will also continue to engage the Mary River SEMWG and QSEMC on this topic.

Project Certificate Condition No. 160

Category	Community Infrastructure and Public Services – Distribution of benefits
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure the distribution of benefits is done in a way that off-sets Project-related impacts to infrastructure or services.
Term or Condition	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure in a broad sense, that Project benefits are distributed across impacted communities and across various demographic groups within these communities in a manner that best offsets any Project-related impacts to infrastructure or services.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association (QIA), Government of Nunavut (GN)
Reference	Inuit Impact and Benefit Agreement (IIBA; QIA and Baffinland, 2013) 2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

While Baffinland cannot influence how the (QIA and GN interact with one another, the Company regularly cooperates with both organizations to help ensure Project benefits are distributed appropriately and Project-related impacts are addressed.

Baffinland produces an annual socio-economic monitoring report and regularly engages the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG) to discuss socio-economic impacts and benefits of the Project. GN and QIA representatives are active members of both the QSEMC and Mary River SEMWG.

RESULTS

The 2016 Socio-Economic Monitoring Report identifies a number of positive effects the Project had in 2016. Approximately 1,888,260 hours of Project labour were performed by Baffinland employees and contractors in Nunavut in 2016, which was equal to approximately 908 full time equivalent positions. In addition, approximately \$7.6 million in payroll was provided to Baffinland LSA employees and \$64.4 million was spent on procurement with Inuit-owned businesses and joint ventures in 2016. Various programs under the IIBA also continued to operate in 2016, such as the Illagiiktunut Fund, which provides up to \$750,000 per year for projects across the Qikiqtani Region that are designed to enhance community wellness.

TRENDS

None.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to support the QIA and GN in 2017, where appropriate to help offset any Project-related impacts to infrastructure or services in the communities.

Project Certificate Condition No. 161

Category	Community Infrastructure and Public Services – Policing
Responsible Parties	The Proponent, Government of Nunavut, Royal Canadian Mounted Police
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG) processes
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

While Baffinland cannot influence how the Government of Nunavut (GN) and Royal Canadian Mounted Police (RCMP) interact with one another, the Company regularly cooperates with the GN with regards to Project-related socio-economic monitoring. For example, Baffinland produces an annual socio-economic monitoring report (which includes demographic and crime-related information) and regularly engages the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG) to discuss socio-economic impacts and benefits of the Project. GN representatives are active members of both the QSEMC and Mary River SEMWG. Information obtained by the GN during these meetings and through review of Baffinland's annual socio-economic monitoring reports may be used to prepare for any potential increased need for policing and crime prevention activities.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to cooperate with the GN in regards to Project-related socio-economic monitoring (including monitoring of demographic and crime-related information). Baffinland will continue to engage the GN through the QSEMC and Mary River SEMWG, moving forward.

4.6.7 Culture, Resources & Land Use (PC Conditions 162 through 166)

Five (5) PC conditions relate to the potential impacts of the Project on culture, resources and land use. The conditions request Baffinland notify communities regarding Project activities and particularly shipping and that Baffinland engage communities in monitoring programs and the establishment of mitigation measures to ensure that both consider traditional activities.

Stakeholder Feedback

Key stakeholders focused on culture, resources and land use include the communities, the QIA, the GN Department of Culture and Heritage, and the Inuit Heritage Trust. The latter two organizations are responsible for the management of cultural heritage including archaeological sites. The potential for the Project to affect current land uses and the availability of wildlife resources were key concerns of the communities and the QIA. The GN departments expressed concern regarding the potential for adverse effects to archaeological sites and ensuring proper planning and procedures took place.

Monitoring

Baffinland conducts annual monitoring and sometimes mitigation work under an Archaeological Permit issued by the GN. Baffinland also monitors the number of land use visitor person-days at Project sites, and the number of Wildlife Compensation Fund claims recorded annually. Table 4.36 provides an evaluation of the Project's impacts on culture, resources and land use, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.36 Culture, Resources and Land Use Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Archaeological Sites	Unauthorized removal of artifacts from known archaeological sites	Worker site orientation training includes rules regarding archaeological sites, with dismissal a consequence of offence. Baffinland's consulting archaeologist visits most sites each year. Sites are successfully mitigated or protected, as applicable.	Effects did not occur
	Disturbance to archaeological sites due to ground disturbance activities without mitigation		
	Potential for chance finds	Reporting of chance finds as per Cultural and Heritage Resource Protection Plan: no chance finds located in 2016	
Inuit Harvesting of Wildlife	Mine operations affecting the harvesting of caribou, marine mammals and fish	Land user visits to the Mine Site and Milne Port were recorded. Monitoring suggests Inuit harvesting successfully coexists with the Project's activities. However, a small number (2) of Wildlife Compensation Fund claims were filed in 2016, one of which was eventually approved and resulted in compensation being paid.	Effect within FEIS predictions
Travel and Camps	Potential for reduced safety travelling around Eclipse Sound and Pond Inlet, and through Milne Port. Emissions and noise disruption during travel and/or camping	Site observations suggest Inuit land use coexists with the Project's activities. In 2016, a total of 293 land use visitor person-days were recorded at Project sites, which is 77 person-days more than in 2015.	Effect within FEIS predictions
	Sensory disturbance and safety along Milne Inlet Tote Road	Fewer hunters using cabins due to caribou hunting ban	Effect within FEIS predictions
	Detour around Mine Site		
	HTO cabin closure	HTO cabin at Milne Port and the Mine Site were relocated several years ago. The new cabins appear to be used satisfactorily.	Effect within FEIS predictions

Meaningful effects to culture, resources and land use as a result of the Project have not occurred, based on monitoring and site observations. In fact, monitoring data suggests Inuit land use and harvesting coexists with the Project. Local land users continued to access Project sites in 2016, and the number of land use visitor person-days have increased every year since

record-keeping was commenced. Baffinland acknowledges the potential for future wildlife-related impacts from the Project and has contributed \$750,000.00 to a Wildlife Compensation Fund (administered by the QIA under the terms of the IIBA) to address this issue. While two Wildlife Compensation Fund claims were made in 2016, only one of these was eventually approved and for a relatively small amount of compensation (i.e. \$600.00).

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the MRSMWG and QSEMC. Reporting on each PC condition follows.

Project Certificate Condition No. 162

Category	Culture, Resources and Land Use – Public consultation
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure the ongoing and consistent involvement of Elders and community members in developing and revising monitoring and mitigation plans
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtani Inuit Association, North Baffin Communities
Reference	Not applicable
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

In 2016, Baffinland completed workshops on the Phase 2 Expansion Project that had been initiated in 2015. These workshops engaged key elders and other community members in identifying impacts, potential mitigation measures and monitoring programs related to the impacts of the Phase 2 Expansion Project on wildlife, hunting and the communities. The QIA was involved in designing the workshops.

A summary of the results of the key environmental issues noted by the communities in a survey conducted in 2016 (caribou, impacts from dust and impacts to marine mammals) were provided to the five communities in presentation and poster format in November of 2016. All comments received were recorded for Baffinland’s consideration in the development of monitoring programs and mitigative measures.

The Mittimatalik Hunters and Trappers Organization are members of the Marine and Terrestrial Environment Working groups where the monitoring programs are reviewed annually and plans are developed for the following year incorporating mitigative measures as required.

Workshops and meeting with the community of Pond Inlet were held in late 2016 to discuss a proposed Winter Sealift that would allow Baffinland to bring additional supplies to the Mary River site by ice-breaker. Due to feedback and concerns raised by the community especially around the potential impacts to sea dens and hunting activities that occur in March, Baffinland cancelled the 2017 Winter Sealift.

RESULTS

Feedback received during the Phase 2 workshops helped contribute to Baffinland’s decision making with respect to the duration of shipping on the Phase 2 proposal submitted to the Nunavut Planning Commission in 2017.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide the results of the key monitoring programs of interest to the communities. The engagement with the MHTO during the working group meetings has provided valuable knowledge, which will guide the development of monitoring programs and mitigative measures as, needed.

