



Baffinland Iron Mines 2018 Annual Report to the
Nunavut Impact Review Board

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Project certificate No. 005

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March 31, 2019 / ᑏᑦᑏᑦ 31, 2019



Figure 8 Marine Mammal Observations onboard the MV Nulijak

Highlights and Challenges

Project Shipping

Between July 24 to October 17, Baffinland shipped approximately 5.09 million tonnes of iron ore. Baffinland brought in an Ice Management Vessel (the MSV Botnica) to escort ore carriers at the beginning and end of the shipping season, which served to facilitate safe passage through prevailing ice conditions. Seventy-one voyages were executed, with vessels carrying an average of 71,750 tonnes of iron ore each. This surpasses Baffinland's previous record of 4.1 million tonnes shipped in 2017.

Inuit Employment and Training

Baffinland made Inuit employment and training a key focus for 2018 and is committed to increasing Inuit participation in the Project workforce. During 2018, Baffinland launched a number of initiatives aimed at improving the total number of Inuit employed by the Project. In 2018, the total number

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of hours worked by both Inuit men and women relative to the

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ABBREVIATIONS

the Project Mary River Project

AAQS Ambient Air Quality Standards

AEMP Aquatic Effects Monitoring Plan

exactAIS Automatic Identification System

AIS Aquatic Invasive Species

ARD acid rock drainage

ASR annual security review

Baffinland Baffinland Iron Mines Corporation

BCLO Baffinland Community Liaison Officer

CCG Canadian Coast Guard

CCME Canadian Council of Ministers of the Environment

CDA Canadian Dam Association

CIRNAC Crown Indigenous Relations and Northern Affairs Canada

CO₂ carbon dioxide

CO₂eq carbon dioxide equivalent

CoPC contaminant of potential concern

CORI Coastal and Ocean Resources

CPR Cardiopulmonary Resuscitation

CREMP Core Receiving Environment Monitoring Program

dB decibels

dBA A-weighted decibels

DFO Fisheries and Oceans Canada

DPA Development Partnership Agreement

EA environmental assessment

ECCC Environment and Climate Change Canada

EDI Environmental Dynamics Inc.

EEM environmental effects monitoring

EFAP Employee Family Assistance Program

EIS environmental impact statement

EPP Environmental Protection Plan

ERP Early Revenue Phase

FAD *Fisheries Act* Directive

FEIS Final Environmental Impact Statement

FNBC First Nations Bank of Canada

FSWMP Fresh Water Supply, Sewage and Wastewater Management Plan

GDP Gross Domestic Product

GED General Education Development

GHG Greenhouse Gas

GN Government of Nunavut

Golder Golder Associates Ltd.

HADD harmful alteration, disruption or destruction (of fish habitat)

Hatch Hatch Ltd.

HTOs Hunter and Trapper Organization

HTAs Hunter and Trapper Association

ICPS Inuit Procurement and Contracting Strategy

ICRP Interim Closure and Reclamation Plan

IFC Issued-for-Construction

IHRS Inuit Human Resources Strategy

IIBA Inuit Impact and Benefit Agreement

IOL Inuit-Owned Land

IPCC Intergovernmental Panel on Climate Change

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

LSA local study area

MEWG Marine Environment Working Group

MHTO Mittimatalik Hunters and Trappers Organization

MIEG Minimum Inuit Employment Goal

Mining Industry Human Resources Council MiHR

MMER Metal Mining Effluent Regulations

MMER ERP Metal Mining Effluent Regulations Emergency Response Plan

Mtpa million tonnes per annum

NBRLUP North Baffin Regional Land Use Plan

NHC Nunavut Housing Corporation

NIRB Nunavut Impact Review Board

NLCA Nunavut Land Claims Agreement

NO₂ nitrogen dioxide

NPC Nunavut Planning Commission

NPRI National Pollutant Release Inventory

NRCan Natural Resources Canada

NT Northwest Territories

NTI Nunavut Tunngavik Inc.

NT-NU Northwest Territories-Nunavut

NU Nunavut

NWB Nunavut Water Board

OHS Occupational Health & Safety

OPEP Oil Pollution Emergency Plan

PAI Potential Acid Input

PC Project Certificate

PDA Potential Development Area

PM particulate matter

ppb parts per billion



QA/QCQuality Assurance / Quality Control

QIA..... Qikiqtani Inuit Association

QSEMC.....Qikiqtaaluk Socio-Economic Monitoring Committee

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

RCMP Royal Canadian Mounted Police

RSA regional study area

SEAPStakeholder Engagement Action Plan

SEMWGMary River Socio-economic Monitoring Working Group

MEEMP.....Marine Environmental Effects Monitoring Program

SEMWGSocio-economic Environment Working Group

SEM Sikumiut Environmental Management Ltd.

SEAPStakeholder Engagement Action Plan

SMWMP Shipping and Marine Wildlife Management Plan

SNP Surveillance Network Program

SO₂.....sulphur dioxide

SWAEMPSurface Water and Aquatic Ecosystem Management Plan

TCTransport Canada

TDG.....Transportation of Dangerous Goods

TEMMP..... Terrestrial Environment Mitigation and Monitoring Plan

TEWG..... Terrestrial Environment Working Group

the Communities.....North Baffin communities

the Report 2017 Annual Report

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

WRF Waste Rock Facility

WRO Water Resources Officer

WSCC..... Workers’ Safety and Compensation Commission

WWF..... World Wildlife Fund

YOY Young-of-Year

1 – INTRODUCTION

This 2018 Annual Report (the Report) to the Nunavut Impact Review Board (NIRB) is a requirement of Baffinland Iron Mines Corporation's (Baffinland's) Project Certificate (PC) No. 005 for the Mary River Project (the Project). The Annual Report summarizes:

- Project activities undertaken during the reporting year (January 1, 2018 - December 31, 2019);
- Baffinland's performance against the requirements of the Terms and Conditions in PC No. 005;
- An evaluation of the Project's effects in relation to those predicted in the Final Environmental Impact Statement (FEIS; Baffinland, 2012); and the Addendum to the FEIS (FEIS Addendum; Baffinland, 2013a) for the Early Revenue Phase (ERP); and
- Planned Project-work for the next reporting year (January 1, 2019 - December 31, 2019).

1.1 PROJECT OVERVIEW

The Project is an open pit iron ore mine located in the Qikiqtani Region of Nunavut on northern Baffin Island, 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. (Figure 1.1).

The Project is currently in the Early Revenue Phase (ERP), which consists of a mining rate of up to 4.2 million tonnes per annum (Mtpa) at Deposit No. 1. A temporary approval (for 2018 and 2019 exclusively) for a production increase to haul and ship 6.0 Mtpa from Milne Port was approved in September 2018 (NIRB, 2018a). For the purposes of this report, this is considered a temporary expansion of the ERP phase. The operation has the potential to last for generations; representing an important long-term opportunity for economic development in the North Baffin region.

During the ERP phase, the Project includes three (3) primary components (Figure 1.1):

- Mine Site;
- Milne Inlet Tote Road; and
- Milne Port.

Operational activities include:

- Ore extraction;
- Ore processing via crushing;
- Transportation of the ore from the Mine site to Milne Port;
- Loading and shipping of ore from Milne Port;
- Stakeholder and Inuit community engagement; and
- Environmental monitoring and reporting.

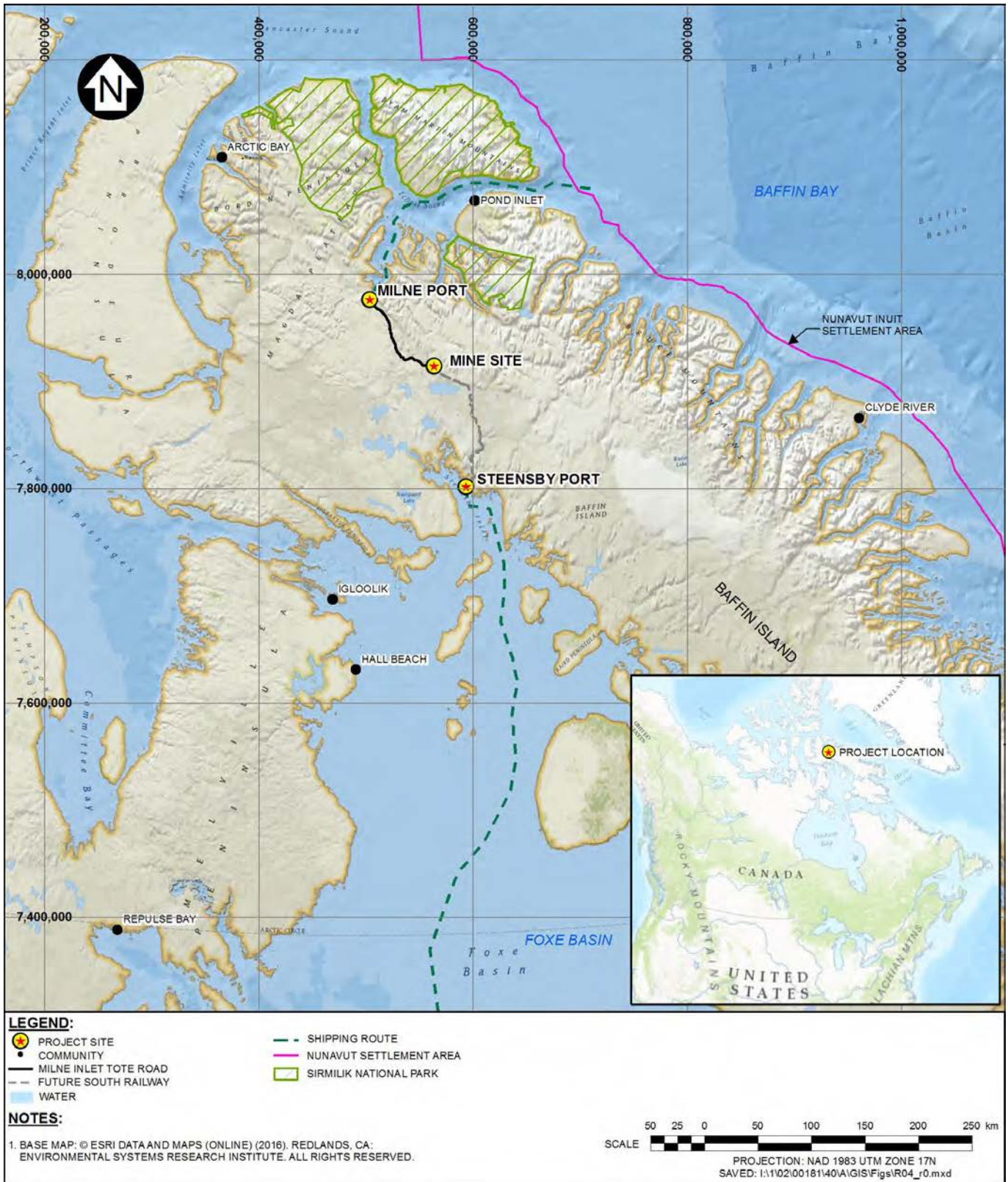


Figure 1.1 Project Location Map

1.2 REGULATORY CONTEXT

1.2.1 Project Certificate

On December 28, 2012, the NIRB issued PC No. 005 for the Project to Baffinland (NIRB, 2012a) 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 the Project Certificate is Baffinland's FEIS (Baffinland, 2012), 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 Mtpa.

In addition to the primary components of the ERP, the Approved Project includes construction, operation, closure and post-closure activities associated with the following proposed Project components:

- A 150-km South Railway from the Mine Site to a new port facility at Steensby Inlet (Figure 1.1);
- Steensby Port, which will operate year-round; and
- Year-round shipping along the Southern Shipping Route (Foxye 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 Baffinland Iron Mines Corporation's Mary River Project* (the Guidelines; NIRB, 2009); and NIRB's Preliminary Hearing Conference Decision (NIRB, 2011).

Two amendments to the PC have been issued to Baffinland, one of which was in 2018. Additionally, the Company is currently seeking a further reconsideration for its Phase 2 Proposal which, if granted, will result in a third amendment to the PC. This history is described below.

Amendment No. 1 of Project Certificate No. 005 for the Early Revenue Phase

Following the issuance of the PC, Baffinland requested an amendment to the PC to undertake the 4.2 Mtpa ERP, and an Addendum to the FEIS was submitted to the NIRB in June 2013 (Baffinland, 2013a). The Minister of Aboriginal Affairs and Northern Development Canada (AANDC; now Crown Indigenous Relations and Northern Affairs Canada - CIRNAC) 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).

Amendment No. 2 of Project Certificate No. 005 for the Production Increase Project Proposal

In 2018, Baffinland applied for and was granted a second amendment to its PC for the Production Increase Proposal.

In April 2018, Baffinland submitted a project proposal to the Nunavut Planning Commission (NPC) for an increase in production from the current 4.2 Mtpa to 6.0 Mtpa (Stantec Consulting Ltd., 2018). On May 18, 2018 the NPC referred the Production Increase Proposal to the NIRB for screening. In the Production Increase Proposal, Baffinland requested that NIRB reconsider Mary River Project Certificate No. 005 and amend Conditions 179(a) and 179(b) in order to accommodate the increase in the volume of ore transported and shipped out of Milne Port.

On June 11, 2018 the Board determined that the modifications proposed in the Production Increase Proposal require assessment through a formal reconsideration of the Project Certificate terms and conditions. On June 20, 2018 Baffinland filed additional information in support of the FEIS Addendum and on June 27, 2018, the NIRB issued correspondence formally accepting the FEIS Addendum, and inviting comment on the proposal from interested parties to be received on or before July 26, 2018. The NIRB held a public information session in Pond Inlet on July 12, 2018.

A public hearing was not held in support of the review and the NIRB issued its Reconsideration Report and Recommendations on August 31, 2018 that partially approved the infrastructure and activities included in the Production Increase

Proposal (NIRB, 2018b). Notably, Baffinland was approved to move forward with the construction of its 380-person camp and additional 15 ML fuel tank at Milne Port, but was not approved to increase its annual limits for trucking and shipping ore to market. On September 30, 2018, following an appeal by the Qikiqtani Inuit Association (QIA) to the Minister responsible for the final determination of the NIRB's Report – the Minister of Intergovernmental Affairs, Northern Affairs and Internal Trade - Baffinland received an approval to increase its trucking and shipping limits for 2018 and 2019 (Minister of Intergovernmental and Northern Affairs and Internal Trade, 2018). On October 30, 2018, the NIRB issued PC Amendment No. 2 (NIRB, 2018a).

1.2.2 Permits

Baffinland 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.

Table 1.1 Permit Registry

Approval	Project Activity	Expiry
Nunavut Impact Review Board <i>Nunavut Agreement, and the Nunavut Planning and Project Assessment Act</i>		
Project Certificate No. 005 <i>Nunavut Agreement</i> (Article 12) (Amendment No. 1)	Required to obtain the requisite permits and approvals to proceed with Project	No Expiry
Project Certificate No. 005 <i>Nunavut Agreement</i> (Article 12) (Amendment No. 2)	Required to obtain the requisite permits and approvals to proceed with Project	December 31, 2019
<i>Nunavut Agreement</i> (Article 12) Qikiqtani Inuit Association Agreements issued under Articles 6, 20 and 26 of the <i>Nunavut Agreement</i>		
Inuit Impact and Benefits Agreement (IIBA) <i>Nunavut Agreement</i> , Article 26	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</i> , Article 6	Wildlife Compensation regime set out in IIBA	No Expiry
Quarry Concession Agreement	Required to extract specified substances (quarried rock and borrow sand and gravel) on Inuit Owned Land	N/A
Water Compensation Agreement <i>Nunavut Agreement</i> , Article 20	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
Nunavut Water Board Water Licences issued under the <i>Nunavut Agreement</i> (Article 13), the <i>Nunavut Waters and Nunavut Surface Rights Tribunal Act</i>, and the Northwest Territories Water Regulations		
Type B Water licence 2BE-MRY1421	Regional exploration activities, including exploration drilling	April 16, 2021
Type A Water Licence 2AM-MRY1325	Water use and waste disposal associated with the mine	June 10, 2025
Crown Indigenous Relations and Northern Affairs Canada Mineral Leases and Land Leases, Land Use Permits, and Quarry Permits on Crown Land, issued under the <i>Territorial Lands Act</i> and associated Canadian Mining Regulations and Territorial Land Use Regulations		
Land Use Permit N2014C0013	Infrastructure and activities on Crown Land at Steensby Port	June 30, 2019

Approval	Project Activity	Expiry
Land Use and Quarry Permit N2014Q0016	Extraction of sand and gravel from Borrow P1 at Km 63 along the Tote Road	June 30, 2019
Land Use Permit N2014J0011	Summer narwhal monitoring camp at Bruce Head, in Milne Inlet	June 30, 2019
Class A Land Use Permit N2014X0012	Port operation on Crown Land (ore dock operation)	June 30, 2019
Mineral Leases #2483, #2484 and #2485	Rights to extract minerals; Lease #2484 covers Deposit No. 1.	August 27, 2034
Foreshore Lease 47H/16-1-2	Use of seabed by current ore dock at Milne Port	June 30, 2035
Department of Fisheries and Oceans Authorizations and Letters of Advice issued under the <i>Fisheries Act</i>		
Letters of Advice (various)	DFO issued Baffinland various letters of advice in regard to culvert extensions and replacements along the Tote Road	No Expiry
Fisheries Authorization NU-06-0084	Authorization to construct water crossings in fish habitat along the Tote Road	August 30, 2008; monitoring ongoing
Fisheries Authorization 14-HCAA-00525	Authorization to construct the ore dock in fish habitat	December 31, 2020
Transport Canada Approvals of in-water works under the <i>Navigable Waters Protection Act (NWP)</i>; now the <i>Navigation Protection Act</i>; and Marine Facility Approval under the <i>Marine Transportation Security Act</i> and Regulations		
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 Licensing of Explosives Manufacture and Storage Facilities under the <i>Explosives Act</i>		
Factory Licence #F76068	Issued to Baffinland's explosives contractor, Dyno Nobel Baffin Island, to manufacture explosives for the mine	-

Approval	Project Activity	Expiry
Nunavut Research Institute		
Issues scientific licences for land and water research, or social and traditional knowledge research, under the <i>Scientists Act</i>		
Scientific Research Licence 02 009 18R-M	Environmental monitoring of the land and water environments	December 31, 2018
Scientific Research Licence 02 001 19N-M	Socio-economic and Inuit Qaujimagatuqangit studies	December 31, 2019

1.2.3 Permitting of the Phase 2 Expansion Project Proposal

Baffinland is in the process of pursuing approvals for an expansion to the Project (the Phase 2 Expansion Project Proposal). The Phase 2 project proposal was first submitted to the Nunavut Planning Commission (NPC), NIRB and other agencies and stakeholders in October 2014 (Baffinland, 2014a). Public consultation, the collection of traditional knowledge and scientific baseline data, as well as engineering studies have been ongoing since that time in support of the Phase 2 Expansion Project Proposal.

In February 2016, Baffinland announced its intention to revise the mode of overland ore transportation from road haulage, as originally proposed in Phase 2 Expansion Proposal submission, to the use of a railway (Baffinland, 2016a). NIRB subsequently sought feedback from regulatory agencies, stakeholders and the Federal Minister of Indigenous and Northern Affairs Canada (INAC, now CIRNAC) as to whether this constituted a significant modification to the October 2014 Project Proposal. On October 28, 2016, the NIRB requested further information and clarification regarding the current nature and scope of Baffinland's Phase 2 Expansion Project Proposal for the Mary River Project (NIRB, 2016a). In response, Baffinland submitted a Project Update on the Phase 2 Expansion Project Proposal to the NIRB on November 30, 2016 (Baffinland, 2016b). This revision also included a proposal to conduct winter shipping through the Northern shipping route, however due to community feedback during consultation, this component of the proposal was later removed by Baffinland. On December 19, 2016, the NIRB indicated to Baffinland that switching transportation modes from road to rail constituted a significant modification to the original Phase 2 Expansion 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 Expansion Proposal was submitted by Baffinland on February 3, 2017 to the NPC for a decision of conformity to the North Baffin Land Use Plan (Baffinland, 2017a). Specifically, Baffinland applied to NPC for an amendment to Appendix Q of the NBRLUP to allow for the use of rail within the existing Milne Inlet Tote Road and Marine Transportation Corridor. As part of the application, Baffinland filed extensive supporting documentation to demonstrate that the proposed amendment complies with the requirements of the NBRLUP, including Appendices J and K. On December 4 and 5, 2017 NPC held public hearing in Pond Inlet as part of the amendment process. Subsequent to the public hearings, letters of support for the Phase 2 Expansion Project Proposal were submitted by the Government of Nunavut (GN), CIRNAC, the NWT & Nunavut Chamber of Mines and other community organizations and individual residents of the North Baffin communities. However, letters of opposition were submitted to the amendment by the Mittimatalik Hunters and Trappers Organization (MHTO) and individual residents of the North Baffin communities.

During the public hearing the NPC and Baffinland heard from regulators, non-government organizations, and the general public on the Phase 2 Amendment Application. On March 18, 2018 the NPC issued its Report on Public Review that recommended the approval of the proposed amendment to the NBRLUP. By May 8, 2018 all signatories – Government of Canada, Government of Nunavut, and Nunavut Tunngavik Incorporated – approved the proposed amendments and Baffinland was able to move forward with the next steps in the approval process for the Phase 2 Project.