Project Certificate Condition No. 163

Category	Culture, Resources and Land Use – Public consultation
Responsible Parties	The Proponent, North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To involve communities in the development and evolution of management and monitoring plans
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	North Baffin Communities
Reference	Community Survey Summary Report Community Tour Report Summary Report
Ref. Document Link	Appendices A and B

METHODS

In 2016, Baffinland held public meetings whose purpose were to share project related information and gather feedback. In addition, Baffinland carried out a community survey within the five North Baffin communities that are the most likely to be affected by the Mary River Project. The survey consisted of a series of high level questions that asked about how the project may potentially be affecting the communities, the environment, and the overall way of life in North Baffin Island. The survey was also used to gather information about the overall relationship between Baffinland and the North Baffin communities. The survey was a mechanism for community residents to have their voices heard, and for Baffinland to support positive relationship building with the communities.

Baffinland has used radio announcements, public meetings, meetings with Hamlet councils and local HTOs as well as community surveys and workshops to engage with the North Baffin communities in 2016. In addition, Baffinland employs community liaison officers (BCLOs) in each of the five communities to provide in person support and communication.

RESULTS

Baffinland has continued to respond to community concerns and has evolved Project plans based on the feedback received. Some of the results we received from the community survey held in September of 2016 indicate that the majority of respondents have felt that the Project has made a positive impact on their communities and 65% of the respondents did not have concerns about the Project impacting the communities or the environment. The use of public meetings and radio announcements were the preferred mechanism for communication. Other tools such as Facebook and engagement with the BCLOs were noted as useful engagement mechanisms.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Community meetings and surveys have been useful tools to communicate and engage with the communities and gather feedback. Baffinland has added a web document portal to its corporate page, which will make accessible information related to the projects such as annual reports and management plans. Many of the documents will include a popular summary, which will be available in both English and Inuktitut. Baffinland will continue to engage with the North Baffin communities.

Project Certificate Condition No. 164

Category	Socio-Economic Impacts – Shipping notification
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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.
Term or Condition	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
Reporting Requirement	The information required shall be provided on a monthly basis at a minimum or more often as the Proponent determines necessary and is to be provided to the Proponent's community liaison officers and those of the Qikiqtani Inuit Association as well as the Hunters and Trappers Organizations and Hamlet organizations of the North Baffin communities, Coral Harbour, and the NIRB's Monitoring Officer. Where deviations from the proposed schedule or routing are required, this information shall be provided as soon as possible.
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Baffinland has enlisted exactAIS[®], a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The ship location data from exactAIS is available on the Baffinland web site for easy access by the local communities. In addition, access to a tracking portal was provided to the QIA and Parks Canada in Pond Inlet.

Information on ships such as: last reported coordinates of the vessel, whether the vessel is moving, the direction of vessel movement and destination of the vessel are provided.

The vessel locations plotted on the map are not "real-time", but are a regularly updated snap shot of vessel movement in the North Baffin region. Baffinland encourages all land and water users to continue to practice safe boating, hunting, and other travel activities, and be aware of your surroundings at all times.

A workshop was held in July of 2016 in Pond Inlet to present the 2016 shipping plans to the community prior to the start of the season.

RESULTS

Baffinland has made vessel routing accessible to the public. There were no changes to the shipping route in 2016.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactAIS[®] to be beneficial in providing information related to ship routing to the public. Baffinland will continue its use of this service. Baffinland will continue to communicate changes to the proposed shipping schedule to the Marine Environment Working Group where the Mittimatalik Hunters and Trappers Organization is a member.

Project Certificate Condition No. 165

Category	Socio-Economic Impacts – Emergency shelters
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	In order to provide for human safety precautions in the event of adverse weather or other emergency situations along segments of linear transportation infrastructure
Term or Condition	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.
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Tote Road Travel Procedure (Baffinland, 2015d)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland has constructed 3 refuge stations at Km 33, 40 and 69 along the Tote Road. Each station is heated with beds and bedding, water, an automatic external defibrillator (AED), food and a digital radio that will contact security or dispatch and that is always monitored. A fourth station is to being set-up at km 60, which currently has a heated washroom and an AED. In addition to the four refuge stations, there are 11 seacans co-located at communication towers along the Tote Road, equipped with a fire extinguisher, first aid kits and are heated. The seacans do not house radios, food or water. Photos of the emergency shelters, sea-cans and locations of the communication towers have been included in Appendix E.

Baffinland has a trained emergency response team at both ends of the Tote Road with emergency vehicles to respond to any concerns rapidly. The emergency response team also has a Hagluund rescue vehicle that is capable of moving through snowdrifts and effecting a rescue as required. The Tote Road Travel Procedure is publicly available and outlines the emergency response procedure.

Past procedure when public have been in the area and has requested to travel down the tote road has been to escort the snowmobiles down the tote road so that they are travelling in convoy with mine equipment (however experience has shown that in general the public has not often chosen to use the road). All ore haul trucks carry emergency bags with blankets and provisions in case they get stuck on the Tote Road, which could be used in an emergency situation.

The Steensby rail line project has been deferred at this time.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

This PC condition was originally developed for the development of the southern rail-line running to Steensby Inlet. There are significant differences between the rail project and the Milne ERP project that reduce risk to land users travelling through the Project area that Baffinland felt warranted a reduced number of emergency shelters. The rail project would not have had a road alongside it, and so organizing a rescue required more logistics. With the Tote Road, the ability of multiple types of vehicles to access a person in need of assistance is significantly reduced. The time between passing vehicles is also significantly different. With the rail project, it was predicted that there were three trains with a 10.5 hr cycle time operating 300 days per year. In a given day when all three trains were running this means that, you have up to 3.5 hours between a passing vehicle that could be alerted to an emergency situation. With over 50 vehicles travelling down the 100km Tote Road with an average cycle time of 7 hours, there is approximately 8 minutes between a passing vehicle.

Baffinland does not feel that construction of emergency shelters along every 1km of the Tote Road is warranted at this time.

Construction of emergency shelters along the Steensby rail line will be considered when this phase of the Project becomes active.

Project Certificate Condition No. 166

Category	Socio-Economic Impacts – Public Consultation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	None
Reference	Hunter and Visitor Site Access Procedure (Baffinland, 2015e)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Vessel transit information is publicly available on the Baffinland website. The webpage displaying ship transit information also posts an email address (contact@baffinland.com) to contact regarding any shipping updates or information.

Baffinland has developed a Hunter and Visitor Site Access Procedure for visitors wanting to access the project area, made available to local communities and accessible on the Baffinland web portal. All policies related to visitors to the Project Area are developed with rights of NLCA beneficiaries and conditions of the IIBA in mind.

RESULTS

The public have access to shipping operations personnel via telephone and internet contact.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to promote the use of the Hunter and Visitor Site Access procedure and the ship transit web tracking service available on the Baffinland website.

4.6.8 Benefits, Royalties and Taxation (PC Condition 167)

One PC condition relates to the potential impacts of the Project on benefits, royalties and taxation: that Baffinland negotiate a Development Partnership Agreement with the GN. The GN, however, no longer negotiates such agreements.

Stakeholder Feedback

Key stakeholders focused on the benefits, royalties and taxation include the following:

- QIA - Receives IIBA benefits; also receives surface lease rents and royalties on aggregate on Inuit Owned Land (IOL)
- NTI - recipient of mineral royalties first payable to the Government of Canada, since Inuit hold sub-surface rights to Deposit No. 1 covered by a grandfathered federal mining lease
- GN - Recipient of territorial taxes (corporate, property and payroll taxes)
- Qikiqtani Inuit - Beneficiaries of benefits and royalties that accrue to the QIA, as well as a portion of mineral royalties paid to NTI and then dispensed to the QIA and other regional Inuit organizations
- Other Nunavummiut - Beneficiaries of mineral royalties payable to NTI

Inuit in the North Baffin have expressed a desire to receive various financial and other benefits from the Project. These benefits are viewed by some as compensation for having industrial activity on their land and for the risk of impacts to wildlife upon which the people in the North Baffin Region depend. More recently, North Baffin communities have expressed dissatisfaction with the benefits being delivered by the QIA through the IIBA, and have initiated actions to establish a North Baffin designated Inuit organization under the *Nunavut Agreement*.

Monitoring

Baffinland tracks payments made as benefits, royalties and taxes, and this information is presented in annual monitoring reports. Table 4.37 provides an evaluation of the Project's impacts on benefits, royalties and taxes, based on monitoring activities completed in 2016, relative to predictions presented in the FEIS.