On August 16, 2018, Baffinland submitted to the NIRB and NWB the Project's Phase 2 Expansion FEIS and associated Type A Water Licence amendment application (Baffinland, 2018a). Following a positive conformity determination with respect to Baffinland's FEIS Addendum for Phase 2 on October 12, 2018 the NIRB initiated its public technical review by requesting parties to submit Information Requests (IRs) by November 23, 2018. Baffinland's IR Response Package was filed on December 19, 2018 followed by the NIRB commencing the technical review period on December 21, 2018 (NIRB, 2018c). The Project's Phase 2 Expansion Proposal continues to proceed through the review and approvals process facilitated by the NIRB and NWB, with a recommendation report from the NIRB expected on November 5, 2019.

1.3 REPORT STRUCTURE

1.3.1 Report Content

This report is structured as follows:

Section 1: provides an overview of the Project and the regulatory context in which this Report is being submitted.

Section 2: highlights key activities and consultation efforts conducted with stakeholders for the Project, including:

- The five (5) North Baffin communities (the Communities);
- The Qikiqtani Inuit Association (QIA);
- Relevant regulatory agencies; and
- PC mandated Project working groups (Marine Environment Working Group (MEWG), Terrestrial Environment Working Group (TEWG) and the Mary River Socio-economic Environment Working Group (SEMWG)).

Section 3: describes the Project's operational context in 2018, provides an overview of operational successes, and discusses challenges Baffinland faced with respect to meeting PC Terms and Conditions in 2018.

Section 4: includes a 'summary sheet' detailing compliance for each of the PC Conditions. The summary sheets provide an overview of the work completed towards meeting the requirements of all the PC conditions, and a status of compliance is assigned. This section also describes the status and/or progress Baffinland has made towards fulfilling the commitments the Company made during the Final Public Hearing (NIRB, 2012b) for the Project and a high-level review of the Project's effects in comparison to the potential effects predicted in the FEIS and FEIS Addendum.

Section 5: outlines the correspondence Baffinland has had with NIRB during 2018 and comments provided by NIRB on Baffinland's 2017 Annual Report to NIRB.

Section 6: lists all updates made to environmental management plans as a result of monitoring programs and engagement activities throughout 2018.

1.3.2 Supporting Documents and Appendices

Where PC conditions specify that Baffinland provide supporting documentation to NIRB as part of the submission of this Report, these documents have been appended to the Report. Other appendices, such as reports or documentation that are likely to be of specific interest to NIRB as part of their review of this Report, and those that provide a pertinent context to the discussions are also included in this Report.

In the interest of sustainability, other Project documentation that may be of interest to NIRB and other interested parties has been posted to the Project Document Portal available on the Baffinland website: <http://www.baffinland.com/document-portal-new/?lang=en>. As described in Section 2.5 several reports are shared with the Working Groups and regulatory agencies throughout the year during various engagement activities.

2 – ENGAGEMENT ACTIVITIES

2.1 ENGAGEMENT APPROACH

Meaningful stakeholder and Inuit community engagement is valued by Baffinland as a means of building and maintaining community relationships and continuously optimizing community benefits 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 (Figure 2.1).



Figure 2.1 Baffinland’s Approach to Stakeholder Engagement

2.2 ENGAGEMENT OBJECTIVES

Baffinland is committed to meaningful engagement with stakeholders potentially affected by the Project, including the five (5) North Baffin Inuit Communities (Arctic Bay, Clyde River, Hall Beach, Igloolik and Pond Inlet), the QIA, applicable regulatory agencies and the general public. Baffinland’s approach to meaningful stakeholder engagement is integrally related to its commitment to corporate responsibility and sustainable development.

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

Baffinland’s approach to stakeholder and Inuit community engagement has informed the development and implementation of the Stakeholder Engagement Plan (SEP) for the Project (Baffinland, 2016c).

The objectives of Baffinland’s engagement efforts are to:

- Provide stakeholders and Inuit communities 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 and Inuit communities have the opportunity to understand and meaningfully engage in the processes initiated by the Project;
- Build constructive and positive relationships with the Communities most likely to be affected by the Project;
- Consider traditional and local knowledge as well as scientific expertise in 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; and
- Incorporate additional knowledge and expertise from potential partners (e.g. communities, academic researchers, government agencies).

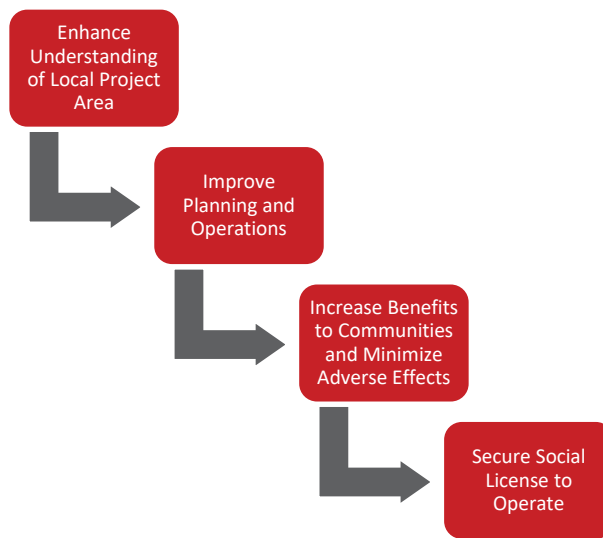


Figure 2.2 Overview of Baffinland’s Engagement Objectives

2.3 ENGAGEMENT ACTIVITIES

In support of the Baffinland’s focus on continuous improvement and the engagement objectives defined for the Project (Section 2.2), Baffinland implements a variety of engagement mechanisms that are intended to ensure a broad and comprehensive approach to the identification of stakeholders and that the creation of enhanced opportunities for dialogue and input are executed. During 2018, Baffinland completed a number of engagement activities, which included:

- Providing regular and ongoing opportunities for the dissemination of Project-related information and receipt of stakeholder input through Baffinland Community Liaison Officers (BCLOs) stationed in each of the five (5) North Baffin communities;
- Hosting public meetings and open houses;
- Conducting employee surveys;
- Participating in multi-stakeholder forums (e.g. Working Groups);
- Holding focus groups, workshops and meetings with community groups and hamlet Councils;
- Hosting site meetings for interested observers; and

- Distributing Project-related information through the corporate website, newsletters, advertisements and other means.

2.3.1 Public Meetings & Events

In 2018, Baffinland held public meetings within the five (5) North Baffin communities. These meetings provided an important opportunity for Baffinland to share information with the Communities related to current operations and avenues for Inuit to become more involved in the Project and/or a way to access the benefits of the Project. A list of the public meetings and events held in the communities is provided in Table 2.1.

Table 2.1 Public Meetings & Events in 2018

Community	Date(s) of Public Meeting	Information Shared
All 5 North Baffin Communities	September 10-14	Career and Training Information Tour
All 5 North Baffin Communities	October 15-19	Contracting and Procurement Information Tour
Hall Beach, Igloolik and Artic Bay	December 13-17	Holiday Country Foods Feast Tour

Meeting notes from public meetings and community group meetings held in 2018 are presented in Appendix B.

2.3.2 Community Group Meetings

Baffinland meets with various community groups on a regular basis to discuss aspects of the Project and ongoing issues, concerns or recommendations community representatives may have. Baffinland engaged with several community groups in 2018 including local community HTOs and Hamlet Councils, as presented in Table 2.2.

Table 2.2 Community Group Meetings in 2018

Date	Community Group	Location	Topic
March 21 2018	Hamlet and HTO	Pond Inlet, NU	Overview of Project shipping and production plans for 2018
April 5, 2018	Hamlet and HTO	Hall Beach, NU	Exploration program consultation
April 6, 2018	Hamlet and HTO	Igloolik, NU	Exploration program consultation
June 6, 2018	HTO	Pond Inlet, NU	Production Increase Application - Shipping Management
June 7, 2018	HTO	Pond Inlet, NU	Freight dock construction and offset - marine monitoring programs
June 11, 2018	Hamlet Council and HTO	Clyde River, NU	Phase 2 impacts and mitigation
June 12, 2018	Hamlet Council and HTO	Pond Inlet, NU	Phase 2 impacts and mitigation
June 13, 2018	Hamlet and Mayor	Arctic Bay, NU	Phase 2 impacts and mitigation
June 14, 2018	HTO	Igloolik, NU	Phase 2 impacts and mitigation
June 15, 2018	Hamlet Council and HTO	Hall Beach, NU	Phase 2 impacts and mitigation
July 12, 2018	Hamlet and HTO	Pond Inlet, NU	Production Increase Application
August 30, 2018	MHTO	Mary River	MHTO Site Visit (August 30-31)

Date	Community Group	Location	Topic
October 11, 2018	QIA, Nunavut Arctic College, and MHTO	Pond Inlet, NU	Pond Inlet training centre
November 19-22, 2018	Hamlet and HTO	Pond Inlet and Arctic Bay	Phase 2 Information Sessions
November 27-28, 2018	HTO	Pond Inlet	End of shipping and marine monitoring season meeting

2.3.3 Community Sponsorships

Baffinland understands the importance of and is committed to proactively pursuing opportunities to support the North Baffin communities. Partly through support of the following activities, Baffinland is working to delivering long-term benefits to the communities. The following community sponsorships were provided in 2018:

- Laptops to high school graduates in each of the North Baffin communities - May 2018;
- Cash donations to the Igloodik Soccer Association to support participant travel to tournaments - November 2018;
- Cash donations to each of the North Baffin communities for community Christmas activities - December 2018;
- Christmas Hampers in each of the North Baffin communities to the local Food Banks - December 2018; and
- Cash donations to support the Pond Inlet Fire Fighter’s Christmas Gather - December 2018.

2.4 ENGAGEMENT WITH THE QIA

Baffinland is committed to maintaining a positive relationship with the QIA through ongoing engagement and collaboration. Engagement with the QIA is generally focused on the implementation of the IIBA and on the Commercial Lease (Q13C301), associated Agreements and other regulatory authorizations.

2.4.1 Engagement on IIBA Implementation

Implementation of the IIBA is managed by a Joint Executive Committee (JEC) and a Joint Management Committee (JMC). Both committees consist of an equal number of representatives from Baffinland and QIA, and meet on a regular basis by phone or in-person. The JEC is responsible for:

- Providing oversight to the implementation of the IIBA through the setting of annual goals, objectives and priorities;
- Establishing and supporting annual implementation budget;
- Reviewing and providing comment on relevant reports; and
- Providing strategic guidance to both parties to optimize benefits through implementation of the IIBA.

The JMC is responsible for monitoring the ongoing operations and management of the Project as it relates to the IIBA. The JMC is also an important forum for sharing information regarding the progress of training initiatives, employment targets and contract awards. Disputes that arise in JMC are referred to the JEC for resolution.

At various points throughout the year, the JMC hosts weekly teleconference calls to address ongoing issues related to IIBA implementation. In addition to these regular teleconference calls, Baffinland met with the JEC and JMC on several occasions throughout 2018, as presented in Table 2.3.

Table 2.3 JMC and JEC Meetings in 2018

Date	Location	Topics Discussed
Joint Management Committee (JMC)		
January 24, 2018	Iqaluit	<ul style="list-style-type: none"> • Report to Presidents Workplan • Review of Workplace Conditions Review Survey • Annual Project Review Forum Planning • IIBA Work Plan
February 13, 2018	Oakville	
March 2, 2018	Teleconference	
May 11, 2018	Teleconference	
Joint Executive Committee (JEC)		
January 11, 2018	Iqaluit	<ul style="list-style-type: none"> • IIBA Work Plan • Inuit Human Resource Strategy • Inuit Procurement Contracting Strategy • Status of Workplace Conditions Review • 2018 and 2019 Minimum Inuit Employment Goals
March 14, 2018	Teleconference	
July 4, 2018	Teleconference	
August 24, 2018	Iqaluit	
September 28-29, 2018	Ottawa	
December 7, 2018	Ottawa	
December 13, 2018	Teleconference	

In addition to the work of the Joint Executive and Management Committees, QIA and Baffinland have also developed topic specific committees; namely the Employment Committee and Contracting Committee. The mandate of these committees is to develop and agree upon annual priorities and implementation strategies for the execution of commitments made in the IIBA regarding employment and training initiatives, and contracting and procurement management, respectively. Meetings of these two committees are listed in Table 2.4.

Table 2.4 Contracting and Employment Committee Meetings in 2018

Date	Location	Topics Discussed
Contracting Committee		
May 29, 2018	Oakville	<ul style="list-style-type: none"> • Fair Value memo • Outstanding Inuit Procurement and Contracting Procedures • Procurement and Contracting Community Tour • Availability of Country Foods at Site • Legacy Contracts • New Contracts • Advanced Contract Notification
July 9, 2018	Teleconference	
August 2, 2018	Teleconference	
Employee Committee		
May 30, 2018	Oakville	<ul style="list-style-type: none"> • Complaints and Grievances procedure • Education and Training Fund Proposal • Career and Training Information Tour • Inuit Human Resources Strategy Rollout • 2018 Workplace Conditions Review
July 10, 2018	Teleconference	
August 22, 2018	Teleconference	
October 25, 2018	Mine Site	
December 4, 2018	Iqaluit	

QIA and Baffinland host an IIBA Annual Project Review Forum (APRF) where both parties provide Project updates and progress reports to representatives of the five (5) North Baffin communities. In 2018, the IIBA forum was held in Hall Beach on April 17-18, 2018. During the forum Baffinland and the QIA presented updates on the Project and activities related to IIBA Implementation. The Annual Project Review Forum provides a valuable opportunity to discuss and address Project-related issues of concern identified by community members and to develop collaborative solutions. An IIBA Annual Implementation Report is also produced annually by Baffinland that describes implementation plans and priorities for the preceding calendar year.

2.4.2 Engagement on the Commercial Lease and Associated Agreements

In addition to engagement related to the implementation of the IIBA, Baffinland and QIA also engage on a regular basis with respect to the Commercial Lease, associated Agreements and a range of management plans. Meetings in 2018 were primarily focused on discussing the Annual Work Plan, Annual Securities Review, the Water Compensation Agreement, Dustfall Monitoring along the Tote Road and finalizing the Interim Closure and Reclamation Plan. Regular engagement with QIA on the commercial lease and associated agreements has been ongoing for the past several years and will continue to be a priority.

2.5 ENGAGEMENT WITH WORKING GROUP'S

PC No. 005 Conditions require that Baffinland establish three (3) working groups for the Project, identified as the:

- Terrestrial Environment Working Group (TEWG);
- Marine Environment Working Group (MEWG); and
- Socio-Economic Monitoring Working Group (SEMWG).

The Working Groups provide a valuable forum for ongoing Project communication and reporting between Baffinland and interested parties. The Working Groups also serve as an advisory board to provide recommendations on monitoring and management approaches related to the Project.

The meetings are structured to enable participants to have the opportunity to provide input on monitoring program design and implementation and follow-up at the conclusion of the field programs prior to finalization of the Annual Monitoring 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 Working Groups 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. The TEWG and MEWG includes both member-status and observer-status participant organizations.

Updates on 2018 activities specific to each working group are provided below. A record of meeting minutes for all Working Group meetings held in 2018 are provided in Appendix C.

2.5.1 Terrestrial and Marine Environment Working Groups

Project Certificate Conditions No. 49 and 77 mandated the establishment of working groups related to the terrestrial and marine environments. Members for each group include the Government of Nunavut, the QIA, Environment and Climate Change Canada (ECCC), Mittimatalik Hunters and Trappers Organization and Baffinland. Fisheries and Oceans Canada (DFO), Parks Canada and Makivik are also members of the Marine Environment Working Group. World Wildlife Foundation - Canada participate as an observer on both groups, and Oceans North participates as an observer to the MEWG.

Generally, the Working Group meetings are structured in such a way to include time for:

- Baffinland to provide a Project update to the members;
- Discussion of monitoring planning;
- Discussion of results of monitoring programs; and
- Various research presentations (given by Baffinland, Baffinland technical consultants and other members).

A list of the meetings with the TEWG and MEWG in 2018 is provided in Table 2.5.

Table 2.5 Terrestrial Environment and Marine Environment Working Group Meetings in 2018

Date	Location	Topics Discussed
TEWG		
March 22, 2018	Teleconference	<ul style="list-style-type: none"> • Baffinland Project Update • 2017 Field Monitoring Programs Final Results and Annual Trends • 2018 Field Monitoring Programs Overview
June 5, 2018	Ottawa	<ul style="list-style-type: none"> • Baffinland Project update and update on Phase 2 Expansion Project Proposal <ul style="list-style-type: none"> ○ Production Increase Proposal ○ Floating Freight Dock Application ○ Phase 2 EIS Submission • 2018 Terrestrial Monitoring Overview <ul style="list-style-type: none"> ○ Dust Fall Monitoring ○ Vegetation Monitoring ○ Helicopter Overflights ○ Snow Track and Snow Bank Height ○ Height-of-land Surveys • Trends to Date
September 20, 2018	Teleconference	<ul style="list-style-type: none"> • Baffinland Project Update <ul style="list-style-type: none"> ○ Operations Update ○ Production Increase Proposal ○ Phase 2 EIS Submission • 2018 Field Season Update <ul style="list-style-type: none"> ○ Dust Fall ○ Vegetation ○ Helicopter Overflights ○ Height of Land Surveys ○ Raptor Survey
December 11, 2018	Ottawa	<ul style="list-style-type: none"> • Baffinland Project Update <ul style="list-style-type: none"> ○ 2018 Highlights and Challenges ○ Production Increase Proposal ○ Phase 2 EIS Submission • 2018 Monitoring Program Results <ul style="list-style-type: none"> ○ Vegetation ○ Helicopter Overflights ○ Snow Track and Snow Bank Height ○ Height of Land ○ Dust Fall ○ Trends ○ Future Monitoring and Recommendations • Government of Nunavut - Regional Caribou Monitoring Program • Environment and Climate Change Canada - Shorebird PRISM surveys
MEWG		
March 15, 2018	Teleconference	<ul style="list-style-type: none"> • Baffinland Project Update

Date	Location	Topics Discussed
		<ul style="list-style-type: none"> ○ Marine Monitoring Report Distribution and Working Group Comment Form ○ Use of Ice Management Vessels in 2018 ● 2017 Marine Monitoring Program Results <ul style="list-style-type: none"> ○ MEEMP and AIS Monitoring Program ○ Tremblay Tagging Program ○ 2016 Aerial Survey ○ Bruce Head Shore Based Monitoring Program - Data Integration ● 2018 Marine Monitoring Program Overview <ul style="list-style-type: none"> ○ MEEMP and AIS Monitoring Program ○ Tremblay Tagging Program ○ Ship-Board Observer Program ○ Aerial Surveys ○ Bruce Head Vessel Based Monitoring Pilot Project
June 6, 2018	Ottawa	<ul style="list-style-type: none"> ● Baffinland Project Update <ul style="list-style-type: none"> ○ Production Increase Proposal ○ Floating Freight Dock Application ○ Phase 2 EIS Submission ● 2018 Marine Monitoring Programs Overview <ul style="list-style-type: none"> ○ Narwhal Tagging Program ○ Bruce Head Vessel-Based Monitoring Pilot Project ○ Ship-Board Observer Program ○ MEEMP and AIS Monitoring Program ○ Physical Oceanography and Acoustic Monitoring ● World Wildlife Fund - Eastern Arctic Mariner’s Guide ● Environment and Climate Change Canada - Inuit Training Program

Date	Location	Topics Discussed
September 13, 2018	Teleconference	<ul style="list-style-type: none"> • Baffinland Project Update <ul style="list-style-type: none"> ○ 2018 Shipping Season Update ○ Production Increase Proposal ○ Phase 2 EIS Submission • 2018 Marine Monitoring Field Season Update <ul style="list-style-type: none"> ○ Tremblay Sound Narwhal Tagging Program ○ Bruce Head Vessel-Based Monitoring ○ Ship-Board Observer Program ○ MEEMP and AIS ○ Physical Oceanography and Acoustic Monitoring ○ Ballast Water Monitoring Program • Early Warning Indicator (EWI) and Adaptive Management Development Framework <ul style="list-style-type: none"> ○ EWI Template Submission ○ Next Steps for EWI Development Process
December 10, 2018	Ottawa	<ul style="list-style-type: none"> • Baffinland Project Update <ul style="list-style-type: none"> ○ 2018 Shipping Season Highlights and Challenges ○ Production Increase Proposal ○ Phase 2 EIS • Preliminary Results of 2018 Marine Monitoring Programs <ul style="list-style-type: none"> ○ Narwhal Tagging Program (2018 and 2017 Reports) ○ Bruce Head Monitoring Program (2018 Field Summary and 2014-2017 Data Integration Report) ○ Ship-Board Observer Program ○ MEEMP and AIS Monitoring Program ○ Physical Oceanography and Acoustic Monitoring • Early Warning Indicator Development <ul style="list-style-type: none"> ○ Screening of Indicator Species ○ Monitoring Programs ○ Review of contributions from Working Group members to date

2.5.2 Mary River Socio-Economic Monitoring Working Group

Baffinland coordinates the Mary River Socio-Economic Monitoring Working Group (SEMWG) in fulfillment of Project Certificate Condition No. 129. The SEMWG is a sub-group of the Regional Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), which meets annually. Baffinland also acts as a participant in the QSEMC. The SEMWG includes members from the GN, the QIA, CIRNAC and Baffinland.

A list of 2018 meetings with the SEMWG is provided in Table 2.6.

Table 2.6 Socio-economic Monitoring Working Group Meetings in 2018

Date	Location	Topics Discussed
SEMWG		
June 19, 2019	Pangnirtung	<ul style="list-style-type: none"> • Baffinland Project Update • Update on Phase 2 • Overview of results from 2017 Socio-Economic Monitoring Report • Overview of plan for 2018 Socio-Economic Monitoring Report • Revisions to SEMWG Terms of Reference
QSEMC		
June 20, 2018	Pangnirtung	<ul style="list-style-type: none"> • Food security • Public Housing • Infrastructure for social service and commercial development • Employment-related challenges: • Childcare • Workplace conditions (rotation, length of work-days, cross-cultural issues) • Work readiness and technical training opportunities • Inuit recruitment and retention • Programs to support mental health

2.6 LOOKING AHEAD

Baffinland will continue to implement a proactive approach to engagement with various stakeholders through meetings, workshops, surveys and dissemination of information and reports. This will ensure that the communities, QIA, regulators and the public are informed in a timely manner of the Project's progress and the potential environmental and social impacts of ongoing operations. In 2019, Baffinland will develop a Mine Closure Working Group to be implemented in collaboration with QIA, with a primary focus on reclamation research and monitoring to inform and update the Interim Closure and Reclamation Plan objectives and criteria.

3 – OPERATIONS OVERVIEW

3.1 SITE ACTIVITIES COMPLETED IN 2018

Baffinland continued to focus on mine production from Deposit No. 1 in 2018. Key activities undertaken in 2018 occurred at the active Project component areas including Milne Port, the Milne Inlet Tote Road, and the Mine Site. No Project activities were undertaken related to the development of the South Railway or at Steensby Port in 2018.

Mining and hauling activities from the Mine Site to Milne Port continued throughout 2018, with 5.44 million tonnes of iron ore hauled using the Tote Road. This year also marked the fourth season of shipping with a total of 5.09 million tonnes of iron ore shipped between July 24 to October 17. Baffinland utilized an ice management vessel (the MSV *Botnica*) to escort ore carriers at the beginning and end of the shipping season, which served to facilitate safe passage through prevailing ice conditions. Seventy-one (71) voyages were executed, with vessels carrying an average of 71,750 tonnes of iron ore each. This surpasses Baffinland's previous record of 4.1 million tonnes shipped in 2017.

Operational activities in 2018 included:

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. Continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction activities, which included the use of water and deposition of waste as authorized under existing permits.
4. Ongoing operation of permitted quarry and borrow sources.
5. Arrival of vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port during shipping season (approximately between mid-July and mid-October 2018). Transportation of material, fuel and supplies required for operational and construction activities to the Mine Site year-round via the Tote Road.
6. Ongoing environmental effects studies and baseline data collection to support the construction and operation of the Project as well as for future engineering requirements.
7. Environmental monitoring in accordance with the approved Project Certificate, licences, authorizations, management plans and environmental effects monitoring plans.
8. Ongoing exploration activities including drilling, mapping, prospecting, sampling and geophysics.
9. Tote Road improvements to address freshet runoff issues and poor road conditions during the spring and summer periods.
10. Continued construction of the 800-person (Sailivik) hard wall camp at the Mine site to address retention issues and safety concerns with continued long-term use of the tent camp at the Mine.
11. Continued construction of additional fuel storage at Milne Port.
12. Installation of communications towers and infrastructure along the Tote Road to improve safety and data transfer between Milne Port and the Mine Site.
13. Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues.
14. Erection of additional maintenance facilities to safely service equipment.

Representative photographs showing major 2018 site activities are included in the Photo Essay (Appendix D).

3.2 2018 HIGHLIGHTS AND CHALLENGES

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

2018 represented another successful year of operations for Baffinland. Production and shipping numbers continue to increase, supported by a positive decision from the Minister of Intergovernmental and Northern Affairs and Internal Trade to increase the amount of iron ore hauled and shipped to 6 million tonnes per year for 2018 and 2019.

3.2.1 Project Economics

With the current ERP production rate of 4.2 million tonnes the Project is vulnerable to iron ore prices fluctuations. Expansion of the Project is necessary for Baffinland to continue to operate and provide benefits to the North Baffin communities, governments, and other stakeholders.

Implementation of the 18 Mtpa South Railway and Steensby Port as authorized under Project Certificate No. 005 is not economically feasible in the short-term, due to its high capital cost. However, the South Railway and Steensby Port remains an important part of Baffinland's long-term development plan for the Project, as Baffinland seeks to expand to 30 Mtpa to be competitive in the world's iron ore market.

Advancing the Phase 2 Proposal will allow Baffinland to increase production and achieve profitability in a shorter timeframe, while working incrementally towards the longer-term goal of reaching a production rate of 30 Mtpa. Continued pursuit of this phased approach will safeguard the Project from vulnerability to market fluctuations, which will subsequently help prevent temporary or early closure of the Project.

3.2.2 IIBA Renegotiation

Baffinland and QIA renegotiated the IIBA in accordance with Article 22 over the course of 2018. The amended IIBA was signed by the President of QIA and President and CEO of Baffinland in Iqaluit during the QIA Annual General Meeting on October 3, 2018. The amended IIBA formally came into effect on October 22, 2018.

Some highlights from the amended IIBA include:

- \$10 million toward the design and construction of a regional training centre in Pond Inlet
- A significantly expanded Inuit training budget (\$2.25 million per year from 2018-2021, \$1.5 million on the delivery of training to Inuit from 2021-2031);
- Creation of a Harvesters Enabling Fund (\$400,00 per year); and
- Creation of fund to provide fuel for Inuit in Pond Inlet to assist Inuit in accessing wildlife, recognizing the importance of an active hunting lifestyle.

3.2.3 CIRNAC Directive - Waste Rock Facility

During the summer of 2017, the development of Acid Rock Drainage and Metal Leaching (ARD/ML) at the Mine Site Waste Rock Facility (Waste Rock Facility) in combination with the Waste Rock Facility surface water management pond (Waste Rock Facility Pond) liner becoming compromised resulted in non-compliant effluent discharges at the Waste Rock Facility.

In response to the concerns identified and non-compliant discharges in 2017, Baffinland developed and implemented several immediate corrective actions in 2017 to ensure compliance regarding the management of waste rock and effluent at the Waste Rock Facility. These actions were summarized and provided to regulators in the Project's 2017 QIA & NWB Annual Report for Operations (Baffinland, 2019a). During 2018, Baffinland continued to implement corrective actions to address ongoing concerns, including:

- The successful installation and operation of a dedicated water treatment plant at the Waste Rock Facility to ensure effluent water quality compliance under the Metal & Diamond Mining Effluent Regulations (MDMER) and Type A Water Licence during controlled discharges;
- Inspection of the Waste Rock Facility Pond's liner integrity to further investigate the cause of the uncontrolled seepage observed in August 2017;
- Approval from the NWB under Modification No. 8 for the expansion and repair of the Waste Rock Facility Pond;
- Installation of eight (8) thermistor series at varying depths and locations throughout the Waste Rock Facility to characterize the thermal condition of the Waste Rock Facility. Thermistor data will be used to inform future waste rock and ARD/ML management practices as well as water quality modelling at the Waste Rock Facility;
- Continued optimization of the Project's near-term waste rock depositional and management strategies, detailed in the Interim Waste Rock Management Plans developed by Golder Associates and provided to regulators on December 31, 2018 (Golder, 2018a) and 2019 (Golder, 2019a); and
- Development of a MDMER Emergency Response Plan (Baffinland, 2019b) to clarify roles & responsibilities; clarify emergency spill response procedures; and outline the controls in place to ensure effluent water quality compliance at the Project under MDMER.

Baffinland continues to remain committed to addressing the identified concerns and maintaining compliance in the management of waste rock and effluent at the Waste Rock Facility. Industry best practices and procedures planned for the Waste Rock Facility to maintain compliance are detailed in the Project's most recent revisions of the Interim Waste Rock Management Plan (Golder, March 31, 2019; Appendix E.5), MDMER Emergency Response Plan (Baffinland, 2019b) and Fresh Water Supply, Sewage and Wastewater Management Plan (Baffinland, 2019c). Key corrective actions planned for 2019 include the expansion and repair of the Waste Rock Facility Pond and additional waste rock studies to further optimize the Project's waste rock and ARD/ML management strategies.

Additional information regarding actions taken by Baffinland to address this Directive can be found in the QIA & NWB Annual Report for Operations (Baffinland, 2019a).

3.2.4 Inuit Employment and Contracting

During 2018, the total number of hours worked by both Inuit men and women relative to the overall number of hours worked for the Project by both Baffinland employees and contractors was comparable to 2017. In 2018, on average, Inuit employment at the Project hovered around 14%, with more Inuit men employed by the Project than Inuit women (Figure 3.1). It should be noted that the number of individuals in the Inuit workforce at the Project increased in 2018 as the project workforce expanded, maintaining the overall Inuit employment rate of around 14%.

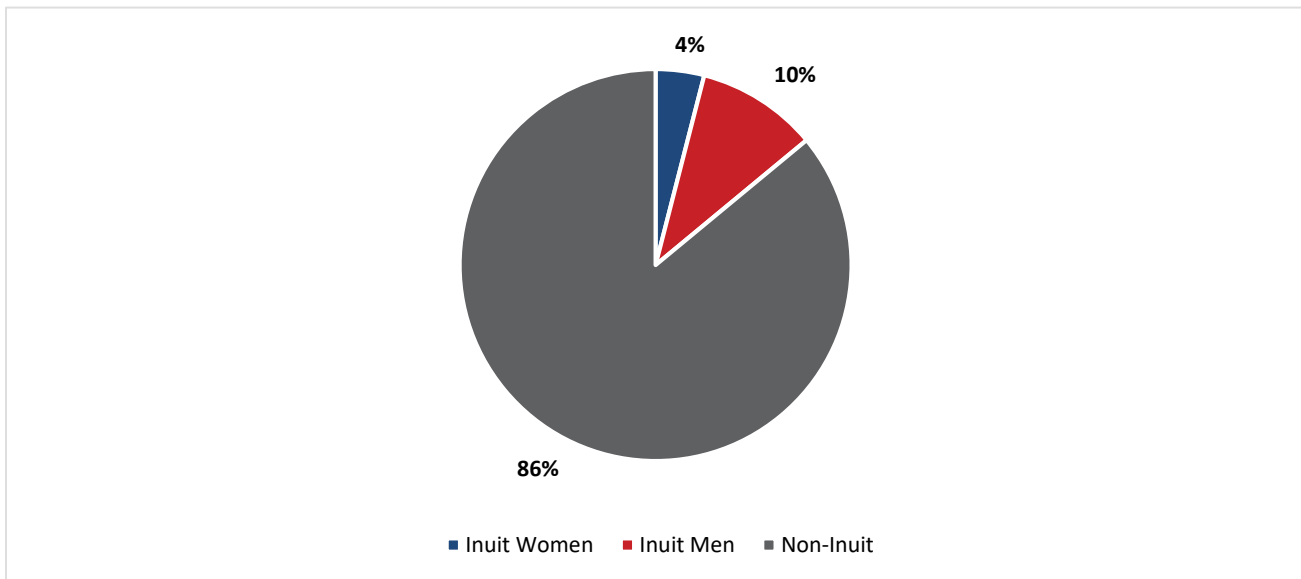


Figure 3.1 Workforce Breakdown by Ethnicity and Sex (2018)

The value of Project-related procurement with Inuit-owned businesses and joint ventures demonstrates the business opportunities created by the Project. Approximately \$140.9 million in contracts were awarded to Inuit-owned businesses and joint ventures in 2018. Of a total of ten (10) contracts awarded to Inuit-owned businesses and joint ventures, nine (9) were awarded to businesses based out of the five (5) North Baffin communities. Total procurement (with Inuit *and* non-Inuit firms) in 2018 totalled \$415.1 million. Since Project development, a total of \$960 million worth of contracts has been awarded to Inuit-owned businesses and joint ventures.

Throughout 2018, Baffinland continued to take steps to ensure that maximum benefits of the Project, represented by employment and contracting opportunities, were accessible to Inuit. A discussion of some of these relevant initiatives is provided in the sections that follow.

3.2.4.1 Training Initiatives

Baffinland and the QIA have partnered in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program, with the objective of providing Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Q-STEP is a four-year initiative consisting of work readiness measures, as well as targeted training programs directed at apprenticeships, skills development, supervisor training, and formal certification in heavy equipment operation.

In 2018, Baffinland further identified twenty-five (25) vacancies in the following eight (8) skilled trades: carpenter, electrician, heavy duty mechanic, heavy equipment technician, housing maintainer, millwright, plumber, and welder. The recruitment process started in Q4 2018 and fourteen (14) placements have commenced. The apprenticeship program is designed as follows: recruits join Baffinland as trades assistants for six months, job shadowing and learning about their prospective trade. Upon successful completion of the six-month term, candidates will write their Trades Entrance exam. Pending successful enrollment in that program, candidates will become full-time, permanent apprentices with Baffinland.

In partnership with the Operating Engineers Training Institute of Ontario (OETIO), Baffinland offers North Baffin Inuit opportunities to participate in the Heavy Equipment Operating Training delivered by the OETIO in Morrisburg, Ontario. This training began in early 2018. Five (5) classes of twelve (12) trainees were enrolled in the HEO program and fifty-four (54) successfully graduated. Baffinland also offered advanced heavy equipment operator training to four (4) existing Baffinland Inuit employees to upgrade their heavy equipment skills.

In 2018, Inuit training hours totalled 32,629.2 hours which is 45% of the total training provided by Baffinland, a 25% increase from 2017, where Inuit training hours represented only 11% of training conducted for the Project.

3.2.4.2 Support for Local Businesses

In addition to provisions respecting the participation of Inuit Firms in Project contracting opportunities as detailed in Article 6 of the Inuit Impact and Benefit Agreement (IIBA) and the Inuit Procurement and Contracting Strategy, Baffinland supports the development of local businesses through its annual contribution of \$250,000 through the IIBA's Business Capacity and Start Up Fund. The fund, which is administered by the QIA, is designed to assist existing Inuit Firms to develop capacity to participate in the bidding process and to encourage business start-ups in the communities.

In addition, Baffinland has worked and will continue to work with local businesses on an ongoing basis to create contracting opportunities in the communities.

3.2.4.3 Community Engagement

Baffinland also undertook several community engagement initiatives geared towards recruiting members and providing information on business opportunities for Inuit contractors from the five (5) North Baffin communities. See Section 2 for more details.

3.3 LOOKING AHEAD

The 2019 Work Plan was submitted to the NWB and the QIA on November 1, 2019 (Baffinland, 2018b). 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 and the QIA (QIA, 2013).

A summary of the planned 2019 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 Mary River Mine Site, and along the Tote Road for the Mary River Project.
3. Continued operation of Mine Site and 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. Ongoing operation and expansion of permitted quarry and borrow sources; additionally, four (4) new quarries have been identified along the Tote Road to support ongoing maintenance and construction.

5. At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive between approximately mid-July and mid-October 2019. Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year-round via the Tote Road.
6. 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.
7. Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans.
8. Ongoing exploration activities including drilling, mapping, prospecting, sampling and geophysics. Planning of the details of the summer drilling and/or trenching program is not yet finalized.
9. Tote Road improvements to address safety concerns, freshet runoff issues and poor road conditions during the spring and summer period.
10. Continued construction of additional fuel storage at the Project.
11. Construction of 380-person hardwall camp at Milne Port following approval of a Water License Modification.
12. Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues around current infrastructure.
13. Installation of a floating freight dock to improve efficiencies on offloading of sealift as well as provide an opportunity for shore-based connection for fuel ships to potentially avoid future use of floating hose for fuel receipt.
14. Erection of additional maintenance facilities to safely service equipment.

No activities are planned to be undertaken along the south railway or at Steensby Port in 2019. However, Baffinland will continue to proceed through the regulatory process for the Phase 2 Expansion Proposal.

4 – PERFORMANCE ON PC CONDITIONS

The following sections provide a discussion of Baffinland’s self-assessed status of compliance and performance related to each of PC conditions for the Project in 2018.

The discussion of compliance with PC conditions has been disaggregated into the following categories:

- Performance on General Conditions;
- Performance on Compliance with Regulatory Instruments;
- Performance on Ecosystemic Terms and Conditions;
- Performance on Socio-Economic Terms and Conditions; and
- Performance on Other Terms and Conditions.

4.1 METHODOLOGY AND CRITERIA

Table 4.1 outlines the status of compliance levels and describes the criteria related to each of these options. Each PC condition has been assigned a status of compliance. Where a PC condition is designated as being only ‘partially compliant’ or ‘non-compliant’, a rationale explaining why ‘in-compliance’ was not achieved in 2018 and, where applicable, a strategy for moving towards full compliance for the 2019 reporting year has been provided.

Table 4.1 Status of Compliance Terminology and Criteria

Status of Compliance	Criteria
In-Compliance	Condition requirements have been met
Partially-Compliant	Condition requirements have been partially met <i>*Demonstrable efforts towards meeting compliance requirements is evidenced.</i>
Non-Compliant	Conditions requirements have not been met <i>*Rationale for being unable to meet compliance requirements is provided.</i>
Not Applicable	Condition is tied to a project phase or component that was not active during the reporting year, or the responsible party is not the Proponent

Baffinland has taken a conservative approach to self-assessing the status of compliance with PC Conditions for 2018. When determining a status of compliance for each of the PC conditions, the following process was implemented by Baffinland and its technical experts:

1. A review of the specific requirements outlined in each PC condition is conducted.
2. A review of all relevant work completed by Baffinland in the reporting year and/or previous reporting years (if applicable) relevant to the PC condition is conducted.
3. A gap analysis is completed to assess whether or not there is a delta between the requirements of the PC condition and the work completed by Baffinland to meet these requirements.
4. Stakeholder comments relevant to the PC condition are considered.
5. A status of compliance based on the results of the analysis is assigned.

4.2 APPROACH TO REPORTING ON PERFORMANCE

An individual summary sheet for each of the ecosystemic, socio-economic and ‘other’ terms and conditions has been provided in Sections 4.6 to 4.8. The category and content of information provided in these summary sheets is outlined in Table 4.2.

Table 4.2 Layout of PC Condition Summary Sheets

Item	Summary of Content
Category	<ul style="list-style-type: none"> • Category as defined in PC No. 005.
Responsible Parties	<ul style="list-style-type: none"> • Responsible party as defined in PC No. 005.
Project Phase(s)	<ul style="list-style-type: none"> • Phase(s) of the Project the PC Condition is applicable to: <ul style="list-style-type: none"> ○ Construction ○ Operations ○ Temporary Closure / Care and Maintenance ○ Closure ○ Post-Closure Monitoring (as outlined in PC No. 005)
Objective	<ul style="list-style-type: none"> • The objective as outlined in PC No. 005
Term or Condition	<ul style="list-style-type: none"> • The term or condition as written in PC No. 005
Relevant Project Commitment	<ul style="list-style-type: none"> • List of all corresponding Baffinland commitments outlined in the Final Hearing Report (NIRB, 2012b).
Reporting Requirement	<ul style="list-style-type: none"> • The reporting requirement as outlined in PC No. 005.
Status of Compliance	<ul style="list-style-type: none"> • A self-assessed status of compliance for the PC Condition: <ul style="list-style-type: none"> ○ In-Compliance ○ Partially-Compliant ○ Non-Compliant ○ Not Applicable
Stakeholder Review	<ul style="list-style-type: none"> • Stakeholders and other interested parties that participate in discussions and reviews related to aspects and implementation of regulatory submission of actions or documents relevant to the PC condition.
Reference	<ul style="list-style-type: none"> • Description / title of relevant documents where supporting information related to PC condition status of compliance is available for review. • Hyperlink to web-portal where referenced documentation can be accessed.
Methods	<ul style="list-style-type: none"> • The methods employed to complete work required to meet compliance to the PC condition. • Summary of any adaptive management measures employed that year in support of achieving compliance to the PC condition.
Results	<ul style="list-style-type: none"> • Summary of efforts or work that were completed in support of achieving PC condition compliance in 2018, and previous reporting years, where applicable.
Trends	<ul style="list-style-type: none"> • Summary of notable trends from previous years.

Item	Summary of Content
Recommendations / Lessons Learned	<ul style="list-style-type: none"> • Summary of any operational changes undertaken or recommended for the future to achieve compliance or to further enhance environmental performance. • Assessment of effectiveness of monitoring program and whether any changes to the scope of monitoring are appropriate. • Identification of any challenges related to implementing mitigation measures, undertaking monitoring, or obtaining data from other sources.

4.3 SUMMARY OF 2018 COMPLIANCE WITH CONDITIONS

Baffinland’s performance in fulfilling the PC conditions in 2018 is presented on Figure 4.1. A summary of each of the conditions and the Project status with respect to the conditions in 2018 is presented in Appendix A.