Table 4.37 Benefits, Royalties and Taxation Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Benefits and Royalty Payments to Inuit Organizations	Increased revenues that can be dispensed to Inuit beneficiaries	Monitoring is not required.	Within FEIS predictions
Territorial Own-source Revenues	Increased taxes and revenues; Payments of payroll and corporate taxes to territorial government	Monitoring is not required to validate if taxation occurs	Within FEIS predictions

Significant positive benefits have been realized by the stakeholders listed above, as a result of benefits, royalties and taxes paid by the Project in 2016.

Path Forward

Baffinland will continue to meet its commitments with respect to benefits, royalties and taxes. Reporting on PC Condition 167 follows.

Project Certificate Condition No. 167

Category	Benefits, Royalty and Taxation – Partnership Agreements
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction
Objective	The Proponent and the Government of Nunavut develop a formalized partnership agreement.
Term or Condition	The Proponent and the Government of Nunavut are strongly encouraged to, as soon as practical following the issuance of the Project Certificate, enter into discussions to negotiate a Development Partnership Agreement
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not applicable in 2016
Stakeholder Review	Government of Nunavut (GN)
Reference	Not applicable
Ref. Document Link	None

METHODS

Baffinland issued an invitation letter to the Government of Nunavut in September 2013 regarding the negotiation of a Development Partnership Agreement (DPA). However, a DPA between the GN and Baffinland has not yet been formalized. It has come to Baffinland's attention that the DPA program for new mines is currently on hold, while the GN's Department of Economic Development and Transportation and Department of Finance work to develop a replacement (Gregoire, 2016). For added context, the GN's Department of Economic Development and Transportation webpage on this topic (i.e. Government of Nunavut, 2017) contains a DPA Policy that is noted to have expired on March 31, 2016.

RESULTS

Not applicable.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will consider re-engaging with the GN on this topic once a replacement policy has been developed by the GN.

4.6.9 Governance & Leadership (PC Conditions 168 through 169)

Two (2) PC conditions relate to the potential impacts of the Project on governance and leadership, both of which relate to the collection of socio-economic data and annual reporting to NIRB.

Stakeholder Feedback

Members of the MRSMWG include Baffinland, the QIA, the GN, and INAC. Each organization has an interest and a role in improving socio-economic conditions within the Qikiqtani Region or Nunavut as a whole. Baffinland has actively engaged the group over the past several years. In 2015 and early 2016, Baffinland revised its socio-economic monitoring program based on feedback from this group. Baffinland is also actively involved in the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and regularly participates in its meetings.

Monitoring

Baffinland completes a socio-economic monitoring report annually, which presents the applicable monitoring results. The socio-economic monitoring program has been developed in consultation with the MRSMWG, and monitoring results are also reviewed by this group and QSEMC annually.

Path Forward

Baffinland will continue to undertake the collection of socio-economic monitoring data in consultation with the MRSMWG and QSEMC, and report this monitoring data annually. Reporting on each PC condition follows.

Project Certificate Condition No. 168

Category	Governance and Leadership – Monitoring program
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Outline variables that are relevant to the Project and which should be adopted by the QSEMC's monitoring program
Term or Condition	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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Data collection and analysis methods are presented in the annual report. Data is collected from Nunavut Statistics, change of address information collected by Baffinland's Community Liaison Officers, and from voluntary employee surveys.

RESULTS

The results and trends in the 2016 socio-economic monitoring data is presented in Table 4.38.

Table 4.38 2016 Monitoring Results and Trends for Key Socio-economic Indicators

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Known in-migrations of non-Inuit Project employees and contractors	n/a	No change	No change	N. Baffin LSA	Since 2015, a net of zero known non-Inuit employees/contractors have in-migrated to the North Baffin LSA
In-migration of non-Inuit to the North Baffin LSA	n/a	n/a	n/a	N. Baffin LSA	Limited data currently available. However, the percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant.
Known out-migrations of Inuit Project employees and contractors	n/a	↑	↑	N. Baffin LSA	Since 2015, a net of three known Inuit employees/contractors have out-migrated from the North Baffin LSA
Out-migration of Inuit from the North Baffin LSA	n/a	n/a	n/a	N. Baffin LSA	Limited data currently available. However, the percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant.
Nunavut annual net migration	↓	↓	↓	Territory	A downward trend in Nunavut annual net migration is occurring
Employee changes of address, housing status, and migration intentions	n/a	n/a	n/a	Project	20.9% of Employee Information Survey respondents (43 surveys total) housing situation changed in the past 12 months. 16.3% moved (either to different housing or a different community) and 7.0% moved to a different community. 16.3% intend to move to a different community in the next 12 months. 7.0% intend to move away from the North Baffin LSA. No individuals intend to move into the North Baffin LSA. Over two-thirds of respondents currently live in public housing.
Hours worked by female employees and contractors	n/a	↑	↓ (% hours worked compared to Q4 2015)	Project	151,128 hours were worked by female employees and contractors in 2016 (8.0% of total), 68,862 hours of which were worked by Inuit females (3.7% of total)
Childcare availability and costs	n/a	n/a	n/a	Project	This topic continues to be tracked through the QSEMC process and Baffinland's community engagement program
Project harvesting interactions and food security	n/a	n/a	n/a	Project	This topic continues to be tracked through the QSEMC process and Baffinland's community engagement program
Number of drug and alcohol related contraband infractions at Project sites	n/a	↑	↑	Project	There were 11 contraband infractions at Project sites in 2016
Number of impaired driving violations	↑ ↓	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the number of impaired driving violations is apparent in the North Baffin LSA, while a long-term decrease is apparent in Iqaluit. Both trends were evident prior to the Project.
Number of drug violations	↑ ↑	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term increase in the number of drug violations is apparent in the North Baffin LSA and was evident prior to the Project. A decrease in Iqaluit has occurred since the Project, after experiencing a prior increase.

Indicator(s)	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Prevalence of gambling issues	n/a	n/a	n/a	Project	These topics continue to be tracked through the QSEMC process and Baffinland's community engagement program
Prevalence of family violence	n/a	n/a	n/a	Project	
Number of secondary school graduates	↑ ↓	↓ ↓	↑ ↑	N. Baffin LSA Iqaluit	A long-term decrease in graduation numbers is apparent in Iqaluit and was evident prior to the Project. A decrease in the North Baffin LSA has occurred since the Project, after experiencing a prior increase. However, a similar decrease has occurred throughout the territory as a whole.
Secondary school graduation rate	↓	↓	↑	Region	A long-term decrease in graduation rates is apparent in the region and was evident prior to the Project

Detailed results are presented in the annual socio-economic monitoring report referenced above, including additional information for indicators where appropriate community-level indicator data are not currently available (e.g. for the topics of childcare availability and costs, Project harvesting interactions and food security, prevalence of gambling issues, prevalence of family violence).

TRENDS

Trends in the monitoring data relative to the previous year and pre-development are presented above in Table 4.38.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on potential socio-economic effects of the Project through its socio-economic monitoring program. In instances where appropriate community-level indicator data are not currently available, these topics continue to be tracked through the QSEMC process and Baffinland's community engagement program. Baffinland will also continue discussing with the Mary River SEMWG how improved indicator data may be obtained for these topics.

Project Certificate Condition No. 169

Category	Governance and Leadership – Monitoring economic effects
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To maintain transparency inform communities in relation to economic benefits associated with the Project
Term or Condition	The Proponent provide an annual monitoring summary to the NIRB on the monitoring data related to the regional 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
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2016 Socio-Economic Monitoring Report for the Mary River Project (Jason Prno Consulting Services Ltd., 2017)
Ref. Document Link	Appendix H

METHODS

Baffinland has provided a summary of monitoring data related to regional and cumulative economic effects (positive and negative) associated with the Project in its annual socio-economic monitoring report.

RESULTS

The Project continued to make positive contributions to the Nunavut economy in 2016. A total of 1,881,506 hours of Project labour were performed by Baffinland employees and contractors in Nunavut in 2016, which was equal to approximately 905 full-time equivalent positions. In addition, approximately \$7.6 million in payroll was provided to employees residing in the North Baffin, and \$64.4 million was spent on procurement with Inuit-owned businesses and joint ventures in 2016. When compared to annual economic outputs for Nunavut as a whole, these values are notable. In 2015 (the most recent year for which estimates are available), for example, there were a total of 15,815 jobs held in Nunavut and 28,338,000 total hours worked (Nunavut Bureau of Statistics, 2016j), with average weekly earnings of \$1,256.70 per employee (Nunavut Bureau of Statistics 2016k). By comparison, hours worked by Baffinland's employees and contractors in Nunavut in 2015 (i.e. 1,844,081) represent 6.5% of the Nunavut total. Average weekly earnings of Baffinland's Inuit employees in 2015 were also higher than the Nunavut average, at \$1,851.57.

Mining remains an important contributor to the Nunavut economy. Nunavut's real gross domestic product (GDP) for all industries in 2015 was \$2,027.2 million. Of this amount, '*mining, quarrying, and oil and gas extraction*' was responsible for contributing \$337.4 million, while '*construction*' was responsible for \$261.0 million (Nunavut Bureau of Statistics, 2016). The Mary River Project has been an important contributor to these amounts, as has Agnico-Eagle Mines Limited's Meadowbank Mine (Nunavut's only other operating mine), and several other Nunavut-based mining projects that are in various stages of development. Mining contributed \$57 billion to the country's GDP, or 3.5% of total Canadian GDP in 2014. The industry also employs some 375,000 individuals and remains the largest proportional private sector employer of Aboriginal peoples in the country (Mining Association of Canada, 2016).

TRENDS

The Project continues to provide positive regional and cumulative economic effects.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on regional and cumulative economic effects of the Project through its socio-economic monitoring program. No negative regional or cumulative economic effects associated with the Project were identified in 2016. As such, no mitigation measures are being proposed to mitigate negative effects.

4.7 PERFORMANCE ON OTHER CONDITIONS

4.7.1 Accidents & Malfunctions (PC Conditions 170 through 177)

Eight (8) PC conditions relate to accidents and malfunctions. Two of these conditions relate to the TEMMP, four relate to spill response planning, one relates to implementing adaptive management measures around hunter safety around ice tracks, and one relates to the use of foreign flagged vessels. Baffinland's updates to these PC conditions are provided in the pages that follow.

Project Certificate Condition No. 170

Category	Accidents and Malfunctions – Terrestrial Wildlife Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	Updates to plan in order to better understand the potential for, and to minimize possible caribou-railway interactions
Term or Condition	The Proponent shall include in an updated Terrestrial Wildlife Management and Monitoring Plan, plans for increased caribou monitoring efforts including weekly winter track surveying and summer and fall surveys undertaken on foot twice per month
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Deferred
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	None
Ref. Document Link	None

METHODS

None

RESULTS

None

TRENDS

None

RECOMMENDATIONS / LESSONS LEARNED

Project Certificate Condition No. 170 refers to better understanding and to minimize caribou interactions with the railway. The railway has not been built, and these monitoring activities have not been triggered.

Project Certificate Condition No. 171

Category	Accidents and Malfunctions – Terrestrial Wildlife Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Pre-Construction
Objective	Updates to plan in order to minimize potential for caribou-railway interactions
Term or Condition	The Proponent shall include within its updated Terrestrial Wildlife Management and Monitoring Plan, a commitment to establish deterrents along the railway and Tote Road embankments at any areas where it is determined that caribou are utilizing the embankments or transportation corridors to facilitate movement and where such movement presents a likelihood of caribou mortality to occur
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status	Complete
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2016 Terrestrial Environment Annual Monitoring Report (EDI, 2017)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Areas along the Tote Road that caribou may use for movement were identified in the Final Environmental Impact Statement terrestrial wildlife baseline report. Successive Height of Land Surveys and driver observations have continued to provide information on potential areas of use by caribou along the Tote Road.

RESULTS

Caribou observations near the Tote Road have diminished since 2013 to no observations through winter 2017. The lack of observations near site is related to the region-wide low caribou numbers.

TRENDS

None

RECOMMENDATIONS / LESSONS LEARNED

To date, no areas have been identified along the road where there is a likelihood of caribou mortality to occur. Because of these observations, no deterrents have been necessary along the Tote Road.

Project Certificate Condition No. 172

Category	Accidents and Malfunctions – Overwintered fuel vessel
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To provide evidence that vessel to be used is fit and insured for proposed use
Term or Condition	The Proponent is encouraged to provide the Government of Nunavut with evidence that the vessel that it intends to use for the overwintering of fuel has been designed and certified for use under the conditions which it is expected to operate, and that it be required to provide copies of the vessel owners' insurance policies
Reporting Requirement	The required information is to be provided to the Government of Nunavut as soon as possible, and at a minimum, at least 60 days prior to the commencement of any construction related shipping
Status	Not applicable in 2016
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

Not applicable

RESULTS

None

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland did not require the overwintering of fuel in 2016. If overwintering of fuel is required, Baffinland will provide the Government of Nunavut with the requested information.

Project Certificate Condition No. 173

Category	Accidents and Malfunctions – Use of best practices
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure
Objective	To provide additional spill contingency measures for spills in marine areas
Term or Condition	The Proponent shall employ best practices and meet all regulatory requirements during all ship-to-shore and other marine-based fuel transfer events
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Transport Canada
Reference	Oil Pollution Emergency Plan (OPEP; Baffinland, 2016u)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Baffinland maintains a Transport Canada approved OPEP for ship to shore fuel transfers at Milne Port. No updates to the Plan were made in 2016. Training of Baffinland staff on the Milne Inlet OPEP was conducted by a qualified marine spill response contractor between July 29-31, 2016.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 174

Category	Accidents and Malfunctions – Community level spill response
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure
Objective	To improve community ability to assist in spill response
Term or Condition	The Proponent and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to potentially improve response times in the event of a spill
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Transport Canada, Canadian Coast Guard
Reference	Spill at Sea Response Plan (Baffinland, 2015c) Canadian Coast Guard letter to NIRB dated January 29, 2015 (CCG, 2015)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Spill training exercises took place at Milne Port from July 29 to 31, 2016.

In a January 29, 2015 letter from the Canadian Coast Guard (CCG) letter to NIRB, the CCG noted that the provision of spill response equipment and training to communities was the responsibility of CCG.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 175

Category	Accidents and Malfunctions – Ship track markers in ice cover
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Hunters and Trappers Organizations of the North Baffin region and Coral Harbour
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Deferred
Stakeholder Review	None
Reference	Not applicable
Ref. Document Link	None

METHODS

Baffinland is conducting all of its shipping during open water and there is currently no winter shipping or ice-breaking being conducted. Action on this PC Condition is deferred until the Steensby Port is developed and transits through ice are scheduled.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 176

Category	Accidents and Malfunctions – Revised spill modeling
Responsible Parties	The Proponent
Project Phase(s)	Pre-Construction, Construction Operations, Closure
Objective	To improve community ability to assist in spill response
Term or Condition	The Proponent is required to revise its spill planning to include additional trajectory modeling for areas of Hudson Strait, such as Mill Island, where walrus concentrate, as well as for mid-Hudson Strait during winter conditions as well as for the northern shipping route, including Milne Inlet, Eclipse Sound and Pond Inlet
Reporting Requirement	The updated modeling shall be provided to the NIRB, Fisheries and Oceans Canada, and Environment Canada for review at least 3 months prior shipment of bulk fuel to Steensby Inlet or Milne Inlet
Status	Deferred
Stakeholder Review	Transport Canada, Canadian Coast Guard, Fisheries and Oceans Canada, Environment and Climate Change Canada
Reference	Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season - Milne Inlet, Eclipse Sound, Pond Inlet (AMEC, 2015)
Ref. Document Link	http://www.baffinland.com/shareddocuments/

METHODS

Revised oil spill modelling was conducted for shipping from Milne Port in 2015. Leading up to this modelling, a fuel spill preparedness workshop was held in April 2014 with Transport Canada and the Canadian Coast Guard. This workshop established the following credible spill scenarios for modelling:

- For arctic diesel - two compartments of a double-hull, multi-compartment fuel tanker, which amounts to 4,000 m³ (4 ML). The expected maximum size of the fuel tanker is 15 ML.
- For IFO - half of the IFO fuel remaining in the ship when sailing into Milne Inlet which amounts to 2,000 m³ (2 ML) of IFO.

The spill assessment considered the open water season, and the month of September was selected as representative in terms of meteorological and oceanographic conditions. Five potential spill locations along the shipping route were selected considering community recommendations.