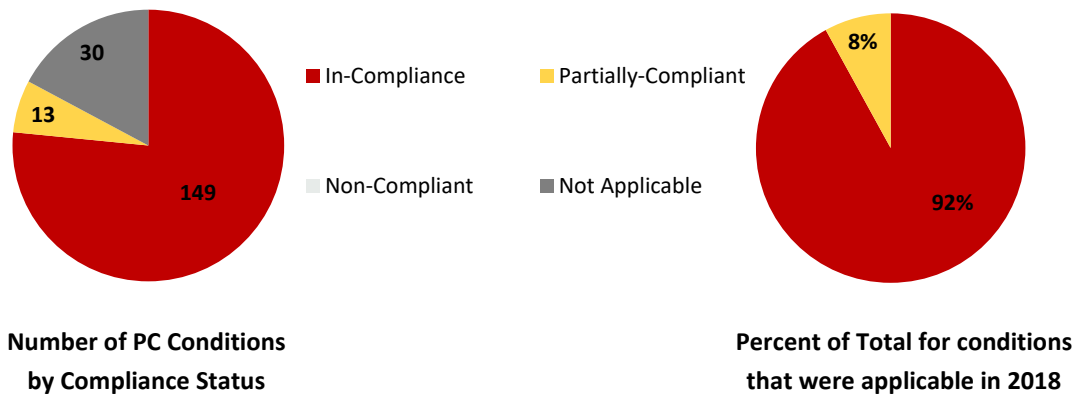


Figure 4.1 Baffinland's Overall Performance against Project Certificate Conditions in 2018

Overall, Baffinland is in-compliance with the required terms and conditions for the Project. Of the 162 PC conditions that were applicable to the Project in 2018, Baffinland is 92% in-compliance with these terms and conditions – a 10% improvement over 2017. In areas where improvement is required Baffinland will continue to make operational changes and work with regulators and the communities to ensure the Project remains in compliance with Project Certificate No. 005.

4.4 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, and Sections five through 12 describe additional requirements for Baffinland. A 2018 status on these items is provided 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 received the necessary approvals from NIRB to construct and operate the 18 Mtpa (Steensby) rail project, the 4.2 Mtpa ERP, and for the temporary production increase to 6 Mtpa for 2018 and 2019 (NIRB, 2018a), as well as the permits necessary to operate the latter two projects (Table 1.1). Baffinland 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 for operations submitted to the NWB and the QIA, 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 management activities, as well as spill management and other topics related to water.

A separate annual report on the status of implementation of the IIBA in 2018 is issued to the QIA and Joint Executive Committee on March 31, 2019. 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/news-reports/sharedocuments/?lang=en>.

The Company's performance on compliance with its regulatory instruments is described in Section 4.5.

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 4.5.

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 through the Annual Security Review (ASR) process conducted in accordance with Schedule C of the Type A Water License 2AM-MRY1325, Amendment No. 1, and the QIA Commercial Lease Q13C301. 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. Baffinland submitted the Marginal Closure and Reclamation Financial Security Estimate to the NWB and QIA with the Annual Work Plan on November 1, 2018, and a subsequent revised version was submitted on December 20, 2018. Publically available ASR document submissions for a respective year, describing in detail annual estimated closure and reclamation costs, can be downloaded from the NWB FTP site at: <ftp.nwb-oen.ca>.

Items eight to twelve speak to conditions related to monitoring records. The conditions and Baffinland's responses 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 2018 Baffinland included a summary of all monitoring programs in the executive summary of the NIRB annual report which was translated into Inuktitut. In 2018, Baffinland ensured that a popular / executive summary was developed for

the Socio-economic, Terrestrial and Marine Annual Monitoring Reports, and translated these summaries into Inuktitut. Meeting minutes from the Terrestrial and Marine Environment Working Group meetings were also 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. A summary of the effects of the Project compared to those predicted in the FEIS is also provided in Sections 4.5 through 4.7.

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 monitoring and reporting information to the public (<http://www.baffinland.com/news-reports/shareddocuments/?lang=en>). The web portal has been live as of March 31, 2017 and remained operational throughout 2018. Where possible the web portal provides links to English and Inuktitut versions of the popular summary of reports as well as the main body of the report or document.

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

4.5 PERFORMANCE ON COMPLIANCE WITH REGULATORY INSTRUMENTS

General regulatory requirements under the PC requires Baffinland to take prompt and appropriate action to remedy any event of non-compliance, and to report all instances of non-compliance and associated follow-up annually to NIRB. Baffinland's compliance with applicable regulatory instruments in 2018 is discussed below.

4.5.1 Agency Inspections and Site Visits

To validate compliance with the Project's various regulatory instruments, Baffinland hosted numerous regulatory inspections with representatives from CIRNAC, ECCC, QIA and the Workers' Safety and Compensation Commission (WSCC) during 2018. Where relevant, documentation and correspondence associated with these inspections are available in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a). The following subsections outline the inspections conducted by regulatory agencies and stakeholders at the Project in 2018. Details regarding NIRB's site visits are provided in Section 5.1.

4.5.1.1 CIRNAC Inspections

During 2018, five (5) inspections were conducted by CIRNAC:

- May 15-17, 2018;
- June 21-25, 2018;
- July 25 - August 1, 2018;
- August 21-23, 2018, and

- October 3 - 10, 2018.

Inspection results were conveyed during close-out meetings and are documented in Water Licence Inspection Reports subsequently distributed to Baffinland and the NWB. Baffinland responded to any concerns identified in the inspections to provide additional information and/or address the identified concerns. More details are available in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

4.5.1.2 QIA Inspections

In 2018, five (5) inspections were conducted on the following dates by the QIA:

- March 20-22, 2018;
- June 25-28, 2018;
- August 2-4, 2018;
- September 6-11, 2018; and
- October 2-3, 2018.

The findings from the audit and inspections were conveyed during the close-out meetings between QIA personnel and Baffinland representatives as well as documented in subsequent reports and correspondence. Baffinland responded to the concerns identified in the inspections to provide additional information and/or address the identified concerns. More details are available in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

4.5.1.3 ECCC Inspections

In 2018, one (1) inspection was conducted on the following date by ECCC:

- June 21-25, 2018.

Inspection results are conveyed during close-out meetings following each inspection and subsequent correspondence. Baffinland responded to the concerns identified in the inspections to provide additional information and/or address the identified concerns.

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

During 2018, the WSCC conducted a total of eight (8) inspections at the Mine Site and Milne Port. WSCC inspections were held on the following dates:

- January 23-29, 2018;
- March 28-29, 2018;
- July 5-9, 2018;
- July 13, 2018;
- August 29-30, 2018;
- October 17, 2018;
- November 8, 2018; and
- December 16, 2018.

The reports for these inspections were distributed to Baffinland management as well as Baffinland's Occupational Health & Safety (OHS) Committee.

4.5.2 Unauthorized Discharges and Spills

During 2018, thirty-six (36) spills were reported to the Northwest Territories-Nunavut (NT-NU) Spill Line, CIRNAC, NWB and the QIA by the Project. Overall, this represented a frequency decrease of 25 percent when compared to the frequency of reportable spills in 2017. A summary of the 2018 spills reported by the Project are outlined in Table 4.3.

In addition to the initial spill report submitted to regulators within 24 hours of each spill event in 2018, a detailed follow-up report was submitted within thirty days of each reported spill. The follow-up reports included a description of the event, the immediate cause(s), corrective and preventative action(s), photos, and a map showing the location of the spill.

To further outline the corrective actions taken in 2018 and planned to address the sediment releases reported during freshet 2018, Baffinland provided the 2018 Freshet Monitoring Report to the NWB, CIRNAC, ECCC and the QIA in early 2019.

Copies of the 2018 initial and follow spill reports along with the 2018 Freshet Monitoring Report are provided in the appendices of the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

Table 4.3 List of Reported Spills and Unauthorized Discharges - 2018

Date of Occurrence	Quantity (m ³)	Material Spilled	Location	Proximity to a Water Body?	Spill Line ID No.
18-Jan-18	0.2	Sewage (Untreated)	Mine Site	> 100 m	18-016
21-Jan-18	0.4	Grey Water	Mine Site	> 200 m	18-020
21-Jan-18	0.15	Sewage (Untreated)	Milne Port	> 100 m	18-022
7-Feb-18	0.225	Sewage (Untreated)	Mine Site	> 100 m	18-037
9-Feb-18	2	Sewage (Untreated)	Milne Port	> 100 m	18-040
14-Feb-18	10	Impacted Water	Mine Site	> 160 m	18-045
22-Feb-18	0.2	Sewage (Untreated)	Mine Site	> 100 m	18-051
23-Feb-18	0.15	Sewage (Untreated)	Mine Site	> 100 m	18-050
25-Feb-18	0.2	Fuel - Diesel	Milne Port	> 100 m	18-052
27-Feb-18	0.2	Sewage (Untreated)	Mine Site	> 100 m	18-062
16-Mar-18	0.2	Sewage (Untreated)	Mine Site	> 100 m	18-089
18-Mar-18	0.3	Sewage (Untreated)	Mine Site	> 100 m	18-098
19-Mar-18	0.3	Sewage (Untreated)	Milne Port	> 100 m	18-100
9-Apr-18	1	Sewage (Untreated)	Mine Site	> 100 m	18-118
23-Apr-18	0.25	Sewage (Untreated)	Mine Site	> 100 m	18-131
23-Apr-18	0.25	Sewage (Untreated)	Mine Site	> 100 m	18-140
26-Apr-18	0.3	Sewage (Untreated)	Mine Site	> 100 m	18-141
29-Apr-18	0.5	Fuel - Diesel	Mine Site	> 100 m	18-145
30-Apr-18	1.3	Sewage (Untreated)	Mine Site	> 100 m	18-148
4-May-18	0.25	Sewage (Untreated)	Mine Site	> 100 m	18-153
6-May-18	0.5	Sewage (Treated)	Mine Site	> 100 m	18-154
16-May-18	-	Sediment	Mine Site	0	18-180
17-May-18	-	Sediment	Mine Site	0	18-182
5-Jun-18	-	Sediment	Tote Road	0	18-209
8-Jun-18	-	Sediment	Mine Site	0	18-214
15-Jun-18	1	Waste Oil	Milne Port	100 m	18-232

Date of Occurrence	Quantity (m ³)	Material Spilled	Location	Proximity to a Water Body?	Spill Line ID No.
19-Jun-18	-	Non-Compliant Effluent	Mine Site	> 3 km	18-244
22-Jul-18	0.03	Gear Oil	Milne Port	0	18-286
12-Aug-18	0.2	Fuel - Diesel	Milne Port	> 100 m	18-324
27-Aug-18	1.1	Fuel - Diesel	Mine Site	> 100 m	18-363
25-Oct-18	1	Sewage (Untreated)	Milne Port	> 100 m	18-436
13-Nov-18	0.5	Sewage (Untreated)	Mine Site	> 100 m	18-451
20-Nov-18	0.5	Grey Water	Mine Site	> 100 m	18-459
25-Nov-18	0.5	Sewage (Untreated)	Mine Site	> 100 m	18-463
14-Dec-18	0.1	Fuel - Diesel	Tote Road	90 m	18-479
18-Dec-18	0.6	Sewage (Untreated)	Mine Site	> 100 m	18-481

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

In 2018, Baffinland operated the Mary River Project under its Type A Water Licence (2AM-MRY1325 – Amendment No. 1) and a Type B Water Licence (2BE-MRY1421). The scope of the Type A Water Licence focuses on Early Revenue Phase (ERP) operations while the scope of the Type B Water Licence focuses on geotechnical and exploration activities, including drilling operations and the establishment of satellite exploration camps. Both Water Licences include conditions on water use, wastewater management and water quality monitoring as well as the management of fuel and waste.

Compliance to the conditions and requirements outlined in the Type A Water Licence during 2018 is discussed in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a). Similarly, compliance to the conditions and requirements outlined in the Type B Water Licence is discussed in the 2018 QIA & NWB Annual Report for Exploration and Geotechnical Activities (Baffinland, 2019d).

4.6 PERFORMANCE ON ECOSYSTEMIC CONDITIONS

4.6.1 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 in Nunavut, with communities reporting observations of the changing climate. 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. Participants from the Mary River Inuit Knowledge Study (2007-2010; Baffinland, 2014b) shared observations related to climate change in the Arctic. 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 regarding observations of climate change (JPCSL, 2017; Appendix B).

Monitoring Activities

Baffinland operates three meteorological stations, and this information is made publicly available on its website and through The Weather Network.

To date, no climate change impacts have been observed through Project monitoring. Baffinland continues to track and monitor Greenhouse Gas (GHG) emissions and report as per Environment and Climate Change Canada’s GHG Emissions Reporting Program (ECCC, 2016), which is included as part of the Air Quality and Noise Abatement Plan (Baffinland, 2016d). Baffinland submitted a Climate Change Strategy to NIRB on February 12, 2019 (Baffinland, 2019e). The Strategy includes a description of the actions the Company will undertake to validate and update climate change impact predictions for the Project and the effects of the Project on climate change.

Table 4.4 provides a summary of climate effects monitoring completed in 2018, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum. The calculated gaseous emissions in 2018 (Table 4.5) are below the maximum annual GHG, SO₂ and NO₂ 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 emissions at Milne Port	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 ¹
SO ₂ and NO ₂ emissions at Mine Site	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 ¹

NOTE:

1. The 1-hour NO₂ ambient air quality standard (AAQS) was exceeded on one occasion on February 15, 2018. This result appears to be an outlier as NO₂ levels were otherwise well below the AAQS.

Path Forward

As Baffinland implements the Climate Change Strategy, updates regarding the status of these activities will be provided as part of the annual reporting. The Climate Change Strategy 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 feedback on the impacts that climate change might be having on the port facilities.
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.
Relevant BIM Commitment	N/A
Reporting Requirement	The Proponent shall summarize and supply these monitoring results to NIRB in the annual project report.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2018 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species (AIS) Monitoring Program Report (Golder, 2019b)
Ref. Document Link	N/A

METHODS

Milne Port:

In 2014, tide data was collected using a tidal gauge installed at Milne Port (ASL, 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 2015 or 2016. As such, no tidal data were collected or are available from Milne Port for the 2015 or 2016 reporting periods. Baffinland re-installed a tide gauge system at Milne Port and resumed tidal monitoring on-site during the 2017 and 2018 open-water season. The purpose of the tide gauge was to extend the tidal data set (starting in 2014) and provide insight to relative sea level and storm surges at the project site. Tide monitoring instrumentation consisted of an RBRconcerto CTD (RBR) sensor programmed to continuously measure pressure, temperature, and conductivity. The instrument was mounted on a steel ladder located on the west end of the existing ore dock. The ladder provided a consistent mounting point (i.e. repeatable position and elevation from year to year) that can be installed as part of standard port operations. A steel plate at the top of the ladder was surveyed with a Real Time Kinematic Global Positioning System (RTK GPS) survey instrument. The elevation and position of the top plate of the ladder was surveyed using five survey points and the average elevation of the five points has been used to reference the position of the tide gauge to the Canadian Geodetic Vertical Datum (CGVD).

Steensby Port:

No tidal gauge systems were installed at Steensby Port in 2018, as that component of the Project is currently inactive.

RESULTS

Milne Port:

A continuous time-series of water level, temperature, and conductivity data was collected from June 30 to October 19, 2018. Water level data recorded at Milne Port indicated typical fluctuations resulting from tidal forcing. During the measurement period, a total of seven neap-spring tidal cycles were observed.

Detailed results of tidal gauge and salinity/temperature monitoring are provided in the 2018 MEEMP and AIS Monitoring Program Report (Golder, 2019b).

Steensby Port:

No activities took place at Steensby Port during 2018.

TRENDS

Trends cannot be currently evaluated based on the available data (2014, 2017 and 2018) and without an assessment of site-specific land uplift/subsidence rates (i.e. local relative sea level at the site and regional and site-specific (as available) geodetic elevation data).

RECOMMENDATIONS / LESSONS LEARNED

Milne Port:

The tide gauge system will be re-deployed at Milne Port during summer of 2019 and the relative tide gauge position will be surveyed with an RTK GPS, with the intention of continuing annual monitoring of relative sea levels and storm surges at the site. A tide gauge monitoring plan has been developed (Golder, 2018b) which provides guidelines for annual management and maintenance of the tide gauge station such that a long-term record of water levels at Milne Port during the open-water season can be developed. To support a future trends analysis, Baffinland is considering conducting a desktop review in 2019 of local relative sea level at the site and regional and site-specific (as available) geodetic elevation data.

Steensby Port:

The measurement of sea level 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.
Relevant BIM Commitment	58
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
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Climate Change Strategy (Baffinland, 2019e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland submitted a Climate Change Strategy to the NIRB on February 12, 2019 (Baffinland, 2019e). The Strategy describes the actions the Company will undertake to validate and update climate change impact predictions for the Project, and the effects of the Project on climate change. These include:

- Implementing comprehensive environmental monitoring and management programs that are based on a combination of scientific data and Inuit Qaujimagatuqangit to safeguard the environment.
- Modifying or replacing equipment with more efficient alternatives to reduce greenhouse gas (GHG) emissions.
- Researching the potential for renewable energy sources, and where possible, implementing these sources to off-set fuel requirements and reduce GHG emissions.
- Conducting ongoing risk assessments to ensure that all aspects of the operations are able to withstand potential climate change related events
- Identifying opportunities for energy efficiency through Project design optimizations
- Ensuring that an effective closure strategy is in place at all stages of Project development that considers best available science for future climate scenarios
- Maintaining compliance with monitoring and regulatory reporting requirements

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

As Baffinland implements the Climate Change Strategy, updates regarding the status of these activities will be provided in the Annual Report to the NIRB.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	The Proponent shall include relevant information in the Annual Report submitted to the NIRB.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

METHODS

In 2017, Baffinland established an Idling Policy to reduce unnecessary vehicle and equipment idling. This was developed with the specific purpose of reducing air pollution generated as a result of Project activities. Employees are required to follow the Idling Policy where manufacturer guidelines for warm-up periods are not readily available. Where specific manufacturing guidelines are not provided, idling times are restricted to a maximum of 10 minutes for light vehicles and 20 minutes for heavy vehicles and equipment in -20 degrees Celsius or below, and a maximum of 5 minutes for light vehicles and 10 minutes for heavy vehicles and equipment when the ambient temperature is between 0 to -20 degrees Celsius.

From 2013 to 2017 Baffinland used solar power generators to supplement energy requirements at our remote environmental monitoring sites (e.g. Bruce Head camp). Baffinland also conducting ongoing investigations into operating alternative energy sources to supply supplementary renewable energy for the Project at a much larger scale.

RESULTS

In 2018, Baffinland replaced all diesel-powered lighting systems at the crusher with high efficiency LED lights. This represents a fuel savings of approximately 30,000 L per year. Other mechanical improvements at the crusher also reduced the need for use of ten (10) diesel-fired frost fighter units down to three (3). This efficiency resulted in an additional reduction of approximately 33,300L of diesel at the crusher.

TRENDS

Between 2015 to 2017, Baffinland increased the amount of iron ore hauled on the Tote Road by 246%, although GHG produced by the Project only increased by 27% (Figure 4.2).

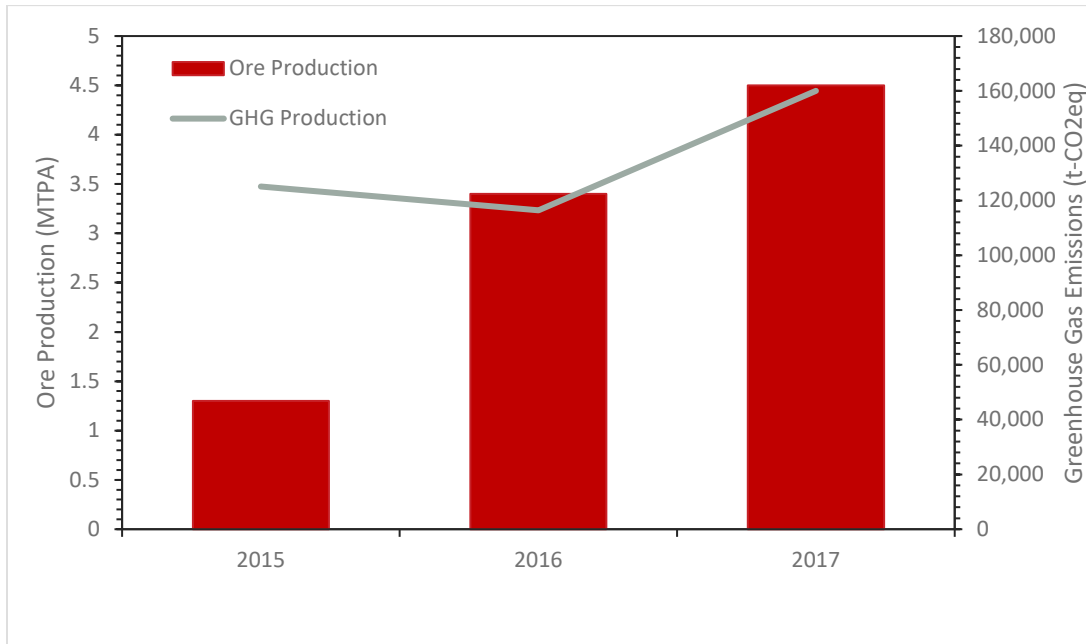


Figure 4.2 GHG Emissions Relative to Ore Production

RECOMMENDATIONS / LESSONS LEARNED

In 2019, Baffinland will be installing new low-speed generators, which are more fuel efficient to supplement the current high-speed generators. Baffinland is also currently investigating the use of thermo-electric or fluid heat exchange heat recovery systems to recover energy from diesel generator exhaust and incinerator capture, although the feasibility of this is yet to be confirmed.

A key component of the proposed amendment to the Project under Phase 2 is the switch from road to rail. Phase 2 is expected to generate approximately 21.6 Mt CO₂e of GHG emissions, which represents a 14.2% reduction relative to the ERP.

Consistent with the Climate Change Strategy for the project, Baffinland will continue to modify or replace equipment with more energy efficient alternatives, research and where possible implement renewable energy sources, and identify opportunities for energy efficiency through optimizations in the Project design, all in an effort to further reduce GHG emissions. Future updates regarding Baffinland's GHG emission production and initiatives being undertaken to optimize efficiencies in energy requirements will continue to be reported in Baffinland's Annual Report's to the NIRB.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Climate Change Strategy (Baffinland, 2019e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=6&archive=1

METHODS

Baffinland submitted a Climate Change Strategy to the Nunavut Impact Review Board (NIRB) on February 12, 2019 (Baffinland, 2019e). The Strategy includes a description of activities the Company will undertake to validate and update climate change impact predictions for the Project and the effects of the Project on climate change. This includes, though is not limited to:

- Implementing comprehensive environmental monitoring and management programs that are based on a combination of scientific data and Inuit Qaujimagatuqangit to safeguard the environment.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

As Baffinland implements the Climate Change Strategy, updates regarding the status of these activities, including consultation with Inuit communities will be provided in future relevant updates in the Annual Report to the NIRB.

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.
Relevant BIM Commitment	5
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Baffinland Corporate Website
Ref. Document Link	www.baffinland.com

METHODS

Baffinland ensures that weather related information is publicly accessible for the Mary River Project Site by posting current weather information on the Baffinland website (www.baffinland.com). Weather related information is also available to the public at www.weathernetwork.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 publicly available websites 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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland used guidance documents provided by Environment and Climate Change Canada (ECCC, 2016; ECCC, 2017) and the Intergovernmental Panel on Climate Change (IPCC, 2006) along with published emission factors to estimate the Project's annual GHG, SO₂ and NO_x emissions. Annual emissions were calculated based on on-site fuel consumption and waste management at the Project.

Baffinland continues to report annual emissions to ECCC through the National Pollutant Release Inventory (NPRI) and GHG reporting programs.

RESULTS

Baffinland's 2018 annual emissions for GHGs, SO₂ and NO_x are presented in Table 4.5.

Table 4.5 Calculated 2018 Project Gaseous Emissions

Gaseous Emission	Units	Calculated Emissions
GHG	t-CO ₂ eq	152,000
SO ₂	t (SO ₂)	11
NO _x	t (NO ₂)	3500

TRENDS

Total gaseous emissions have increased from 128,000¹ tonnes in 2017 to 156,000 tonnes in 2018, therefore indicating a general upward trend.

¹ Value adjusted from previously reported value of 160,000 GHG emissions in 2017.

RECOMMENDATIONS / LESSONS LEARNED

Consistent with the Climate Change Strategy for the project, Baffinland will continue to modify or replace equipment with more energy efficient alternatives, research and where possible implement renewable energy sources, and identify opportunities for energy efficiency through optimizations in the Project design, all to further reduce GHG emissions. Future updates regarding Baffinland's GHG emission production and initiatives being undertaken to optimize efficiencies in energy requirements will continue to be reported in Baffinland's Annual Report's to NIRB.

4.6.2 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, except for dust. During review of the FEIS and FEIS Addendum, communities and regulators alike focused on dust, including dustfall and potential impacts to soil, vegetation and forage to caribou. The focus of stakeholder feedback on dustfall and potential impacts on soil, vegetation and wildlife, along with several years of exceedances of the predicted threshold levels for dustfall presented in the FEIS, has prompted Baffinland to implement additional dust mitigation measures described in the updates to PC Conditions 10 and 58c. Concern about dust was expressed several times during 2018 consultation activities, mostly in relation to the Phase 2 Expansion Project Proposal, but also in regard to current operations (Appendix B).

Monitoring Activities

Table 4.6 provides a summary of air quality effects, monitoring completed in 2018, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum.

Table 4.6 Air Quality Impact Evaluation

Component	Effect	Monitoring Program	Impact Evaluation
Incineration of combustible non-hazardous wastes	Release of air contaminants, including particulate matter (PM), carbon monoxide (CO), mercury, dioxins, furans	Incinerator stack testing was completed at commissioning. There was no additional testing undertaken in 2018, however it is planned in 2019 following recommendations from the NIRB.	Air quality limits should be met under normal operating conditions and appropriate use of incinerators.
Release of air contaminants from mobile and stationary equipment due to fuel combustion	Increased concentrations of total suspended particulate (TSP), sulphur dioxide (SO ₂), nitrogen dioxide (NO ₂), CO and potential acidic input (PAI)	Continuous NO ₂ and SO ₂ monitoring was conducted at Milne Port and the Mine Site continuously through 2018.	With the exception of a single outlier, 2018 air quality monitoring was within Nunavut AAQS and FEIS predictions.

Component	Effect	Monitoring Program	Impact Evaluation
Earthworks, mining, hauling, stockpiling and transfer of ore	Ore handling and transport, including wheel entrainment from haulage of ore	Dustfall in 2018 was less than in 2017 at most year-round sampling locations (EDI, 2019a). Mine Site - Annual dustfall levels were within predicted threshold levels. Milne Port - Annual dustfall continued to exceed predicted threshold levels at all but one site. As seen at the Mine Site dust fall monitoring locations in 2018, dust fall in summer months was lower than winter. Since 2016, dust fall deposition in the summer has decreased while dust fall deposition in the winter months has increased.	Dustfall levels were generally within FEIS predictions at the Mine Site, but exceeded FEIS predictions at Milne Port and along the Tote Road.
Haulage of ore and other traffic on the Tote Road	Particulate matter emissions and dustfall from wheel entrainment	Tote Road - Dustfall associated with the Tote Road at both the north and south crossing was less in 2018 than in 2017. The greatest decrease in dustfall was seen at the monitors 30 m distant from the road. It should be noted that the dustfall decreased, despite the increase in traffic along the Tote Road in 2018.	Monitoring showed that although dustfall exceeded FEIS predictions at select locations, exceedances decreased in 2018 as compared to 2017. The decrease of 2018 dustfall values as compared to 2017 demonstrate significant progress in effectively reducing dust generation from crushing and Tote Road traffic, despite increases in the production level at the Project and the volume of Tote Road traffic.

Baffinland continues to investigate how to better mitigate dust onsite and plans to update the Air Quality and Noise Management Plan in 2019. Baffinland continues, as scheduled, to evaluate and report on dustfall through its approved dust monitoring program at the Mine Site, Port Site and Tote Road, including additional monitoring stations deployed in 2018. Baffinland has worked diligently towards decreasing dust generated by wheel entrainment across the Project Sites, specifically reducing dust generation from ground surfaces by applying water and/or chemical suppressants such as calcium chloride to road surfaces and site layouts during summer conditions. The Company's effort with respect to the application of dust suppressants on the Tote Road are documented in the 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a).

Measures implemented in 2017 to mitigate downwind dust of the Ore Pad at Milne Port continued to be implemented in 2018 by removing dust impacted snow from areas of accumulation, including snow drifts near waterbodies and the beach west of the ship loader. The Crushers at the Mine Site were installed with engineered dust shrouds on the main surge bins to reduce windblown dust as well as hoods at the outflow areas (see Photo Essay in Appendix D).

A snow fence trial was conducted at the Ore and Crusher Pads to determine effectiveness of capturing windblown ore dust snow, however varying wind directions confounded results. Research towards various dust control binding agents for crusher pads and roads continue.

The measuring of dust on vegetation will be incorporated into vegetation and soil base metals monitoring, which is planned to be reinstated for the 2019 season. Baffinland continues to investigate new methods of transportation that will generate less dustfall.

Dust fall continues to decrease at most year-round sampling locations throughout the Project area. This decrease may be due to increased effectiveness of dust suppression activities, particularly along the Tote Road, combined with favourable cool, wet summer conditions.

Path Forward

In 2019, Baffinland will continue its monitoring programs of gaseous emissions and dustfall. The company will also continue to evaluate opportunities to further mitigate dustfall on the Project. Reporting on each PC condition related to air quality is presented in the next several pages. Dustfall monitoring is described in more detail in Section 4.5.8 (PC Condition No. 58, Item c).

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.
Relevant Baffinland Commitment	57, 61, 62
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-Compliance
Stakeholder Review	N/A
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Continuous ambient air quality monitoring equipment was set up at Milne Port and the Mine Site to monitor sulphur dioxide (SO₂) and nitrogen oxides (NO_x) levels at Project sites in 2014. Continuous ambient air quality monitoring commenced in November 2014 and continued throughout 2015. Monitoring throughout 2015 concluded that all results were well below the Ambient Air Quality Standards (AAQS) set out by the Government of Nunavut (2011), resulting in the discontinuation of the monitoring program in 2016. To ensure compliance with Project Certificate Condition No. 7 and collect additional data over multiple shipping seasons, the monitoring program resumed at Milne Port in March 2017 and at the Mine Site in November 2017, and is currently ongoing.

The Air Quality and Noise Abatement Management Plan was last updated in March 2016.

RESULTS

The 2018 air quality monitoring results can be summarized as follows:

- Overall, monitored SO₂ levels at both the Mary River and Milne Inlet sites were very low. The highest measured SO₂ concentration represented 5% or less of the applicable standards. All measured concentrations of NO₂ at the Milne Inlet site fell below the applicable standards.
 - Monitored NO₂ levels at both Mary River and Milne Inlet sites were generally moderate.
 - A minor NO₂ exceedance was observed at the Mary River site.

At Milne Port:

- Maximum SO₂ levels were approximately 3% of the 1-hour AAQS and 5% of the 24-hour AAQS;
- Maximum NO₂ levels were approximately 56% of the 1-hour AAQS and 60% of the 24-hour AAQS;
- NO₂ levels peaked during the cold winter months (October to March) and were significantly lower during the warmer months (April to September); and

- The annual 2018 arithmetic mean at Milne Port was 14.2 ppb for NO₂ and 0.5 ppb for SO₂, which represents 45% of the NO₂ annual standard and 5% of the SO₂ annual standard.

At the Mine Site:

- Maximum SO₂ levels were approximately 3% of the 1-hour AAQS and 5% of the 24-hour AAQS;
- Maximum NO₂ levels recorded at the Mine Site in 2018 were approximately 109% of the 1-hour AAQS and 76% of the 24-hour AAQS. NO₂ had one (1) minor exceedance (109%) of the 1-hour limit in 2018. The exceedance occurred on February 15th, 2018 00:00-01:00;
- NO₂ levels peaked during the colder months (October to March) and were significantly lower during the warmer months (April to September); and
- The annual 2018 arithmetic mean at Mine Site was 20.0 ppb for NO₂ and 0.5 ppb for SO₂, which represents 63% of the NO₂ annual standard and 5% of the SO₂ annual standard.

TRENDS

Monitoring results to date indicate that SO₂ levels at both Milne Port and the Mine Site remain below the AAQS.

Monitored NO₂ levels at both the Mary River and Milne Inlet sites were generally moderate, where NO₂ levels at the Milne Inlet Site remain below the AAQS. On February 15, 2018 there was a single hourly reading of NO₂ at the Mary River site slightly above (109%) the AAQS. Other than this single 1-hour NO₂ exceedance at the Mary River site, all other measurements fell below the applicable standards.

RECOMMENDATIONS / LESSONS LEARNED

In 2018, a minor NO₂ exceedance at the Mary River site was observed. There are several factors that could explain this individual reading, but the most likely explanation is the presence of an unusual source of NO_x emissions temporarily located near the monitoring station, such as a nearby parked vehicle with its diesel engine on and under low wind conditions. As this was a single exceedance, which appears to be a clear outlier in the data set, no mitigation is recommended. Continued monitoring will be used to determine if there are further elevated values in the future.

Baffinland will continue to monitor SO₂ and NO_x levels at Milne Port and the Mine Site during 2019. Emissions will be monitored to ensure that maximum values remain below the AAQS.

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.
Relevant Baffinland Commitment	61
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB.
Status	In-Compliance
Stakeholder Review	None
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Continuous ambient air quality monitoring equipment was set up at Milne Port and the Mine Site to monitor sulphur dioxide (SO₂) and nitrogen oxides (NO_x) levels at Project sites in 2014. Continuous ambient air quality monitoring commenced in November 2014 and continued throughout 2015. Monitoring throughout 2015 concluded that all results were well below the Ambient Air Quality Standards (AAQS) set out by the Government of Nunavut (2011), resulting in the discontinuation of the monitoring program in 2016. To ensure compliance with Project Certificate Condition No. 7 and collect additional data over multiple shipping seasons, the monitoring program resumed at Milne Port in March 2017 and at the Mine Site in November 2017, and is currently ongoing.

RESULTS

The 2017 air quality monitoring results can be summarized as follows:

- Overall, monitored SO₂ levels at both the Mary River and Milne Inlet sites were very low. The highest measured SO₂ concentration represented 5% or less of the applicable standards. All measured concentrations of NO₂ at the Milne Inlet site fell below the applicable standards.
- Monitored NO₂ levels at both Mary River and Milne Inlet sites were generally moderate.
- A minor NO₂ exceedance was observed at the Mary River site.

At Milne Port:

- Maximum SO₂ levels were approximately 3% of the 1-hour AAQS and 5% of the 24-hour AAQS;
- Maximum NO₂ levels were approximately 56% of the 1-hour AAQS and 60% of the 24-hour AAQS;

- NO₂ levels peaked during the cold winter months (October to March) and were significantly lower during the warmer months (April to September); and
- The annual 2018 arithmetic mean at Milne Port was 14.2 ppb for NO₂ and 0.5 ppb for SO₂, which represents 45% of the NO₂ annual standard and 5% of the SO₂ annual standard.

At the Mine Site:

- Maximum SO₂ levels were approximately 3% of the 1-hour AAQS and 5% of the 24-hour AAQS;
- Maximum NO₂ levels recorded at the Mine Site in 2017 were approximately 109% of the 1-hour AAQS and 76% of the 24-hour AAQS. NO₂ had one (1) minor exceedance (109%) of the 1-hour limit in 2018. The exceedance occurred on February 15th, 2018 00:00-01:00;
- NO₂ levels peaked during the colder months (October to March) and were significantly lower during the warmer months (April to September); and
- The annual 2018 arithmetic mean at Mine Site was 20.0 ppb for NO₂ and 0.5 ppb for SO₂, which represents 63% of the NO₂ annual standard and 5% of the SO₂ annual standard.

TRENDS

Monitoring results to date indicate that SO₂ levels at both Milne Port and the Mine Site remain below the AAQS.

Monitored NO₂ levels at both the Mary River and Milne Inlet sites were generally moderate, where NO₂ levels at the Milne Inlet Site remain below the AAQS. On February 15, 2018 there was a single hourly reading of NO₂ at the Mary River site slightly above (109%) the AAQS. Other than this single 1-hour NO₂ exceedance at the Mary River site, all other measurements fell below the applicable standards.

RECOMMENDATIONS / LESSONS LEARNED

In 2018, a minor NO₂ exceedance at the Mary River site was observed. There are several factors that could explain this individual reading, but the most likely explanation is the presence of an unusual source of NO_x emissions temporarily located near the monitoring station, such as a nearby parked vehicle with its diesel engine on and under low wind conditions. As this was a single exceedance, which appears to be a clear outlier in the data set, no mitigation is recommended. Continued monitoring will be used to determine if there are further elevated values in the future.

Baffinland will continue to monitor SO₂ and NO_x levels at Milne Port and the Mine Site during 2019. Emissions will be monitored to ensure that maximum values remain below the AAQS.

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

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.
Relevant Baffinland Commitment	57
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland used guidance documents provided by Environment and Climate Change Canada (ECCC, 2016; ECCC, 2017) and the Intergovernmental Panel on Climate Change (IPCC, 2006) along with published emission factors to estimate the Project's annual GHG emissions. Annual emissions were calculated based on on-site fuel consumption and waste management at the Project.

Baffinland continues to report annual emissions to ECCC through the National Pollutant Release Inventory (NPRI) and GHG reporting programs. Baffinland's 2018 annual emissions for GHGs are presented in Table 4.7.

Table 4.7 Calculated 2017 Project Greenhouse Gas Emissions

Gaseous Emission	Units	Calculated Emissions
GHG	t-CO ₂ eq	152,000

TRENDS

Total gaseous emissions have increased from 128,000² tonnes in 2017 to 156,000 tonnes in 2018, therefore indicating a general upward trend.

RECOMMENDATIONS / LESSONS LEARNED

Consistent with the Climate Change Strategy for the project, Baffinland will continue to modify or replace equipment with more energy efficient alternatives, research and where possible implement renewable energy sources, and identify opportunities for energy efficiency through optimizations in the Project design, all in an effort to further reduce GHG emissions. Future updates regarding Baffinland's GHG emission production and initiatives being undertaken to optimize efficiencies in energy requirements will continue to be reported in Baffinland's Annual Report's to NIRB.

² Value adjusted from previously reported value of 160,000 GHG emissions in 2017.

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"> • Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site. • 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. • 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. • 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. <p>The Proponent shall implement its Dust Management and Monitoring Plan, report all monitoring data to the NIRB annually, and take all adaptive management measures described in its Dust Management and Monitoring Plan if monitoring indicates that dust in the ambient air or dust deposition from the increased traffic associated with the increased volume of ore being shipped is greater than initially predicted.</p>
Relevant Baffinland Commitment	2, 57
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status	In-Compliance
Stakeholder Review	Nunavut Water Board, Nunavut Impact Review Board, Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Environment and Climate Change Canada
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d) Roads Management Plan (Baffinland, 2016e) Dust Mitigation Action Plan (Golder, 2016a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Dust Management and Monitoring was incorporated into the Air Quality and Noise Abatement Management Plan and the Roads Management Plan (Attachment A, Dust Management Protocol) prior to the start of construction. Dust monitoring and mitigation measures continued to be implemented in 2018 at the Mine site, Port Site, and along the Tote Road. In consultation with the QIA and the Pond Inlet HTO, six (6) additional remote dustfall sites were installed in the Tote Road corridor between the Mine Site and Milne Port, to further delineate the extent of dustfall and assess the effectiveness of mitigation measures.

A Dust Mitigation Action Plan (Plan) was developed in 2016 to identify specific measures to be implemented to reduce dust emissions (Golder, 2016a). Implementation of the Plan continued in 2018 including new crusher shrouding and enclosed chutes, road resurfacing, limiting speed and volume of vehicles on all roads, application of water and dust suppression substances, continued implementation of redesigned stockpile activities and layout at the Port, retrofitting existing dust suppressant equipment, and the removal of dust impacted snow at strategic locations at the Project.

RESULTS

Monitoring showed that although dustfall exceeded FEIS predictions at select locations, exceedances decreased in 2018 as compared to 2017. The decrease of 2018 dustfall values as compared to 2017 demonstrate significant progress in effectively reducing dust generation from crushing and Tote Road traffic, despite increases in the production level at the Project and the volume of Tote Road traffic.

TRENDS

Overall, dustfall at the Project decreased in 2018 at most year-round sampling locations, likely as a result of dust mitigation initiatives such as the use of dust suppressants and crusher upgrades, combined with favourable cool, wet summer conditions.

RECOMMENDATIONS / LESSONS LEARNED

New GN approved dust suppressants are planned for trial on the Tote Road in 2019. The Roads Management Plan and Air Quality and Noise Abatement Management Plan will be updated in 2019 to provide further clarity on the adaptive management measures to be considered if elevated dustfall deposition is observed at the Project.

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).
Relevant Baffinland Commitment	57
Reporting Requirement	Updated Incineration Management Plan to be provided to the NIRB at least 60 days prior to the commencement of construction activities.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d) Waste Management Plan (Baffinland, 2018c) Incinerator Operation Procedure (see Waste Management Plan)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

An Incineration Management Plan is presented in Section 3.5 of the Waste Management Plan. Environment Canada's Technical Document for Batch Waste Incineration (EC, 2010) was considered during the development of the Incineration Management Plan, and meets the recommendations outlined by ECCC.

RESULTS

Baffinland adheres to the six-step process for batch waste incineration as outlined in the Environment Canada's Technical Document (EC, 2010), including conducting periodic waste steam audits and waste sorting for the dual chamber incinerators, which are installed at both the mine site and port site as per expected waste generation.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	Stack test results to be reported to the NIRB and Environment Canada annually as required.
Status	In-Compliance
Stakeholder Review	Environment and Climate Change Canada, Nunavut Impact Review Board
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d) Waste Management Plan (Baffinland, 2018c)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

No new temporary or permanent incinerators were commissioned in 2018. Stack testing was conducted on the incinerators when commissioned in 2013, as required by PC Condition No. 12. As part of ongoing operations, Baffinland conducts periodic monitoring of the dual chamber incinerator operation data. This data can be utilised to determine if the incinerators are operating to original specifications. Data includes operational temperature data, burn cycle times, and bottom residual ash composition results. In addition, Baffinland will conduct routine stack tests for dioxins, furans and mercury every five years following commissioning to confirm the above monitoring. Stack testing is planned for the summer of 2019 to address recommendations provided on the 2017 NIRB Annual Report for the existing incinerators, and to support the commissioning of a new incinerator at Milne Port.

RESULTS

Stack testing was performed in 2013 when the dual chamber incinerators were commissioned. Subsequent stack testing has not been carried out however it is planned for 2019 for due diligence purposes and to address recommendations from the 2017 Annual Report.