Two scenarios were modelled at each of the five locations using the software OST, which computes spill probability distributions to indicate geographical regions (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet) which might be affected as a result of a spill, how frequently and how soon.

In addition, 10 (two fuel types x five locations) simulations were run with a September 'P50' wind condition defined as the average wind speed conditions and the associated most frequent wind direction. Finally, a sensitivity run considering a full fuel tanker loss of 15 ML arctic diesel cargo at a location in Eclipse Sound was also prepared. For these scenarios, RPS ASA's OILMAP (RPS 2014) was used to provide additional estimation of spill weathering and fate. This includes slick characteristics, estimate of fuel concentrations in the surface layer, amounts evaporated and that have reached shore, and remaining amounts of fuel, and fuel and water (mousse) volume. The spill modelling completed in this study assumes no intervention, response or containment and that the slick is assumed to freely discharge (during a very short duration) from the damaged vessel.

The OILMAP oil spill model and response system introduced above was used to provide additional estimates of spilled fuel fate, in particular, slick characteristics and weathering. OILMAP calculates the evaporation, dispersion and remaining percentage for a given spill scenario where the user defines a fuel product type, weather conditions, properties of the receiving water, and the amount of fuel released.

The fate or weathering processes considered were evaporation, the conversion of liquid fuel into gaseous component, and natural dispersion, the breakup of a fuel slick into small droplets that are mixed into the sea by wave action. These are two important weathering processes that typically occur over the first five days following a spill and act to remove fuel from the sea surface. Fuel will also be brought to shore depending on the prevailing currents and winds at the time as well as the type and amount of fuel, and type of shoreline. Consideration of the amounts lost due to these processes yields an estimate of the remaining amount of fuel on the surface at any time. These are the key fates modeled and tracked by OILMAP. No containment or recovery of spilled fuel was assumed in the simulations.

RESULTS

The modelling results were presented in a series of figures showing expected spill trajectories after 1 day and 5 days. The spill model informed the development of Baffinland's Spill at Sea Response Plan.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

There have been no changes to the shipping practices since the spill modelling was conducted; therefore, no updates are required.

Project Certificate Condition No. 177

Category	Accidents and Malfunctions – Foreign flagged vessels
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	To ensure foreign flagged ships operating in Canadian waters are held to the same standard as domestic ships with regard to emergency response planning
Term or Condition	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
Reporting Requirement	To be determined following approval of the Project by the Minister
Status	Complete
Stakeholder Review	Transport Canada
Reference	Not applicable
Ref. Document Link	None

METHODS

Shipowners / operators are responsible for enrolling their foreign flagged vessel with the appropriate program. Baffinland incorporates this requirement into contract terms and conditions with all vessels contracted directly by Baffinland.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.7.2 Alternatives Analysis (PC Condition 178)

PC condition 178 requires specific routing of ship to avoid important walrus habitat along the southern shipping route. Baffinland will comply with this requirement when shipping to and from Steensby Port begins in the future.

Project Certificate Condition No. 178

Category	Alternatives Analysis – Mill Island shipping route consideration
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Nunavut Impact Review Board, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance
Objective	To prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island.
Term or Condition	Subject to safety considerations and the potential for conditions, as determined by the crew of transiting vessels, to result in route deviations, the Proponent shall require project vessels to maintain a route to the south of Mill Island to prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island
Reporting Requirement	Where project vessels are required to transit to the north of Mill Island owing to environmental or other conditions, an incident report is to be provided to the Marine Environment Working Group and the NIRB within 30 days, noting all wildlife sightings and interactions as recorded by shipboard monitors. The Proponent shall summarize all incidences of deviations from the nominal shipping route as presented in the FEIS to the NIRB annually, with corresponding discussion regarding justification for deviations and any observed environmental impacts.
Status	Deferred
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	None
Ref. Document Link	None

METHODS

The condition is not currently applicable to project operations, which do not involve shipping through Steensby Inlet. Baffinland will consider this condition when shipping through Steensby Inlet becomes active.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.7.3 Operational Variability (PC Conditions 179, 179a and 179b)

PC condition 179 establishes a limit on the number of ore carrier transits to Steensby Port in a month and over the year. Baffinland will comply with this requirement when shipping to and from Steensby Port begins in the future.

PC condition 179a states that Baffinland cannot ship more than 4.2 million tonnes of ore via Milne Port in a calendar year, and PC condition 179b establishes the same limit on the quantity of ore that can be transported over the Milne Inlet Tote Road. In 2016, Baffinland shipped approximately 2.75 million tonnes of ore from Milne Port, and hauled 3.2 million tonnes of ore over the Tote Road.

Project Certificate Condition No. 179

Category	Operational Variability
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To apply the precautionary principle in respect of potential effects on marine wildlife and marine habitat from changes to shipping frequency that may result from a significant increase in mine production for an extended period of time.
Term or Condition	Baffinland shall not exceed 20 ore carrier transits to Steensby Port per month during the open water season and 242 transits per year in total.
Reporting Requirement	To be developed following approval by the Minister
Status	Deferred
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

The condition is not currently applicable to project operations, which does not involve shipping through Steensby Inlet. Baffinland will consider this condition when shipping through Steensby Inlet becomes active.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 179a

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure that there are appropriate limits on the Early Revenue Phase Proposal marine shipping component in order to limit and manage likely project effects, while balancing the need for operational flexibility
Term or Condition	In any given calendar year, the total volume of ore shipped via Milne Inlet, shall not exceed 4.2 million tonnes
Reporting Requirement	For each year after the Proponent commences shipping ore via Milne Inlet under the Early Revenue Phase Proposal, the Proponent shall include in the Annual Report to the NIRB, a summary of the total amount of ore shipped via Milne Inlet for the previous calendar year
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

The total volume of ore shipped via Milne Inlet is tracked annually by Baffinland.

RESULTS

The total volume of ore shipped via Milne Inlet in 2016 was 2.7 million tonnes.

TRENDS

Baffinland has not exceeded the approved 4.2 million tonnes total volume of ore shipped via Milne Inlet during the first two years of ore shipments (2015 and 2016).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes shipped and will not exceed the approved total volume of ore shipped via Milne Inlet.

Project Certificate Condition No. 179b

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure that there are appropriate limits on the Early Revenue Phase Proposal project land transportation component in order to limit and manage likely project effects, while balancing the need for operational flexibility
Term or Condition	In any given calendar year, the total volume of ore transported by truck on the Milne Inlet Tote Road shall not exceed 4.2 million tonnes
Reporting Requirement	For each year after the Proponent commences transportation of ore via the Tote Road under the Early Revenue Phase Proposal, the Proponent shall include in the Annual Report to the NIRB, a summary of the total amount of ore shipped via the Tote Road for the previous calendar year
Status	Complete
Stakeholder Review	None
Reference	None
Ref. Document Link	None

METHODS

The total volume of ore transported by truck on the Milne Inlet Tote Road is tracked annually by Baffinland.

RESULTS

The total volume of ore transported by truck on the Milne Inlet Tote Road in 2016 was approximately 3.4 million tonnes.

TRENDS

Baffinland has not exceeded the approved 4.2 million tonnes total volume of transported by truck on the Milne Inlet Tote Road during the first two years of ore shipments (2015 and 2016).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes transported by truck on the Milne Inlet Tote Road and will not exceed the approved total volume of ore.

4.7.4 Transboundary Effects (PC Conditions 180 through 182)

Three (3) PC conditions relate to involving Makivik in the activities of the MEWG, and the need to notify Makivik regarding shipping activities along the southern shipping route through Hudson Strait. Baffinland is not currently shipping to and from Steensby Port through Hudson Strait.

Project Certificate Condition No. 180

Category	Transboundary Effects – Makivik Corporation involvement in the Marine Environment Working Group
Responsible Parties	The Proponent, members of the Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	The Marine Environment Working Group established for this Project shall invite a representative from Makivik Corporation to be a member of the Group
Reporting Requirement	To be developed following approval by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Makivik is a member of the MEWG established in 2013. Meeting minutes of working group meetings are distributed to all parties. If a representative of Makivik is unable to attend a meeting, they will be informed of Project plans.

RESULTS

Makivik has received MEWG meeting minutes and other technical information in 2016.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to update Makivik on Project activities through the MEWG meetings and distribution of technical documentation.