TRENDS

Baffinland has noted that the residual bottom ash generated by the dual chamber incineration process rarely exceeds the guidelines outlined in the Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste Facilities (GN, 2011). Any exceedances are reported in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a). These results are indicative that the Incinerator is operating as commissioned.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to document and monitor the incinerator operational and residual bottom ash data to identify changes in operational effectiveness from original commissioning.

4.6.2 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 external stakeholder concern. Concern over noise and vibration levels have been expressed by some workers at the Project site in the context of sleeping at the accommodation facilities. Baffinland made several enhancements to improve noise levels near the accommodation facilities in 2018 (see PC Condition No. 14). In 2018, Baffinland established a new 800-person camp (Sailivik Camp) at a different location, between the mine infrastructure area and Sheardown Lake. Noise and vibration were not raised as concerns during 2018 consultation activities (Appendix B).

Monitoring Activities

Monitoring of noise and vibration was conducted within the accommodation building at each Project site during the spring (May 2018) and winter (December 2018) (PC Condition No. 14).

In 2018 Baffinland engaged an external noise and vibration expert consultant, RWDI, to develop and implement a testing program at the Project Site and to provide training to Baffinland staff on new equipment.

Table 4.8 provides a summary of noise effects monitored in 2018, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum.

Table 4.8 Noise and Vibration Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Ambient Noise and Vibration	Disturbance of sleeping workers, affecting worker health and safety	Indoor noise and vibration levels were measured in the spring and winter of 2018. Occupational noise and vibration at Baffinland was assessed according to the Mine Health and Safety Act, Consolidation of Mine Health and Safety Regulation, R-125-95, Part IX and Schedule 5. The overall average noise recorded at Milne Port and the Mine Site were greater than 2017. This is likely attributed to the increased construction activities in 2018. Vibration levels were significantly less than 2017.	Effect exceeded FEIS predictions at Milne Port
Underwater Vibration Levels	Increased vibration levels affecting fish in nearby watercourses	No Project interactions to monitor in 2018; no explosives used near watercourses in 2018.	N/A

Path Forward

Baffinland will continue to implement noise and vibration monitoring in 2019 twice per year, at each receptor location (Port and Mine). Baffinland is developing a quality assurance / quality control (QA/QC) program in its monitoring of noise and vibration, to ensure that data collected is of high quality in 2019 and onward.

In 2019, Baffinland expects to construct the floating freight dock described and assessed in the FEIS. Baffinland submitted a Request for Review and an Application to Fisheries and Oceans Canada (DFO) in 2018, and on March 21, 2019 the DFO issued an Authorization under the *Fisheries Act* (Ref. No. 18-HCAA-00160). The Authorization describes the measures Baffinland must take to protect fish and fish habitat during construction, and monitoring required to be conducted during construction.

Reporting on each PC condition is provided 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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Fisheries and Oceans Canada, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board, Qikiqtani Inuit Association
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f) Environmental Protection Plan (Baffinland, 2016f) Quarry Blasting Operations Management Plan (Baffinland, 2013b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP) states that work requiring the use of explosives (blasting) in or near water bodies shall be carried-out in accordance with Fisheries and Oceans Canada guidance (Wright and Hopky, 1998), in order to mitigate possible effects on fish habitat and fish health. Blasting at the Project is conducted in accordance with Baffinland's Quarry Blasting Operations Management Plan and Environmental Protection Plan (EPP).

The aforementioned plans described above 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.

RESULTS

Not applicable. No blasting occurred in 2018 within the required setback distances detailed in the DFO guidance document (Wright and Hopky, 1998).

TRENDS

Not applicable. No blasting has occurred at the Project within the required setback distances of fish habitat, as stipulated by the aforementioned 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.
Relevant BIM Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Consolidation of Mine Health and Safety Regulation, R-125-95 Occupational Health and Safety Monitoring (RWDI, 2018)
Ref. Document Link	http://www.wsc.ca/sites/default/files/documents/MineRegulations%20NU%20EN.pdf

METHODS

Noise and vibration monitoring at the Mine Site and Milne Port 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. Monitoring is conducted once per summer and once per winter season. Noise or vibration concerns brought forth by employees are taken seriously and addressed on an as-needed basis. Occupational noise and vibration at Baffinland was assessed according to the Mine Health and Safety Act, Consolidation of Mine Health and Safety Regulation, R-125-95, Part IX and Schedule 5.

The numerical thresholds from which protection is required include 8-hour equivalent sound exposures equal to or greater than 85 dBA, based on the expectation that a worker has a sound environment of 75 dBA or less for the remainder of the day. The noise monitoring equipment used by Baffinland runs continuously for two (2) separate 12-hour periods (the vibration equipment runs for two 10-hour periods) in each room, with calibration of the instruments occurring before and after use as well as between the periods.

Since the Mine Health and Safety Act does not provide specific numerical limits, 8-hour equivalent vibration criteria are taken from the European Physical Agents Vibration Directive – 2002/44/EC. For whole body vibration, the directive provides an exposure action value of 0.5 m/s², and an exposure limit of 1.15 m/s². The action value provides the threshold for increased vigilance to prevent reaching the exposure limit.

RESULTS

In 2018, adaptive management was employed to reduce noise and vibration near accommodation complexes:

- Quiet work hours were implemented;
- Operation of equipment was limited in the vicinity of accommodation complexes, where practicable; and
- The Mine Site helicopter landing zone was relocated further away from the accommodations complexes during the morning and evening hours of the day.

In May and December 2018, accommodations at the Mine Site Complex (MSC), Weatherhaven Camp, and Port Site Complex (PSC) were tested for noise and vibration. During this time, noise monitoring was conducted in accommodation rooms for a 12-hour period.

Sleeping accommodation sound level measurements demonstrate levels that are well below the 75 dBA level for off-work hours that is associated with the 8-hour exposure criterion. Summary statistics of average noise measurements collected within sleeping accommodations are presented in Table 4.9.

Vibration measurements were below the applicable criteria, and are presented in Table 4.10.

Table 4.9 Summary Statistics of 2018 Noise Monitoring Results

Sampling Period	Average Noise Level (dBA)
Summer Monitoring (May 2018)	
Mine Site	50
Port Site	46
Winter Monitoring (December 2018)	
Mine Site	40
Port Site	50

Table 4.10 Summary Statistics of 2018 Vibration Monitoring Results

Sampling Period	Max Vibration Exposure (m/s ²)
Summer Monitoring (May 2018)	0.005
Winter Monitoring (December 2018)	0.008

TRENDS

Overall average noise levels at Mine Site in 2018 experienced an increase over average recorded noise levels in 2017 (28 dBA), and the previous two years (34.8 and 30.6 dBA in 2015 and 2016, respectively); however 2019 values remained below 75dBA exposure criteria. The gradual increase in noise levels may have been the result of additional construction activities that occurred in 2018 in comparison to 2017. Overall average noise recorded at Milne Port in 2018 (48 dBA) was greater than average noise recorded in 2017 (43 dBA), but lower than average noise recorded in 2016 (50 dBA).

Vibration levels measured in 2018 (0.001 to 0.008 m/s²) were significantly less than vibration measured in 2017 (0.49 m/s²).

RECOMMENDATIONS / LESSONS LEARNED

In order to ensure that noise and vibrations at the accommodations within the Project Sites are not adversely affecting our employees and contractors, Baffinland will continue to monitor noise levels in relation to human health and safety. Should the data identify a need for noise or vibration reduction efforts, a plan will be formulated to address these concerns in consultation with stakeholders.

Project Certificate Condition No. 14 (a)

Erin 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.
Relevant BIM Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Milne Ore Dock Construction Environmental Method Statement (PND Engineers 2014) BIM Environmental Protection Plan (EPP) (BIM 2016f) <i>Fisheries Act</i> Authorization File No. 14-HCAA-00525 (DFO 2014)
Ref. Document Link	

METHODS

Mitigation and adaptive management measures to protect marine mammals during in-water and near-water construction works (including pile driving and ore dock construction) are outlined in the Milne Ore Dock Construction Environmental Method Statement (PND Engineers 2014), part of Baffinland's Environmental Protection Plan (EPP) (Baffinland 2016f). Mitigation and adaptive management measures identified in this document are in accordance with those prescribed by Fisheries and Oceans Canada (DFO) in *Fisheries Act* Authorization 14-HCAA-00525 (DFO 2014) issued for the Project.

RESULTS

Not applicable in 2018 as there was no active construction in the marine environment in 2018.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Prior to any future construction in the marine environment such as the construction of the Milne Port freight dock in 2019, Baffinland will develop a Construction Environmental Management Plan (CEMP) that will include updated mitigation and adaptive management measures to protect marine mammals during in-water and near-water construction works including pile driving and ore dock construction.

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.
Relevant BIM Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2016d)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

Baffinland has procedures to minimize the impact of noise to people including regular maintenance of equipment to reduce unnecessary noise levels and the implementation of noise reduction rules in and around living quarters. As described in the Air Quality and Noise Abatement Management Plan, Baffinland is committed to ensuring that all mobile equipment is equipped with mufflers and that equipment is well-maintained.

Monitoring and adaptive management measures for Project activities to reduce noise and sensory disturbance to wildlife has also been discussed with the TEWG for further feedback and recommendations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to engage the TEWG regarding initiatives to reduce noise and sensory disturbance to wildlife.

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.
Relevant BIM Commitment	32
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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, the QIA established the Mary River Community Group (which includes representatives from Baffinland, 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.

Further, Baffinland continues to provide information related to the Project on the Baffinland corporate website including:

Video of operations

- Images of operational activities
- Ship tracks.

In addition to regular engagement with the QIA, Baffinland also held several meetings with local community organizations during 2017. These meetings are listed in Table 4.11.

Baffinland also hosted a site visit with MTHO in August 2018. The site visit included a discussion and mapping exercise of important travel areas in and near the Project area.

Table 4.11 Community Meetings in 2018

Date	Community Group	Location	Topic
March 21 2018	Hamlet and HTO	Pond Inlet, NU	Overview of Project shipping and production plans for 2018
April 5, 2018	Hamlet and HTO	Hall Beach, NU	Exploration program consultation
April 6, 2018	Hamlet and HTO	Igloolik, NU	Exploration program consultation
June 6, 2018	HTO	Pond Inlet, NU	6 MTPA Application - Shipping Management
June 7, 2018	HTO	Pond Inlet, NU	Freight Dock Construction and Offset - Marine Monitoring Programs
June 11, 2018	Hamlet Council and HTO	Clyde River, NU	Phase 2 Impacts and Mitigation
June 12, 2018	Hamlet Council and HTO	Pond Inlet, NU	Phase 2 Impacts and Mitigation
June 13, 2018	Hamlet and Mayor	Arctic Bay, NU	Phase 2 Impacts and Mitigation
June 14, 2018	HTO	Igloolik, NU	Phase 2 Impacts and Mitigation
June 15, 2018	Hamlet Council and HTO	Hall Beach, NU	Phase 2 Impacts and Mitigation
August 30, 2018	MHTO	Mary River	MHTO Site Visit (August 30-31)
October 11, 2018	QIA, NAC, and MHTO	Pond Inlet, NU	Pond Inlet Training Center
November 19-22, 2018	Hamlet and HTO	Pond Inlet and Arctic Bay	Phase 2 Info Sessions (Nov 19-22)
November 27-28, 2018	HTO	Pond Inlet	End of Shipping and Marine Monitoring Season Meeting

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the QIA, MHTO and local Hamlet organization through the working groups and/or other venues to enhance the general public's understanding of the Project.

4.6.3 Hydrology and Hydrogeology (PC Conditions 16 through 19)

Four (4) PC conditions relate to the potential effects of the Project on hydrology and hydrogeology. These conditions relate to 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 NWB is the primary stakeholder regulating water use and waste disposal through its issuance of water licences. The QIA is also a key stakeholder, and has a Water Compensation Agreement in place with Baffinland, pursuant to Article 20 of the Nunavut Agreement (CIRNAC and Nunavut Tunngavik, 2010). Water diversions have the potential to impact fish and fish habitat, and DFO administers the fish and fish habitat sections of the *Fisheries Act*. Effects to water quantity have not been raised in 2018 consultation activities (Appendix B).

Monitoring Activities

Hydrology monitoring is undertaken by recording water use and reporting this information to the NWB under the water licence, and by operating six long-term seasonal hydrometric stations. Visual monitoring is conducted of water conveyance structures, including bridges and culverts.

The mining footprint remains small relative to the fully developed project, and hence water diversions associated with the project footprint are minor in scale.

The Type A Water Licence specifies water withdrawal limits. Under the authorization of the Type A Water Licence, freshwater was withdrawn during 2018 to sustain three key activities at the Project: potable water supply (domestic), dust suppression, and for miscellaneous (industrial) uses. During 2018, daily water volume withdrawal limits, stipulated in the Type A Water Licence, for domestic, industrial and dust suppression purposes were not exceeded at approved Project water sources, with the following exceptions:

- Although the total daily water withdrawal limit for Camp Lake (367.5 m³/day) was not exceeded in 2018, there were four (4) incidents where the daily water volume withdrawn for domestic purposes exceeded Camp Lake's domestic daily water withdrawal limit (300 m³/day). These four (4) incidents are believed to be a result of the mis-categorization of water volumes withdrawn for industrial purposes.; and
- Several exceedances of source specific daily water withdrawal limits occurred at three (3) approved dust suppression water sources along the Tote Road. All exceedances were based on the source specific daily water withdrawal limits, with both weekly and monthly withdrawal volumes being within the source specific withdrawal water limits stipulated in the Type 'A' Water Licence.

Further discussion on the water withdrawals at the Project, including all supporting daily and monthly volumes, are provided in the QIA & NWB Annual Report for Operations.

Table 4.12 provides an evaluation of the Project's impacts on hydrology and hydrogeology based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.12 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 limits	Water usage generally within water licence limits. Effect within 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 continue to implement its Tote Road Earthworks Execution Plan (TREETP) in 2019, 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. Baffinland plans to improve the documentation and categorization of water volumes withdrawn to support Project activities and enforcement of the source specific daily water withdrawal limits at approved water sources.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Final Environmental Impact Statement (FEIS; Baffinland, 2012) FEIS Addendum - Early Revenue Phase (Baffinland, 2013a)
Ref. Document Link	N/A

METHODS

Baffinland ensures that the water related infrastructure and facilities constructed at the Project are consistent with those proposed in the FEIS (Baffinland, 2012) and FEIS Addendum (Baffinland, 2013a).

RESULTS

During 2018, the following work was completed on water related infrastructure and facilities at the Project:

- Continued assembly and installation of the sewage and potable water treatment plants associated with the new 800-Person Mine Site Accommodations Complex (Sailivik Camp);
- Assembly and commissioning of a pipeline to allow for the direct discharge of treated sewage effluent from the sewage treatment plant servicing the new 800-Person Mine Site Accommodations Complex (Sailivik Camp) to the existing discharge location near Mary River;
- Maintenance of the perimeter ditches associated with Mine Site Crusher Facility;
- Expansion of the Mine Site Crusher Facility surface water management pond to accommodate the Facility's previous pad expansion completed in 2017;
- Construction and commissioning of a dedicated wastewater treatment plant to treat effluent generated by the Waste Rock Facility;
- Maintenance of surface water management infrastructure along the Milne Inlet Tote Road (i.e. culvert replacements, extension, etc.);
- Construction of berms, swales and ditches to improve surface water management at Milne Port, as outlined by the Milne Port Water Management Plan; and

- Initial construction works for the expansion of the Milne Port Ore Stockpile Facility and associated surface water management ponds.

Prior to the commencement of construction, the applicable regulatory approvals were obtained by Baffinland for the works listed above.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Water related infrastructure and facilities constructed to date are generally consistent with those proposed in the FEIS (Baffinland, 2012) and FEIS Addendum (Baffinland, 2013a) 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.
Relevant Baffinland Commitment	6
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partial-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) Metals & Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2018) Metals and Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERP; Baffinland, 2019b) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c) 2018 MDMER Annual Report (Baffinland, 2019g) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

Wastewater/effluent management practices and procedures are outlined in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) and the Metals and Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERP; Baffinland, 2019b).

Water quality discharge criteria (discharge criteria) for effluent generated by the Project are stipulated in the Type A Water Licence issued by the Nunavut Water Board, and Schedules 4 and 5 of the Metals and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2018).

Prior to discharge, wastewater (e.g. treated sewage, treated contact water, etc.) is sampled to ensure the wastewater's water quality meets the applicable discharge criteria. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken during wastewater discharges to ensure the water quality remains in compliance with the applicable discharge criteria. In the event that water quality sampling during a discharge indicates that the water quality has changed and is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant wastewater is halted.

Wastewater that does not meet the applicable discharge criteria is treated on-site using approved treatment methods (e.g. sewage treatment plants, mobile oily water treatment systems, etc.) and is not discharged to the receiving environment until it has been confirmed by water quality analysis that the treated wastewater meets the applicable discharge criteria.

All water sampling at the Project is conducted in accordance with the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland; 2017c).

As required by the Type A Water Licence, volumes and water quality analysis of wastewater discharged to the receiving environment are reported to regulators (CIRNAC, NWB) on a monthly and annual basis. As a requirement of MDMER, volume and water quality results for discharges from the surface water management ponds associated with the Crusher Facility and Waste Rock Facility (WRF) at the Mine Site are reported to ECCC on a quarterly and annual basis.

RESULTS

Effluents generated and managed by the Project in 2018, included sewage, contact water retained in surface water management ponds associated with ore and waste rock facilities and oily water retained in containment areas, such as bulk fuel facilities. Effluent treatment systems operated at the Project in 2018, included:

- Sewage Treatment Plants (STPs) at Milne Port (MP-01) and the Mine Site (MS-01, MS-01B);
- Mobile Oily Water Treatment System (OWTS), transported between Project sites as required; and the,
- Wastewater Treatment Plant (WWTP) at the Waste Rock Facility (MS-08), installed prior to freshet 2018.

Discharges of effluent at the Project in 2018 that did not comply with the applicable discharge criteria, involved single isolated events at each of the Mine Site STP (MS-01), the WWTP at the WRF (MS-08) and the mobile OWTS at Mine Site Containment Area MS-HWB-7 (MS-MRY-6). All three (3) events involved minor water quality exceedances of discharge criteria outlined in the Type A Water Licence with no exceedances of MDMER discharge criteria occurring in 2018.

On January 9, 2018, a treated sewage effluent sample collected from the Mine Site STP servicing the Mine Site Accommodation Complex exceeded the applicable discharge criteria for total phosphorus (TP) and total suspended solids (TSS) of 4 mg/L and 35 mg/L, respectively. The elevated TSS concentration (45.3 mg/L) is believed to be result of sampling error while the elevated total phosphorus concentration (4.29 mg/L) is believed to have been caused by temporary upset conditions at the Mine Site STP. The subsequent sampling event of the treated sewage effluent confirmed that both parameters had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated sewage effluent at the Project were observed in 2018.

On August 10, 2018, a treated effluent sample collected from the WWTP at the WRF exceeded the applicable discharge criterion for TSS of 15 mg/L. The elevated TSS concentration (19.3 mg/L) is believed to have been caused by water quality variation in the effluent stream, evidenced by the sample's duplicate having a TSS concentration (14.9 mg/L) below the applicable TSS criterion, and temporary upset conditions at the WWTP. Upon receiving the elevated TSS result, discharge of treated effluent from WWTP was halted until subsequent sampling events confirmed that TSS concentrations had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated effluent at the WRF WWTP were observed in 2018.

On September 4, 2018, a treated oily water effluent sample collected from the mobile OWTS, while stationed at Mine Site Containment Area MS-HWB-7, exceeded the applicable discharge criteria for total lead of 0.001 mg/L. Upon receiving the elevated total lead result (0.00127 mg/L) from the analytical lab, discharge of treated effluent from the mobile OWTS was halted. Due to the close proximity to freeze-up at the Project, subsequent sampling was not undertaken following receipt of

the elevated total lead result. Potential causes of the exceedance include lab error, due to the close proximity of the discharge criterion to the analytical minimum detection limit (MDL), and the metals removal media used by the mobile OWTS being spent. No other water quality exceedances involving treated oily water effluent from the mobile OWTS were observed in 2018.

2018 water quality exceedances for effluents monitored under the Type A Water Licence were reported to CIRNAC, the NWB and the QIA in the monthly monitoring reports prescribed by the Type A Water Licence. A full discussion of the Project's 2018 monitoring results under the Type A Water Licence is provided in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

To ensure the accuracy of future water quality sampling results, Baffinland will continue to train all personnel involved with sampling effluents at the Project in the proper sampling practices and procedures, as outlined in the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c).

In response to the effluent water quality concerns identified at the WRF in 2017, Baffinland installed and commissioned a wastewater treatment plant at the WRF prior to freshet 2018. The WWTP proved to be very effective at addressing the effluent water quality concerns identified in 2017. As a result, Baffinland will continue to operate the WWTP in 2019 to treat contact water generated at the WRF.

To address the total lead exceedance observed at the mobile OWTS in 2018, the metals removal media will be replaced prior to operation of the mobile OWTS in 2019. In addition, all operators of the mobile OWTS will be thoroughly trained in the System's operation to ensure metals removal media continues to be replaced at the frequency recommended by the media's manufacturer.

Overall, the low frequency of non-compliant discharges involving effluents generated and managed by the Project are evidence of the effectiveness of the Project's wastewater/effluent management practices and procedures. Baffinland will continue to update the Project's management practices and procedures and implement new mitigation measures as required to ensure effluent discharges to the receiving environment are in compliance with applicable water quality discharge criteria.

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.
Relevant Baffinland Commitment	42
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Interim Closure and Reclamation Plan (Baffinland, 2018h)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

The latest revision of the Interim Closure and Reclamation Plan (ICRP; Baffinland, 2018h) discusses the estimated fill time for the mine pit lake.

RESULTS

Current mining activities have not yet created a pit at Deposit No. 1. No additional information is available at this time to update the estimated fill time of the mine pit lake. A reclamation research program to evaluate the Open Pit flooding timeline is outlined in Appendix D.2 of the ICRP.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will update the estimated mine pit lake fill time in the ICRP as additional information becomes available through monitoring and implementation of the reclamation research program for Open Pit flooding.

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.
Relevant Baffinland Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Environmental Protection Plan (EPP; Baffinland, 2016f) Fish Habitat Monitoring - 2018 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2018d) Fisheries Authorization No. NU-06-0084 (For Tote Road Crossings; DFO, 2007) Roads Management Plan (Baffinland, 2016e) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f) 2018 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2019d) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

Routine inspections of water crossings (i.e. culverts, bridges) at the Project are conducted throughout the year by road maintenance and environmental monitoring personnel to ensure water crossings are not obstructed and are working as designed. Monitoring and routine maintenance activities completed for Project water crossings are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f), Roads Management Plan (Baffinland, 2016e) and Environmental Protection Plan (EPP; Baffinland, 2016f).

As a requirement of Baffinland's *Fisheries Act* Authorization for the Milne Inlet Tote Road (NU-06-0084; DFO, 2007), fish bearing water crossings at the Project are, at a minimum, assessed annually by a third-party Professional Fisheries Biologist. The assessment focuses on ensuring that surface water flows and fish passage is not being hindered or altered at Project fish bearing water crossings. The annual assessment is documented and summarized in an annual report (Baffinland, 2018d) submitted to Fisheries and Oceans Canada (DFO) each year. Concerns identified by the annual assessment (i.e. perched culvert) are communicated to the Project's Road Maintenance Department for corrective action and promptly addressed.

As stipulated by the Project's Type A and B Water Licences, the Project is required to monitor, document and report the Project's water withdrawal rates from approved water sources. This information is submitted to the CIRNAC, the NWB and the QIA on a monthly and/or annual basis.

RESULTS

During 2018, Baffinland continued to monitor Project water crossings to ensure surface water flows were not being hindered or altered. Routine preventative maintenance conducted at Project water crossing in 2018 included the clearing of snow and ice at the ends of culverts prior to and during freshet. No significant blockages that had the potential of hindering or altering surface water flow volumes downstream of Project water crossings were observed in 2018.

Water withdrawal rates in 2018 for approved water sources under the Type A and B Water Licences are presented in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a) and the 2018 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2019d), respectively.

Under Table 3 of the Type A Water Licence, source specific water withdrawal limits are specified for both domestic and industrial purposes for each approved water source. Although the total daily water withdrawal limit for Camp Lake (367.5 m³/day) was not exceeded in 2018, there were four (4) incidents where the daily water volume withdrawn for domestic purposes exceeded Camp Lake's domestic daily water withdrawal limit (300 m³/day). These four (4) incidents are believed to be a result of the mis-categorization of water volumes withdrawn for industrial purposes. No other water withdrawal incidents or exceedances for domestic and industrial water uses were noted in 2018.

During June, July and August several exceedances of source specific daily water withdrawal limits, outlined in Table 2-3 of the Type A Water Licence, occurred at three (3) approved dust suppression water sources along the Tote Road. All exceedances were based on the source specific daily water withdrawal limits, with both weekly and monthly withdrawal volumes being within the source specific withdrawal water limits stipulated in the Type A Water Licence.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor Project water crossings and conduits to ensure that surface water flows are not being significantly hindered or altered.

As required by the Type A and B Water Licences, Baffinland will continue to monitor, document and report water withdrawal rates from approved water sources to the appropriate agencies.

Baffinland plans to improve the documentation and categorization of water volumes withdrawn to support Project activities. Baffinland will continue to work on improving the enforcement of the source specific daily water withdrawal limits at approved water sources.

4.6.4 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). 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.

Stakeholder Feedback

As described in Section 4.6.3 (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 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. Community members have expressed concern regarding the potential for dust to impact water quality in local streams (Appendix B).

Monitoring Activities

Throughout 2018, Baffinland continued to implement the Surveillance Network Program (SNP) outlined in Schedule I of the Type 'A' Water Licence, analyzing effluents (i.e. treated sewage, treated oily stormwater) discharged to the receiving environment and monitoring surface water quality within specific Project areas (i.e. surface water runoff downstream of Project areas). Based on a review of 2018 SNP results reported to the NWB, CIRNAC and the QIA, exceedances of applicable discharge criteria in 2018 involved mainly surface water runoff and effluents with elevated total suspended solids (TSS) levels. In each case, appropriate control measures were implemented to restore TSS levels below applicable discharge criteria. Baffinland continues to assess and implement the appropriate corrective and mitigation measures to address ongoing sedimentation concerns at the Project.

In addition to the SNP, ongoing environmental monitoring and effects studies, including the Project's Aquatic Effects Monitoring Plan (AEMP), were conducted during 2018 in accordance with the Type A Water Licence and PC terms and conditions.

Table 4.13 provides an evaluation of the Project's impacts on groundwater and surface water, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.13 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	A groundwater monitoring program was continued at the landfill in 2018. There are no established groundwater quality criteria in Nunavut. Future monitoring will seek to establish trends.	N/A

Component	Effects	Monitoring Program	Impact Evaluation
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 under the SNP; the receiving aquatic environment is monitored in accordance with the AEMP.	Elevated TSS concentrations detected downstream of Project infrastructure and water crossings during freshet; within FEIS predictions. Discharges of effluent at the Project met the applicable discharge criteria, with the exception of three (3) events involving minor water quality exceedances of discharge criteria outlined in the Type A Water Licence, with no exceedances of MDMER discharge criteria occurring in 2018.
	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 <i>Fisheries Act</i> , which Baffinland implemented satisfactorily. Erosion and sedimentation impacts were within FEIS predictions.
	Releases of TSS or other changes in water quality due to airborne emissions	Site is inspected visually for evidence of erosion and sedimentation, with follow-up sampling if required. Lake sedimentation monitored under the AEMP.	Ore dust runoff did not exceed FEIS predictions

Path Forward

Baffinland will continue to implement the TREEP and other sedimentation and erosion mitigation measures in 2019, will continue to operate its long-term hydrometric network, and will monitor effluents and receiving waters in accordance with Type A Water Licence and AEMP.

Baffinland plans to continue the groundwater monitoring program in 2019 using a methodology consistent with the 2018 program. The 2019 groundwater monitoring program will establish groundwater wells near Project infrastructure with a focus on the Landfill Facility at the Mine Site. Additional data is required to determine the feasibility and utility of groundwater monitoring in arctic conditions.

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.
Relevant Baffinland Commitment	57, 65
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Aquatic Effects Monitoring Plan (Baffinland, 2015a) Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate Ion (CCME, 2012) Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (CCME, 2010) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

Surface water runoff downstream of Project mining areas and quarries is monitored as prescribed by the Type A Water Licence, with water quality results reported to CIRNAC, the NWB and the QIA on a monthly and annual basis. Water samples are collected using the practices and procedures described in Baffinland's Sampling Program - Quality Assurance and Quality Control Plan (QA/QC Plan; Baffinland, 2017c), which is an approved plan under the Type A Water Licence.

In addition, the Aquatic Effects Monitoring Plan (AEMP; Baffinland, 2015a), a follow-up monitoring program identified in Baffinland's FEIS 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 2018, surface water runoff downstream of active quarries and mining areas were monitored for the water quality parameters outlined by the Type A Water Licence, including parameters related to explosives residue, such as ammonia and nitrate. Although select water samples collected downstream of active quarries and mining areas showed elevated ammonia and nitrate levels in comparison to baseline concentrations, the majority of samples were below the established Canadian Council of Ministers of the Environment (CCME) water quality guidelines for ammonia and nitrate (CCME, 2010; CCME, 2012). All acute toxicity water samples collected in 2018 downstream of Project quarries and mining areas were demonstrated to be

acutely non-lethal. A complete discussion of the 2018 water quality monitoring results collected under the Type A Water Licence is provided in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

Monitoring under the AEMP in 2018 included the Core Receiving Environment Monitoring Program (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 lakes and streams near the Mine Site. Evidence of Project-related change was observed in Camp Lake and Sheardown Lake systems. Each of these waterbodies showed changes in AEMP monitoring parameters and metrics in 2018. AEMP water quality monitoring of mine-exposed tributaries flowing into Camp Lake and Sheardown Lake showed elevated concentrations of nitrate in 2018, however in each case, nitrate concentrations were well below the established AEMP water quality guideline for nitrate (13 mg/L) and no adverse effects to phytoplankton, benthic invertebrates or arctic char were indicated. The 2018 AEMP reports, including a complete analysis and discussion of the 2018 CREMP results, are provided in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

TRENDS

Overall, 2018 monitoring results for surface water runoff and aquatic environments downstream of Project mining areas and quarries were generally consistent with monitoring results observed in 2017.

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 Project's AEMP (Baffinland, 2015a).

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> <p>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</p> <p>b) Measures for dustfall monitoring designed as follows:</p> <p>i. To establish a pre-trucking baseline and collect data during Project operation for comparison</p> <p>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)</p> <p>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..</p>
Relevant Baffinland Commitment	2
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	<p>Aquatic Effects Monitoring Plan (Baffinland, 2015a)</p> <p>Final Environmental Impact Statement (FEIS; Baffinland, 2012)</p> <p>2018 Mary River Project Terrestrial Environment Annual Monitoring Report (EDI, 2019a)</p> <p>2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)</p>
Ref. Document Link	<p>Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1</p> <p>Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1</p>

METHODS

The Aquatic Effects Monitoring Plan (AEMP) was submitted to the NWB on June 27, 2014, as required by the Type A Water Licence, and was subsequently approved by the NWB. On October 31, 2015, Revision 1 of the AEMP was submitted to the NWB and subsequently approved. Revision 1 of the AEMP focused on updating the Plan to reflect Amendment No. 1 of the Type A Water Licence.

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. Key component studies of the AEMP that were conducted in 2018, included the Core Receiving Environment Monitoring Program (CREMP), Lake Sedimentation Monitoring Program and the Dustfall Monitoring Program.

The CREMP evaluates potential mine-related influences on water quality, sediment quality, and/or biota (including phytoplankton, benthic invertebrates and fish) within aquatic environments near the Mine Site. Under the CREMP, receiving

aquatic environments near the Mine Site are monitored during several periods throughout the year and include the Camp Lake, Sheardown Lake and Mary Lake Systems, as well as Reference Lake 3 and several reference tributaries. The AEMP includes benchmarks and an action framework to evaluate monitoring data and determine next steps and/or corrective actions, if required.

The Lake Sedimentation Monitoring Program monitors dust and sediment deposition rates in Sheardown Lake NW in an effort to better understand and evaluate potential mine-related influences on biota (e.g. fish larvae hatching success). Currently, the Lake Sedimentation Monitoring Program is conducted annually and involves the deployment and retrieval of submerged sediment traps to determine sediment deposition rates, density and thickness during ice-cover and open water periods.

Annual monitoring reports for both the CREMP and Lake Sedimentation Monitoring Program provide further discussion of the methods used and annual monitoring results, and are provided as appendices to the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

The Dustfall Monitoring Program is performed annually with sampling stations established at the Mine Site, Milne Port, along the Milne Inlet Tote Road and at reference sites located at various distances from Project operations.

The three (3) main objectives of the Dustfall Monitoring Program are as follows:

1. To quantify the extent, magnitude and composition of dustfall generated by Project activities;
2. To determine seasonal variations in dustfall; and
3. To assess annual changes in dustfall at sampling locations relative to thresholds associated with the models and assessments performed in the Final Environmental Impact Statement (FEIS; Baffinland, 2012).

Results collected under the dustfall monitoring program are provided on an annual basis to NIRB and other relevant regulatory agencies and stakeholders in the Terrestrial Environment Annual Monitoring Report.

RESULTS

Reports discussing the 2018 results for the CREMP and Lake Sedimentation Monitoring Program are provided as appendices to the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a). The 2018 results of the Dustfall Monitoring Program are presented in the 2018 Mary River Project Terrestrial Environment Annual Monitoring Report (EDI, 2019a).

The current revision of the Project's AEMP (Rev. 1; Baffinland, 2015a) meets the requirements and intended scope outlined in PC Condition 21 and has been approved by the NWB.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with appropriate stakeholders and regulatory agencies to identify required revisions to the AEMP and associated environmental monitoring programs. Baffinland submitted Revision 2 of the AEMP in April 2016 to the NWB and continues to work with the appropriate stakeholders and regulatory agencies to finalize the revision. In November 2017, Baffinland chaired a freshwater workshop in Iqaluit, Nunavut to further discuss and justify the proposed changes to the CREMP outlined in Revision 2 of AEMP. Attending participants of the freshwater workshop included the NWB, QIA, CIRNAC, GN and ECCC. Baffinland plans on incorporating points of discussion from the freshwater workshop in the updated Revision 2 of the AEMP. Baffinland plans to submit a revised Revision 2 of the AEMP to the NWB in 2019 for review and final approval. Baffinland will provide Revision 2 of the AEMP to the NIRB following 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.
Relevant Baffinland Commitment	57
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-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

A comprehensive sediment and erosion management plan is incorporated into Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2019f). An earlier revision of the SWAEMP was submitted to and approved by the NWB prior to the commencement of Early Revenue Phase 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.
Relevant Baffinland Commitment	57
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 Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

A groundwater monitoring program, involving the installation of shallow groundwater wells downstream of Project infrastructure, is discussed in Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2019f).

During 2018, Baffinland continued the pilot groundwater monitoring program initiated in 2017 to confirm program feasibility. During September 2018, Baffinland installed shallow groundwater wells up-gradient and down-gradient of the Mine Site Non-Hazardous Waste Landfill (Landfill Facility) using drive point piezometers. Groundwater wells were established to the depth of permafrost (approx. 1 - 1.5 metres) and water samples were collected at well locations where groundwater was detected. The methodology for the 2018 groundwater monitoring program is detailed in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

RESULTS

During the 2018 program, groundwater was detected and sampled at three (3) monitoring wells down-gradient and two (2) monitoring wells up-gradient of the Landfill Facility. Due to the limited data set collected to date for groundwater chemistry, further groundwater monitoring is required to gain a better understanding of natural groundwater chemistry and flow of groundwater at Project sites.

TRENDS

Groundwater monitoring at the Project commenced in 2017. As additional monitoring is conducted in future years, Baffinland will be able to better characterize natural groundwater chemistry at Project sites and identify any trends, including potential impacts from Project activities or infrastructure.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland plans to continue the groundwater monitoring program in 2019 using a methodology consistent with the 2018 pilot program. The 2019 groundwater monitoring program will establish groundwater wells near Project infrastructure with a focus on the Landfill Facility at the Mine Site. Additional data is required to determine the feasibility and utility of groundwater monitoring in arctic conditions. Following the 2019 year, Baffinland will provide further recommendations.

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.
Relevant Baffinland Commitment	6
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) Metals & Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2018) Metals and Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERP; Baffinland, 2019b) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c) 2018 MDMER Annual Report (Baffinland, 2019g) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

Wastewater/effluent management practices and procedures are outlined in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) and the Metals & Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERP; Baffinland, 2019b).

Water quality discharge criteria (discharge criteria) for effluent generated by the Project are stipulated in the Type A Water Licence issued by the NWB, and Schedules 4 and 5 of the Metals and Diamond Mining Effluent Regulations (MDMER, 2018).

Prior to discharge, wastewater (e.g. treated sewage, treated contact water, etc.) is sampled to ensure the wastewater's water quality meets the applicable discharge criteria. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken during wastewater discharges to ensure the water quality remains in compliance with the applicable discharge criteria. In the event that water quality sampling during a discharge indicates that the water quality has changed and is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant wastewater is halted.

Wastewater that does not meet the applicable discharge criteria is treated on-site using approved treatment methods (e.g. sewage treatment plants, mobile oily water treatment systems, etc.) and is not discharged to the receiving

environment until it has been confirmed by water quality analysis that the treated wastewater meets the applicable discharge criteria.

All water sampling at the Project is conducted in accordance with the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland; 2017c).

As required by the Type A Water Licence, volumes and water quality analysis of wastewater discharged to the receiving environment are reported to regulators (CIRNAC, NWB) on a monthly and annual basis. As a requirement of MDMER, volume and water quality results for discharges from the surface water management ponds associated with the Crusher Facility and Waste Rock Facility (WRF) at the Mine Site are reported to ECCC on a quarterly and annual basis.

RESULTS

Effluents generated and managed by the Project in 2018, included sewage, contact water retained in surface water management ponds associated with ore and waste rock facilities and oily water retained in containment areas, such as bulk fuel facilities. Effluent treatment systems operated at the Project in 2018, included:

- Sewage Treatment Plants (STPs) at Milne Port (MP-01) and the Mine Site (MS-01, MS-01B);
- Dissolved Air Flotation (DAF) Treatment System at Milne Port to treat and discharge wastewater stored in Milne Port PWSP (MP-01A);
- Mobile Oily Water Treatment System (OWTS), transported between Project sites as required; and the,
- Wastewater Treatment Plant (WWTP) at the Waste Rock Facility (MS-08), installed prior to freshet 2018.

Discharges of effluent at the Project in 2018 that did not comply with the applicable discharge criteria, involved single isolated events at each of the Mine Site STP (MS-01), the WWTP at the WRF (MS-08) and the mobile OWTS at Mine Site Containment Area MS-HWB-7 (MS-MRY-6). All three (3) events involved minor water quality exceedances of discharge criteria outlined in the Type A Water Licence with no exceedances of MDMER discharge criteria occurring in 2018.

On January 9, 2018, a treated sewage effluent sample collected from the Mine Site STP servicing the Mine Site Accommodation Complex exceeded the applicable discharge criteria for total phosphorus (TP) and total suspended solids (TSS) of 4 mg/L and 35 mg/L, respectively. The elevated TSS concentration (45.3 mg/L) is believed to be result of sampling error while the elevated total phosphorus concentration (4.29 mg/L) is believed to have been caused by temporary upset conditions at the Mine Site STP. The subsequent sampling event of the treated sewage effluent confirmed that both parameters had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated sewage effluent at the Project were observed in 2018.

On August 10, 2018, a treated effluent sample collected from the WWTP at the WRF exceeded the applicable discharge criterion for TSS of 15 mg/L. The elevated TSS concentration (19.3 mg/L) is believed to have been caused by water quality variation in the effluent stream, evidenced by the sample's duplicate having a TSS concentration (14.9 mg/L) below the applicable TSS criterion, and temporary upset conditions at the WWTP. Upon receiving the elevated TSS result, discharge of treated effluent from WTP was halted until subsequent sampling events confirmed that TSS concentrations had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated effluent at the WRF WWTP were observed in 2018.

On September 4, 2018, a treated oily water effluent sample collected from the mobile OWTS, while stationed at Mine Site Containment Area MS-HWB-7, exceeded the applicable discharge criteria for total lead of 0.001 mg/L. Upon receiving the elevated total lead result (0.00127 mg/L) from the analytical lab, discharge of treated effluent from the mobile OWTS was halted. Due to the close proximity to freeze-up at the Project, subsequent sampling was not undertaken following receipt of

the elevated total lead result. Potential causes of the exceedance include lab error, due to the close proximity of the discharge criterion to the analytical minimum detection limit (MDL), and the metals removal media used by the mobile OWTS being spent. No other water quality exceedances involving treated oily water effluent from the mobile OWTS were observed in 2018.

2018 water quality exceedances for effluents monitored under the Type A Water Licence were reported to CIRNAC, the NWB and the QIA in the monthly monitoring reports prescribed by the Type A Water Licence. A full discussion of the Project's 2018 monitoring results under the Type A Water Licence is provided in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

To ensure the accuracy of future water quality sampling results, Baffinland will continue to train all personnel involved with sampling effluents at the Project in the proper sampling practices and procedures, as outlined in the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c).

In response to the effluent water quality concerns identified at the WRF in 2017, Baffinland installed and commissioned a wastewater treatment plant at the WRF prior to freshet 2018. The WWTP proved to be very effective at addressing the effluent water quality concerns identified in 2017. As a result, Baffinland plans to operate the WWTP in 2019 to treat contact water generated at the WRF.

To address the total lead exceedance observed at the mobile OWTS in 2018, the metals removal media will be replaced prior to operation of the mobile OWTS in 2019. In addition, all operators of the mobile OWTS will be thoroughly trained in the System's operation to ensure metals removal media continues to be replaced at the frequency recommended by the media's manufacturer.

Overall, the low frequency of non-compliant discharges involving effluents generated and managed by the Project are evidence of the effectiveness of the Project's wastewater/effluent management practices and procedures. Baffinland will continue to update the Project's management practices and procedures and implement new mitigation measures as required to ensure effluent discharges to the receiving environment are in compliance with applicable water quality discharge criteria.