Project Certificate Condition No. 181

Category	Transboundary Effects – Marine Environment Working Group reporting
Responsible Parties	The Proponent, members of Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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
Reporting Requirement	To be developed following approval by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2016 MEWG Meeting Notes
Ref. Document Link	Appendix C2

METHODS

Makivik is a member of the MEWG established in 2013. Meeting minutes of the MEWG meetings are distributed to all parties. If a representative of Makivik is unable to attend a meeting, they will be informed of Project plans.

RESULTS

Makivik has received working group meeting minutes and other technical information in 2016.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to update Makivik on Project activities through working group meetings and distribution of technical documentation.

Project Certificate Condition No. 182

Category	Transboundary Effects - Reporting to Marine Environment Working Group(MEWG)
Responsible Parties	The Proponent, Makivik Corporation
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	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
Term or Condition	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
Reporting Requirement	To be developed following approval by the Minister
Status	Complete
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	None
Ref. Document Link	None

METHODS

Vessel transit information is publicly available on the Baffinland website. Baffinland will provide ship route deviation reports to Makivik when required.

RESULTS

There were no changes to the ship route in 2016.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to make ship route information publicly available and will provide Makivik with any ship route deviation reports.

4.8 FINAL HEARING COMMITMENTS

Appendix A of the Final Hearing Report (NIRB, 2012) contain commitments made by Baffinland during the Final Hearing of the Final Environmental Impact Statement. The majority of the 113 Proponent Commitments are captured in the PC conditions described above. A concordance of those final hearing Proponent Commitments are identified next to the applicable PC condition in a table summarizing the status of PC conditions in 2016 in Appendix A. The status of the remaining 42 Proponent Commitments from the final hearing not addressed under a corresponding PC condition are presented in Appendix I.

5 – NIRB CORRESPONDENCE

In 2016, Baffinland undertook two main exchanges of information with the NIRB regarding current operations. They included

- Comments received on the 2015 Annual Report to the NIRB (NIRB, 2016c)
- The NIRB's 2015-2016 Annual Monitoring Report for the Mary River Project (NIRB, 2016d), accompanied by a letter outlining Recommendations from the Board (NIRB, 2016e)

These exchanges of information are described further below.

5.1 COMMENTS ON THE 2015 ANNUAL REPORT TO THE NIRB

The NIRB presented Baffinland with regulatory agency comments on Baffinland's 2015 Annual Report to the NIRB on August 3, 2016 (NIRB, 2016c). Baffinland provided a response to comments in a letter to the NIRB on August 24, 2016 (Baffinland, 2016x). In developing its response to the August 3, 2016 NIRB letter, Baffinland considered the detailed respondent comments provided and posted on the NIRB Public Registry. A summary and response to the feedback received is provided below.

Baffinland's Performance on Compliance with Licenses, Permits, Authorizations and Approvals

The 2015 Annual Report summarized Baffinland's second year of operations and it was recognized that the development of the Project has created challenges and opportunities for Baffinland, local communities, agencies and regulators. Baffinland indicated it appreciated the support that it has received and this support has allowed Baffinland to continue to grow the Mary River project, work in partnership with the North Baffin communities and meet its commitments for a sustainable mining project. Some of the positive feedback from several agencies in regard to Baffinland's regulatory performance in 2015 is summarized in Table 5.1.

Baffinland Response to NIRB's List of Comments

In Baffinland's response to the NIRB regarding comments received on the 2015 Annual Report, Baffinland provided itemized responses to the comments identified in Tables A.1 to A.6 of the NIRB August 3, 2016 letter. Where applicable, Baffinland also included attachments to fulfill reviewer requests. A summary of the NIRB comments received from reviewers by topic is presented in Table 5.2. A complete version of the itemized responses is available on the NIRB Public Registry.

Table 5.1 Comments on Regulatory Performance

Agency	Comments on Regulatory Performance and Compliance
Qikiqtani Inuit Association (QIA)	"QIA remains committed to working collaboratively and in good faith with BIMC as the Mary River Project progresses, to bring the many promised benefits and opportunities to impacted communities and to all Nunavummiut. QIA appreciates the opportunity to provide comments on the 2015 Annual Monitoring Report, and trusts that NIRB will continue to hold the Proponent to the highest standard in meeting the terms and conditions of the Project Certificate."
Indigenous and Northern Affairs Canada (INAC)	Based on 3 inspections conducted in 2015, INAC did not identify any areas of non-compliance. Several issues identified by the Water Resources Officer (WRO) have been resolved to the satisfaction of the WRO (comment paraphrased by Baffinland).
Government of Nunavut	"The GN appreciates the recent modifications to the 2015 Socio-Economic Monitoring Report that was submitted by the Baffinland and is encouraged by the Proponent's commitment to further develop the socio-economic monitoring program."
Environment and Climate Change Canada (ECCC)	"Overall ECCC would like to acknowledge the extensive work that has been done by Baffinland on the various components of the 2015 Annual Report and notes that the updates made to the monitoring and management plans addressed the comments raised by ECCC in 2014 and 2015."
Department of Fisheries and Oceans (DFO)	DFO noted that based on their site visit and review of the Annual Monitoring Report that Baffinland was in compliance with conditions in its <i>Fisheries Act</i> authorization (comment paraphrased by Baffinland).
Natural Resources Canada (NRCan)	"To date, Explosives Factory Licence F76068 issued to Dyno Nobel meets the requirements of the <i>Explosives Act</i> and Regulations."
Transport Canada (TC)	"TC reviewed the 2015 Annual Monitoring Report and finds that the proponent remains in compliance with all required approvals within the <i>Navigation Protection Act</i> for construction conducted to date. The Proponent has also received an approved Milne Inlet Marine Facility Security Plan and Transport Canada reviewed Oil Pollution Emergency Plan. With these approvals Transport Canada is satisfied that Baffinland has met the Regulatory Conditions that fall within our mandate, as outlined in the amended Mary River Project Certificate (No. 005)."
World Wildlife Fund (WWF)	"We acknowledge the work that has been done by the NIRB during the project assessments to ensure a rigorous review of potential impacts, and we are encouraged by BIMC's dedication to undertaking meaningful project monitoring and by its engagement with parties to the process."

Table 5.2 Summary of Reviewer Comments on the 2015 Annual Report to the NIRB

Agency	Marine	Terrestrial	Freshwater	Social	Other	Total
QIA ¹	53	3	2	14	6	78
INAC		2	2		1	5
GN	2	2		1		5
ECCC	4					4
DFO	31					31
NRCan ²						0
TC ²						0
WWF ³	3	2				5
Totals	93	9	4	15	7	128

NOTES:

1. QIA also submitted an Appendix A containing a large number of comments on marine environment reports.
2. NRCan and TC provided letter responses to NIRB but neither had outstanding comments or questions.
3. WWF submitted detailed comments with 26 recommendations summarized at the end of its submission, of which two (2) recommendations were directed to Baffinland and the remainder directed to the NIRB. NIRB directed Baffinland to respond to five (5) of the comments/recommendations.

Marine Environment Comments

The majority of comments received on the 2015 Annual Report (93 of 128 comments) relate to the marine environmental monitoring program. Baffinland indicated that the majority of the marine-related comments were not related to project certificate compliance but were focused on report or management plan revisions that can be more efficiently managed through the MEWG, due to delays many of the reports were not circulated to the MEWG prior to finalization.

To address this issue and improve the functioning of the MEWG in future years, Baffinland will establish a schedule for draft report submission and review with the MEWG. As a starting point, Baffinland suggested that draft monitoring reports be completed no later than the end of January, so that feedback can be sought prior to the finalization of the report. Starting in 2017, many of the annual reports previously included in the NIRB annual report will now go through the appropriate working group for comment and then the final version will be posted publicly on the Baffinland document portal. This schedule was not established before contracts with consultants were completed in 2016, so this process did not occur prior to the finalization of all of the annual monitoring reports. For the marine environment, only one monitoring report was not provided to the MEWG in draft version prior to finalization by March 31, 2016.

5.2 NIRB'S ANNUAL MONITORING REPORT AND BOARD RECOMMENDATIONS

On November 4, 2016, the NIRB issued its 2015-16 monitoring report (NIRB, 2016d) accompanied with a letter containing 22 recommendations (NIRB, 2016e). Baffinland responded to the NIRB recommendations on December 12, 2016 (Baffinland, 2016y).

While Baffinland was able to address a number of the NIRB recommendations, a number of the recommendations required follow up in this annual report. A status update on these items is provided in Table 5.3.

Table 5.3 Status of 2016 NIRB Recommendations Requiring Follow-Up in this Annual Report

	NIRB Recommendation	Baffinland's December 12, 2016 Response	Update
3	The Board requires that the details of any contemplated changes to the ongoing air quality monitoring program, including rationale for the potential suspension of any monitoring parameters (e.g., SO ₂ and NO ₂), be provided to the NIRB and other authorizing agencies prior to terminating such monitoring activities. The NIRB requests that Baffinland provide an update on this matter within its 2016 Annual Report.	Baffinland understands that it will require board approval before modifying or cancelling monitoring programs identified in the Project Certificate. An update on the status of SO ₂ and NO ₂ monitoring will be provided in the next annual report.	Baffinland's air quality consultant visited the site in March 2017 to re-calibration the SO ₂ and NO ₂ monitoring instrumentation to resume monitoring. See PC Condition 8.
4	The Board requests that Baffinland consider improvements to its Core Receiving Environment Monitoring Program (CREMP) to further substantiate its conclusion of no mine-related effects on fish population.	Baffinland will attempt to provide an expanded discussion regarding mine-related effects on fish populations in the next annual monitoring report, as requested.	This has been considered in the preparation of the 2016 AEMP Annual Report.
5	The Board requests that Baffinland provide information on the terrain stability status of the locations along the Tote road and the borrow pits previously identified for stabilization in 2014. Where applicable, Baffinland should provide descriptions of the specific mitigation measures undertaken to address permafrost degradation and terrain stability within the Project area. It is requested that this information be incorporated into Baffinland's next annual report to the NIRB.	An update will be provided in the 2016 NIRB Annual Report.	As part of the follow-up to Baffinland's Sediment Mitigation Action Plan (Golder, 2016a), the development of a Tote Road Earthworks Execution Plan is being completed to determine and prioritize the actions required to help address dust, sedimentation, safety and operational issues with the Tote Road. The development of this plan included consideration of the areas previously identified for stabilization in 2014 to prioritize and mitigate those areas in the context of the larger execution plan. The Tote Road Earthworks Execution Plan will be provided to relevant regulators once complete and prior to freshet.
8	The Board requests that Baffinland provide the NIRB with an update regarding how it has complied with Project Certificate term and condition 174 to date, further highlighting its future plans to provide spill response equipment and annual training to Nunavut communities along the shipping route. In addition, a discussion should be provided as to how the training and equipment are expected to help improve upon response times in the event of a marine spill. It is requested that this update be provided within 30 days' receipt of these recommendations, and that additional information pertaining to any training sessions held to date including materials provided to affected communities be included within the Proponent's next annual reporting to the NIRB.	Since 2012, Baffinland has had annual spill response exercises whose participants include Petronav (fuel vessel), Baffinland and representatives of the community of Pond Inlet as active participants. Additional training and spill response capabilities for the community have been discussed with the Coast Guard in the past and the Coast Guard was reviewing efforts for the community to have additional spill response equipment to deal with non-Baffinland related spill response activity. Baffinland will follow-up with the Coast Guard on this commitment and will provide an update in the next NIRB Annual report.	Baffinland has established the equipment, training programs and response plans to address spills associated with the Project. The Coast Guard is responsible for responding to non-Project related spills, including the provision of training and equipment.
9	The Board requests that Baffinland provide the NIRB with the identified documentation as absent within the 2015 Annual Report, and further clarify why the 2015 Air Quality and Noise Abatement Management Plan was not updated as required by the Board's 2015 recommendation regarding which specific adaptive management measures that would be implemented in the event of high threshold level of dust deposition, exceeding levels predicted in the FEIS or FEIS Addendum. It is requested that these missing documentation be provided within 30 days' receipt of these recommendations, and that the required update to Section 8 of Air Quality and Noise Abatement	Baffinland's Dust Management Protocol was Attachment 7 of the Air Quality and Noise Abatement Management Plan (Rev 6) submitted to the NIRB with the 2015 Annual Report in March 2016. The Dust Management Protocol was also identified as Attachment A of the Roads Management Plan (Part 2 of 5 of the Roads Management Plan). The Dust Management Protocol will be further updated to reflect changes in measures and practices that will be adopted during 2017.	An update to the Dust Management Protocol is in progress to reflect changes in measures and practices that will be adopted during 2017. Once complete, this document will be made available to the NIRB.

	NIRB Recommendation	Baffinland's December 12, 2016 Response	Update
	Management Plan be included within the Proponent's next annual report to the NIRB.		
11	The Board requests that Baffinland revise its Shipping and Marine Wildlife Management Plan (SMWMP) through engagement with the Marine Environment Working Group (MEWG), and provide updated information within the SMWMP regarding the timelines for the implementation of an anti-fouling system, including an action plan to integrate Inuit from potentially-impacted communities in the interpretation of results from the ongoing monitoring program. It is requested that this be included within the Proponent's next annual report to the NIRB.	Baffinland discussed revisions to the marine monitoring program at the November 29th, 2016 MEWG meeting. Representatives from the Mittimatalik Hunters and Trappers Organization (MHTO) attended the November 2016 meeting and will be invited to attend MEWG meetings going forward. The SMWMP will be updated based on the feedback from the MEWG meeting and reports on 2016 monitoring programs. A status update on the revision to the SMWMP will be discussed in the 2016 Annual Monitoring Report.	Baffinland is currently developing its 2017 marine environment monitoring programs which, in part, will inform an update to the SMWMP. This work is currently being discussed with the MEWG and the 2017 program will be finalized at the next MEWG meeting in May 2017. Once 2017 monitoring programs are established and reflected in the updated SMWMP, the revised SMWMP will be made available to the NIRB.
12	The Board requests that Baffinland follow-up with the recommendations of the Government of Nunavut-Department of Environment and the Marine Environment Working Group on Polar Bear monitoring, and that it revise the Shipping and Marine Wildlife Management Plan (SMWMP) to include methodology for Polar Bear monitoring. It is requested that this revision be reflected in an updated SMWMP, and included within the Proponent's next annual report to the NIRB.	Baffinland discussed the need to revise the SMWMP at the November 29th, 2016 MEWG meeting which focused on marine mammal monitoring. Polar Bear Monitoring will be specifically discussed at a future meeting with MEWG members. A status update on the revision to the SMWMP will be discussed in the 2016 Annual Monitoring Report.	
13	The Board requests that Baffinland, in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee, develop robust indicators to measure and survey the in-migration and out-migration of Inuit and non-Inuit residents in the North Baffin Local Study Area. The Board requests that this survey be conducted, and an assessment of the Project's Inuit employee turnover rate undertaken on an annual basis. Results of the survey should be provided and incorporated in the Proponent's next annual report to the NIRB.	Baffinland has previously committed to conduct this survey and recognizes the requirement to assess in-migration and out-migration within the North Baffin Study Area. Baffinland will review and discuss opportunities for a collaborative approach to the survey with the Qikiqtaaluk Socio-Economic Monitoring Committee and will provide an update on progress towards meeting this commitment in the 2016 Annual Monitoring Report.	In early 2017, following consultation with the SEMWG, Baffinland implemented a revised voluntary Employee Information Survey, which collected information related to employee changes of address, housing status, and migration intentions (amongst other topics). Baffinland Community Liaison Officers (BCLOs) located in each North Baffin LSA community collect other data on the movement of Project employees and contractors to help understand potential in- and out-migration trends occurring in the North Baffin LSA. See PC Condition 133.
14	The Board requests that Baffinland consult with the Qikiqtani Inuit Association (QIA) in discussing priorities regarding monitoring of non-Inuit residents and contractor employees in the local study area (LSA), and where applicable, provide information regarding Baffinland's Inuit employee payroll, in order to provide an understanding of the expansion of the local market for consumer goods and services within the LSA. It is requested that this be included within the Proponent's next annual report to the NIRB.	Baffinland has continued to work with the Qikiqtani Inuit Association (QIA) through the Inuit Impact and Benefits Agreement (IIBA) Joint Management and Joint Executive Committees to improve the availability of information on employment, payroll and the local economy. Currently, Baffinland collects data on the number of contractors in the LSA as well as payroll data for both Inuit and non-Inuit employees of Baffinland. However, contractor payroll information is not normally available to Baffinland by contractors due to concerns related to commercial confidentiality and employee privacy. Baffinland will provide information related to aggregated Inuit/non-Inuit payroll data in its next IIBA annual report.	The 2016 socio-economic monitoring report now includes data on Baffinland's LSA employee payroll expenditures (in Canadian dollars, not including contractors, but including both Inuit and non-Inuit employees).
15	The Board requests that Baffinland develop an action plan for the identified fish-bearing crossings, and that it prioritize those crossings with potential to become impassable in the future (e.g., BG-01). It is requested that updated information regarding the status of the affected fish-bearing crossings,	An action plan for the fish bearing streams is under development as part of the Sediment Mitigation Action Plan follow-up activities and details on the status of fish bearing crossings will be provided in the 2016 NIRB Annual Report.	An action plan for the fish bearing streams is under development as part of the Sediment Mitigation Action Plan follow-up activities. An engineering execution plan is in progress to determine and prioritize the actions required which will be provided to relevant

	NIRB Recommendation	Baffinland's December 12, 2016 Response	Update
	including BG-01 be provided and incorporated into Baffinland's next annual report to the NIRB.		regulators, including the DFO, once complete and prior to freset.
16	The Board requests that Baffinland ensure that the Terms of Reference for both the Terrestrial Environment Working Group (TEWG) and Marine Environment Working Group (MEWG) appropriately reflect the organizations that are involved in the working groups, and if necessary provides additional clarity to expected level of participation for the various groups participating. Baffinland should also detail in its meeting notes how meetings are structured to allow for meaningful engagement. Consideration should be given to adoption of a consensus-based or quorum decision-making process to ensure that the record properly reflects parties' full contributions and inclusion of expertise, prior to implementing any changes to ongoing terrestrial and marine monitoring programs. It is requested that any specific changes to ongoing terrestrial and marine monitoring programs be reported directly to the NIRB on an ongoing basis.	Baffinland has discussed the need to revise both the MEWG and TEWG Terms of Reference (ToR) at meetings on Nov 29th and 30th respectively. Both groups are in agreement with the need for revisions to the ToRs and specific revisions were discussed to reflect update organization status and revisions to the structure of the meetings, minutes and clarity around schedules for report review. Baffinland will provide the MEWG and TEWG with a draft revised ToR including an updated membership list with the intention that an updated ToR for both groups will be completed prior to the submission of the 2016 Annual Monitoring Report. Baffinland will continue to provide meeting minutes to the NIRB and will provide NIRB with any proposed changes to monitoring programs on an ongoing basis.	Baffinland discussed revisions to the ToR at each of the November 2016 meetings with the TEWG and MEWG, and requested confirmation of the membership of the working groups (Sections 2.7.1 and 2.7.2). Baffinland also discussed proposed changes to the ToR with NIRB to ensure that the changes addressed NIRB's concerns. Further revisions are taking place in 2017 with the intent of finalizing within the year.
17	The Board requests that Baffinland provide an explanation as to why the used tire management measures committed to in the Final Environmental Impact Statement (FEIS) and FEIS Addendum for the Mary River Project and Early Revenue Phase, which stated that used tires would be stockpiled for shipment offsite (e.g., re-treading, reuse, or disposal), are not in place onsite. In addition, the Board requests that Baffinland clarify why used tires are not properly segregated in an on-site landfill facility as committed to within the Mine Site Landfill/Landfarm site layout plan submitted to the Nunavut Water Board in 2011. It is requested that this information be provided within 30 days' receipt of these recommendations.	Baffinland recognizes that tire management and disposal is an area for improvement and is currently reviewing disposal/reuse options for used tires at the site for 2017. The Waste Management Plan is currently being revised to improve used tire management including the safe storage of used tires following industry guidelines, clean-up of current storage areas, and plans for shipment of tires off site during summer sealift or disposal on site in a segregated area of the landfill. The updated Waste Management Plan will be provided in the NIRB Annual Report.	Baffinland is updating this plan in 2017; the plan will be provided to the NIRB when updated.
18	The Board requests that Baffinland adhere to industry best practices for landfill operations, including maintenance of landfill litter fences to ensure waste materials are not dispersed offsite. It is further requested that Baffinland continue to evaluate its need for an upgraded litter fence around the active areas of the landfill in the light of changing environmental conditions at site. It is requested that an update regarding implementation of this recommendation be provided within the next annual report to the NIRB.	The old fence was removed during landfill berm extension activities and a new perimeter fence 2 m in height was installed around the open face of the landfill during September 2016. The new fence is positioned around the northern perimeter of the landfill and has proven effective in capturing windblown waste originating from the landfill. Wind-blown waste captured by the fence is routinely removed and redeposited back in the landfill. The details of the new fence will be provided in the 2016 NIRB Annual Monitoring Report and the landfill site will continue to be monitored to ensure that the fence provides control of wind-blown litter.	Details on the new litter fence provided to NIRB in the fall of 2016.
20	The Board requests that Baffinland continue to adhere to industry best practices for landfarm operations, including for management of contaminated snow and waste synthetic liners. It is further requested that Baffinland address the improper storage of used tires near the landfarm area. It is requested that an update regarding steps taken to address this recommendation be provided within the next annual report to the NIRB.	Acknowledged. Additional information will be provide in the 2016 NIRB Annual Monitoring Report.	An On-Site Tire Disposal Procedure (BAF-PH1-300-PRO-0020) was developed and implemented to address the management of used tires including proper storage and preparation for backhaul on the summer sealift. This procedure now forms part of Baffinland's Waste Management Plan (Baffinland, 2016g). A procedure to address historical tires will be developed in 2017.

6 – MANAGEMENT PLAN UPDATES

Table 6.1 provides a listing of those management plans required by a PC condition.

Table 6.1 Management Plan Registry

Appendix or Reference	Management Plan	Project Certificate Condition No. Requirement	Current Version
2015 NIRB Annual Report	Air Quality and Noise Abatement Management Plan	7 and 11	March 2016
2015 NIRB Annual Report	Terrestrial Environmental Management and Monitoring Plan	31-38, 49, 50 and 52	March 2016
2015 NIRB Annual Report	Shipping and Marine Wildlife Management Plan	76, 83a, 89-91, 99, 100, 105, 120 and 121	March 2016
2015 NIRB Annual Report	Site Specific Quarry Management Plans	20 and 30	Various
Appendix F	Environmental Protection Plan	64	August 2016
2015 NIRB Annual Report	Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan	Various ¹	March 2016
Appendix F	Aquatic Effects Monitoring Plan	21	October 2015
2015 NIRB Annual Report	Incinerator Management Plan	12	March 2016
2015 NIRB Annual Report	Ballast Water Management Plan	89	March 2016

NOTES:

1. Meets PC Condition 22 requirements for a Sediment and Erosion Control Plan, PC Condition 23 for a Groundwater Monitoring and Management Plan, PC Condition 26 for a Comprehensive Erosion Management Plan, PC Condition 43 Site Drainage and Silt Control Management Plan.

Of those listed, only the EPP (Baffinland, 2016n) and AEMP (Baffinland, 2015a) have been updated since the previous annual report, and these plans are included in Appendix F. The 2015 AEMP was approved by the NWB subsequent to Baffinland issuing the 2015 Annual Report to the NIRB. Approval of a subsequent revision dated April 2016 remains pending, and for this reason the approved October 2015 AEMP has been enclosed.

All other plans were included in Baffinland’s 2015 Annual Report to the NIRB (Baffinland, 2016w). Each of Baffinland’s environmental management plans are available on the document web portal: <http://www.baffinland.com/sharedocuments/>.

7 – REFERENCES

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- ASTM D1739-98(2017), *Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter)*. ASTM International, West Conshohocken, PA, 2017, www.astm.org.
- ASL Environmental Sciences, 2015. *Project Report – Oceanographic Data Processing – Baffinland Ballast Water Study, Milne Inlet 2014-15*. ASL File: PR-865, Version 2.0, September 30 2015.
- Baffinland, 2012. *Mary River Project – Final Environmental Impact Statement*. February 2012.
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