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 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.
Relevant Baffinland Commitment	N/A
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-Compliance
Stakeholder Review	Nunavut Water Board, Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association
Reference	Annual Geotechnical Inspections (Martin, 2018) Borrow Source Management Plan - Kilometre 97 (Baffinland, 2014c) 2018 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2019d) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	Management plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

In 2018, Barry H. Martin, P. Eng., Consulting Engineer, completed two (2) geotechnical inspections of the following Project facilities and infrastructure:

- Active Quarries (Q1, QMR2);
- Bulk Fuel and Waste Storage Facilities;
- Sedimentation Ponds and associated Surface Water Drainage Infrastructure;
- Polishing and Waste Stabilization Ponds (PWSPs); and
- Select Water Crossings and Areas along the Tote Road.

The inspections took place from July 24th to August 1st, 2018 and October 3rd to October 10th, 2018. The inspections were carried out in accordance with the guidelines set out in the Canadian Dam Association's Dam Safety Guidelines 2007 (CDA, 2013).

The inspections primarily focused on the following aspects:

- 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);
- The structures were specifically inspected for settlement, cracking, and seepage through the berms;
- The areas around the structures were examined for evidence of seepage;
- Quarry walls were reviewed for relative stability;
- New structures under construction were reviewed for conformity with design drawings; and

- The berms of the containment structures were examined with respect to possible tears in miner membranes.

In addition, geotechnical investigations continued to be conducted at Project sites and along the length of the proposed north railway between the Mine Site and Milne Port, to support engineering studies for future Project infrastructure.

RESULTS

Results from the geotechnical inspections at the Mine Site indicate there has been little to no erosion from wind or rain and the dykes constructed of the sand/gravel soil for fuel and waste storage facilities have remained stable at slopes of 3:1 and 4:1. As noted in previous years, there are minor 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 (1) 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.

At Milne Port, minor repairs and actions were recommended at the Hazardous Waste Storage facility, the fuel tank farm, the landfarm containment area, the loading area contaminated storage and the fueling facility containment area. These are scheduled to be addressed in July 2019.

As identified in previous years, Project's activities have led to localized permafrost degradation along the Tote Road that are addressed on an individual basis for optimal remedial efforts.

The 2018 geotechnical inspections reports, along with Baffinland's plans to address any identified concerns, are included in Appendix G.

Details of the geotechnical investigations (e.g. drilling) completed in 2018 are discussed in the 2018 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2019d).

TRENDS

All water retention structures have continued to remain stable with minor settling.

RECOMMENDATIONS / LESSONS LEARNED

Results from geotechnical investigations conducted in 2018 will be used to support the design of future Project infrastructure.

Recommendations outlined in the Geotechnical Inspections reports will be completed in the summer of 2019 to address outstanding issues at Milne Port and Mary River.

In 2019, Baffinland will continue to address permafrost degradation at the Km 97 Borrow Source. Baffinland plans to continue implementing the borrow source's progressive reclamation and rehabilitation plan outlined in Appendix B of the borrow source's approved management plan titled Borrow Source Management Plan - Kilometre 97 (Baffinland, 2014c).

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.
Relevant Baffinland Commitment	57
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-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Environmental Protection Plan (Baffinland, 2016f) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

A comprehensive erosion management plan is included in the Project's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2019f). An earlier revision of the SWAEMP was approved by the NWB prior to the commencement of Early Revenue Phase construction.

Activity specific sediment and erosion control measures and procedures used at the Project are also discussed within the Project's Environmental Protection Plan (Baffinland, 2016f):

- Section 2.3 Land Disturbance;
- Section 2.9 Sediment and Erosion Control;
- Section 2.17 Road Construction and Borrow Development;
- Section 2.18 Tote Road Watercourse Crossing Installation;
- Section 2.25 Quarry and Borrow Pit Operation; and
- Section 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	The Communities of: Artic Bay, Clyde River, Hall Beach, Igloolik and Pond Inlet
Reference	2018 Community Meeting Notes
Ref. Document Link	Appendix B

METHODS

Throughout 2018, Baffinland held several community group meetings within the five (5) North Baffin communities. These meetings provide an important opportunity for Baffinland to share information with the Communities related to current operations, the results of ongoing environmental monitoring programs and future planning to support the development of the Project. Community Group meetings held in 2018 are presented in Table 4.14.

Table 4.14 2018 Community Group Meetings

Date	Community Group	Location	Topic
March 21 2018	Hamlet and HTO	Pond Inlet, NU	Overview of Project shipping and production plans for 2018
April 5, 2018	Hamlet and HTO	Hall Beach, NU	Exploration program consultation
April 6, 2018	Hamlet and HTO	Igloolik, NU	Exploration program consultation
June 6, 2018	HTO	Pond Inlet, NU	6 MTPA Application - Shipping Management
June 7, 2018	HTO	Pond Inlet, NU	Freight Dock Construction and Offset - Marine Monitoring Programs
June 11, 2018	Hamlet Council and HTO	Clyde River, NU	Phase 2 Impacts and Mitigation
June 12, 2018	Hamlet Council and HTO	Pond Inlet, NU	Phase 2 Impacts and Mitigation
June 13, 2018	Hamlet and Mayor	Arctic Bay, NU	Phase 2 Impacts and Mitigation
June 14, 2018	HTO	Igloolik, NU	Phase 2 Impacts and Mitigation
June 15, 2018	Hamlet Council and HTO	Hall Beach, NU	Phase 2 Impacts and Mitigation

Date	Community Group	Location	Topic
August 30, 2018	MHTO	Mary River	MHTO Site Visit (August 30-31)
October 11, 2018	QIA, NAC, and MHTO	Pond Inlet, NU	Pond Inlet Training Center
November 19-22, 2018	Hamlet and HTO	Pond Inlet and Arctic Bay	Phase 2 Info Sessions (Nov 19-22)
November 27-28, 2018	HTO	Pond Inlet	End of Shipping and Marine Monitoring Season Meeting

These meetings provide an opportunity for community representatives to discuss ongoing concerns, interests in participating in the benefits related to the Project and any changes they may have seen in the landscape as a result of the Project.

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. Other comments about changes to the land and sea were focused on ensuring the effects of the Project were being monitored and mitigated, and concerns with potential Project related effects on land use (hunting and harvesting).

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Environment Climate Change Canada, Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	Annual Geotechnical Inspections (Martin, 2018) Environmental Protection Plan (Baffinland, 2016f) Appendix G – 2018 Annual Geotechnical Inspection Reports
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Bi-annual geotechnical inspections are completed by Barry H. Martin, P.Eng., as required by the NWB Type A Water Licence No. 2AM-MRY1325 for the following on-site engineered facilities at the Mine and Port:

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

Inspections in 2018 took place between July 24th to August 1st, 2018 and October 3rd to October 10th, 2018 in accordance with the requirements for two biannual inspections to be carried out within the open water shipping season at the Mine Site and Milne Port. The inspection reports are provided to regulators for review and comment. Inspections are carried out in accordance with the Canadian Dam Association (CDA) *Dam Safety Guidelines* (CDA, 2013). The reports are included in Appendix G.

The inspections primarily focused on the following aspects:

- 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);
- The structures were specifically inspected for settlement, cracking, and seepage through the berms;

- The areas around the structures were examined for evidence of seepage;
- Quarry walls were reviewed for relative stability; and
- New structures under construction were reviewed for conformity with design drawings.

RESULTS

As identified in previous years, project's activities have led to localized permafrost degradation issues along the Tote Road and Mine Haul Road.

The bi-annual geotechnical inspections indicated that the Mary River Polishing/Waste Stabilization Ponds (PWSPs) 1, 2 and 3 were noted to be experiencing minor overall settlements of the structures with respect to the surrounding area. The minor settlement is restricted to the berms.

TRENDS

Baffinland continues to monitor, research strategies and remediate identified locations as required.

RECOMMENDATIONS / LESSONS LEARNED

Project designs and the placement of infrastructure consider sensitive landforms and permafrost. Baffinland continues to have a third-party conduct bi-annual geotechnical inspections.

To improve historical permafrost degradation issues along the Tote Road, Baffinland will continue to develop and prioritize preventative and mitigation measures to minimize the impacts of the Project's activities and infrastructure on landforms along the Tote Road. These activities are reflected in Baffinland's 2019 Work Plan (Baffinland, 2018b).

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	N/A
Ref. Document Link	N/A

METHODS

Not applicable.

RESULTS

As required by the Project's Type A Water Licence and Commercial Lease with QIA, several engineering submissions were provided to regulatory agencies and stakeholders throughout 2018, including Issued-for-Construction (IFC) Drawings, As-Built Drawings and Construction Summary Reports. A summary of the relevant submissions is provided in Table 4.15.

Table 4.15 2018 Submissions to Regulatory Agencies and Stakeholders

Date of Submission	Regulatory Agencies and Stakeholders	Content
January 24, 2018	NWB, CIRNAC, QIA	Construction Summary Report - Modification No. 3a - Milne Port Camp Pad Natural Stream Diversion
February 20, 2018	DFO	IFC Drawings - <i>Fisheries Act</i> Authorization - Milne Port Freight Dock
March 8, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 7 - Mine Site and Milne Port Infrastructure Upgrades
April 9, 2018	DFO	IFC Drawings - <i>Fisheries Act</i> Authorization - Milne Port Freight Dock
May 29, 2018	NWB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 5 - Crusher Facility Pond Expansion
June 26, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 8 - Waste Rock Facility Pond Expansion
July 16, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 9 - Milne Port Ore Stockpile Water Management Upgrades
August 1, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Mine Site Fuel Facility and 15 ML Arctic Diesel Tank

Date of Submission	Regulatory Agencies and Stakeholders	Content
August 1, 2018	DFO	IFC Drawings - <i>Fisheries Act</i> Authorization - Milne Port Freight Dock
August 13, 2018	NWB, CIRNAC, QIA	As-Built Drawing - Modification No. 1 - Crusher Pad Expansion
August 17, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Milne Port 15 ML Arctic Diesel Tank
August 21, 2018	NWB, CIRNAC, QIA	IFC Drawings and Drill Hole Data - Modification No. 9 - Milne Port Ore Stockpile Water Management Upgrades
August 27, 2018	NWB, CIRNAC, QIA	QA/QC and Design Specifications - Modification No. 8 - Waste Rock Facility Pond Expansion
September 5, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 10 - Mine Site Infrastructure Upgrades (Landfill, Effluent Line)
September 21, 2018	NWB, NIRB, CIRNAC, QIA	IFC Drawings and Design Specifications - Run of Mine Stockpile and Sedimentation Pond
September 26, 2018	NWB, CIRNAC, QIA	IFC Drawing - Modification No. 10 - Mine Site Infrastructure Upgrades (Landfill, Effluent Line)
October 30, 2018	DFO	IFC Drawings - <i>Fisheries Act</i> Authorization - Milne Port Freight Dock
December 10, 2018	NWB, CIRNAC, QIA	IFC Drawings and Design Specifications - Modification No. 3b - Milne Port 380 Person Camp and Supporting Infrastructure (WTP, STP)

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 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.
Relevant Baffinland Commitment	65
Reporting Requirement	Plans to be provided to the NIRB for review and comment at least 30 days prior to commencement of construction activities.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

To date, site-specific management plans for quarries and borrow sources have been developed and provided to the relevant agencies prior to development.

RESULTS

No site-specific quarry and borrow source management plans were submitted to relevant agencies for review and approval during 2018.

TRENDS

None.

RECOMMENDATIONS / LESSONS LEARNED

Site-specific management plans for new quarries and borrow sources will be developed and provided to the relevant agencies prior to development.

4.6.5 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; Baffinland, 2016g).

Stakeholder Feedback

Key stakeholders that have expressed concern regarding vegetation have included the QIA, ECCC and the Government of Nunavut (GN). Issues related to vegetation have included a desire to minimize the overall 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. Responses to these issues are reflected in PC Conditions 31 through 40. Effects to vegetation have not been raised in 2018 consultation activities (Appendix B).

Monitoring Activities

Baffinland's vegetation monitoring programs include the following

- Vegetation abundance monitoring;
- Vegetation and soil base metal sampling;
- Exotic invasive plant species monitoring program; and
- Dustfall monitoring.

Not all of these programs involve annual sampling, and trends may become apparent only after many years of monitoring.

In 2018, vegetation abundance monitoring data was collected from transects one to fifteen and reference sites one to six. In addition, measurement methods for the vegetation abundance monitoring program were evaluated. The evaluation of vegetation abundance monitoring methods demonstrated that the method used to measure vegetation is highly objective and repeatable, confirming that it is appropriate for addressing the objectives of the vegetation abundance monitoring program.

Baseline metal concentrations across all 2012 to 2016 vegetation and soil base metals monitoring sites are below Project-specific thresholds. No sampling was conducted in 2018 as part of the vegetation and soil base metals monitoring program; however, sampling will be conducted in 2019 in response to requests from the QIA and the GN in 2018.

With respect to invasive plant species monitoring, this monitoring is conducted every 5 years (i.e., 2014 and again in 2019).

To guide reclamation research, a review of available practices and recent advances from Arctic mine reclamation in Canada's northern territories and Alaska, USA was conducted in 2018. The 2018 Mary River Project Vegetation Reclamation Plan (EDI, 2019b) documents this review and provides methods for revegetation, as well as outlining options for future reclamation/revegetation trials in the Project area to ultimately refine Baffinland's reclamation practices.

Table 4.15 provides an evaluation of the Project's impacts on vegetation. In the absence of monitoring activities in 2018, updated impact evaluations cannot be developed.

Table 4.16 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	No testing was completed in 2018	N/A
Vegetation Abundance	Dustfall results in changes in species composition and vegetation abundance	Vegetation abundance monitoring was conducted in 2018.	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	No testing was completed in 2018.	N/A

Path Forward

In accordance with the TEMMP, the next round of vegetation monitoring will be undertaken in 2019, as described above. In 2019 Baffinland will be organizing a Mine Closure Working Group to evaluate the implementation and results of reclamation research programs and progressive reclamation projects at Mary River, and will evaluate study design for the development of representative test plots for revegetation studies.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Environmental Protection Plan (Baffinland, 2016f) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	Management plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

Baffinland's Project design philosophy focuses on minimizing earthworks, re-using existing facilities, and using pre-assembled infrastructures to minimize construction activities in the Project area. Design activities undertaken to minimize the Project footprint include:

- Using pre-cast concrete where feasible including the use of integrated module foundations;
- Using pre-assembled material packages, such as building wall and roof panels, ground conveyors, elevated conveyors, conveyor bents, fuel tanks etc.;
- Using complete multi discipline modules such as screen building modules, crushing building modules, powerhouse modules, transfer stations, etc.;
- Purchasing fully-assembled yard and mobile mining equipment offsite such as the stacker, reclaimer, ship loader, loader, mine haul truck, etc.;
- Conducting Environmental Protection Plan training, which outlines the importance of minimizing disturbed land at the Project and the process that must be followed prior to construction on non-disturbed land;
- Ensuring appropriate approvals are met with applicable stakeholders and land lease agreement; and
- Documenting and tracking land disturbance approvals associated with the Project.

RESULTS

To-date, Baffinland has completed all required construction activities for the Project within the Project Development Area (PDA). Baffinland also restricts any overland movement of equipment or personnel that 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. Overburden that is removed from an area to be disturbed is stockpiled for the remediation of the area. No unauthorised land disturbance occurred in 2018 and all disturbed land is reported in the 2018 Annual Terrestrial Report (EDI, 2019a).

TRENDS

Baffinland has completed all construction to date within the PDA. During 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, laydowns are constructed for material storage and as quarries expand to support ongoing maintenance. Terrestrial vegetation studies supported little to no impact in the Regional Study Area on vegetation abundance and diversity in 2018.

RECOMMENDATIONS / LESSONS LEARNED

Long term vegetation surveys will continue to be monitored and used for analysis to determine if vegetation is being impacted outside of the PDA. Project footprint will continue to be minimized wherever possible to limit the impact of the project.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

All equipment and supplies are to be inspected by Supplier's prior to being offloaded at Baffinland's Milne Port. Service agreements and contracts sent to suppliers were updated in the beginning of 2018 to include a clause "All equipment delivered to site must be free and clear of soils that may contain seeds of invasive species."

Baffinland continues to monitor and regulate employees seeking to bring plants (e.g. office plants) to site.

RESULTS

No new invasive species were observed during vegetation monitoring programs conducted in 2018.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

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).
Relevant Baffinland Commitments	57
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016g) 2018 TEWG Meeting Records (Appendix C2)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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. The TEMMP is updated on a regular basis to reflect adjustments to programs and analytical results, statistical power analysis, and input provided on programs by the TEWG and annual review by the Nunavut Impact Review Board.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Regularly updating mitigation and monitoring plans to reflect regulator and TEWG feedback has been invaluable in addressing regular analytical results, evolving methods, and adapting to further understanding of the potential Project-related effects.

Project Certificate Condition No. 34

Category	Vegetation – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records (Meeting No. 14)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

METHODS

The vegetation and soil base metals monitoring program began in 2014 prior to commencing operations and considers three (3) Project components (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 (3) to five (5) 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 contaminants 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

Baseline metal concentrations across all 2012 to 2016 vegetation and soil base metals monitoring sites are below Project thresholds. No sampling was conducted in 2018 as part of the vegetation and soil base metals monitoring program.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue monitoring every 3–5 years as part of the vegetation and soil base metals monitoring program in accordance with the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g).

Baffinland will be completing a round of monitoring in 2019 in continuation of the program, based on recommendations received from the QIA and Government of Nunavut in 2018.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2015 TEWG Meeting Records (Meeting No. 7) 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The North Baffin caribou herd is at low numbers and there are few to no caribou being harvested, particularly by harvesters that travel through the Mary River Project site, from which to collect samples.

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

A suitable sampling protocol has yet to be developed in coordination with the GN and the local HTOs through discussions in the Terrestrial Environment Working Group.

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 ongoing monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations.
Relevant Baffinland Commitments	67
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

A monitoring program for caribou forage was established in 2014 to focus on lichen abundance at sites close to and far away from the Mine Site, Milne Port and the Tote Road. 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 (1) to two (2) open plots and one (1) 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 distance from the PDA while accounting for the potential effect of herbivory. Monitoring completed in 2018 marked the second year that vegetation abundance data were analyzed among years including data from 2014, 2016, 2017, and 2018.

A repeatability study was conducted in 2017 and 2018 at previously established vegetation abundance monitoring sites in the Project area. Sites were randomly selected to be remeasured by returning to the site later the same day or the following day. Plots were remeasured using the point quadrat method and by following the same protocol as the vegetation abundance monitoring program. Data were analyzed to evaluate the repeatability of vegetation abundance monitoring methods using the point quadrat method. Repeatability is a standard approach to quantify measurement error for repeated measurements on the same entity, while controlling for other sources of variation that may be introduced through the measurement process. Data analyzed included percent cover by plant group for the ground cover and canopy cover layers.

RESULTS

There was annual variation in vegetation abundance in the Project area from 2014 to 2018, but no evidence of changes in vegetation abundance as a result of the Project. Results of the 2018 monitoring in comparison to prior years is presented as follows:

- Total percent ground cover declined between 2014 and subsequent monitoring years ($p < 0.001$). Although statistically significant, differences in total percent ground cover were small and consistent across all distance classes in the Project area (Figure 4.3). There was no main effect of distance class on total ground cover ($p = 0.77$). There was no interaction between distance class and year ($p = 0.24$), treatment and year ($p = 0.38$) or distance class and treatment ($p = 0.34$). There was also no three-way interaction between year, distance, and treatment ($p = 0.80$). Total ground cover was 94.6% (CI = 92.8 – 96.0) in 2014, 91.6% (CI = 89.1 – 93.6) in 2016, 90.2% (CI = 87.4 – 92.4) in 2017, and 92.2% (CI = 89.9 – 94.0) in 2018 ($p < 0.001$). After accounting for year, average ground cover in closed plots was 91.5% (CI = 88.9 – 93.5) and open plots was 93.1% (CI = 91.1 – 94.7; $p = 0.006$; Figure 4.4).

A detailed examination of changes in ground cover for the major plant groups cover were also consistent across all distance classes in the Project area (Figure 4.5). Ground litter was low in 2014 at 50.4% (CI = 47.0 – 53.8) and higher in 2016 at 62.5% (CI = 59.7 – 65.2), 61.6% (CI = 58.8 – 64.3) in 2017, and 59.3% (CI = 56.5 – 62.1) in 2018 ($p < 0.001$). Moss cover was high in 2014 at 13.9% (CI = 9.7 – 19.4) and lower in 2016 at 7.2% (CI = 5.0 – 10.3), 6.7% (CI = 4.6 – 9.5) in 2017, and 7.7% (CI = 5.3 – 10.9) in 2018 ($p < 0.001$). Lichen cover was high in 2014 at 2.8% (CI = 2.0 – 4.0) and lower in 2016 at 1.6% (CI = 1.1 – 2.3), 1.6% (CI = 1.1 – 2.3) in 2017, and 1.9% (CI = 1.3 – 2.7) in 2018 ($p < 0.001$).

- Total percent canopy cover was different among years ($p < 0.001$) and there was a weak interaction between year and distance class ($p < 0.02$; Figure 4.3). Differences in total percent canopy cover between year and distance class were inconsistent; therefore, we conclude that differences were driven by annual variation in plant cover. There was no support for a main effect of distance class on total canopy cover ($p = 0.43$). There was no evidence for a main effect of treatment on total canopy cover ($p = 0.33$) or for interactions between treatment and distance or year (all $p > 0.17$). Averaging across distance classes and treatments, total canopy cover was 43.5% (CI = 39.8 – 47.3) in 2014, 51.7% (CI = 48.3 – 55.0) in 2016, 50.6% (CI = 47.4 – 53.9) in 2017, and 46.2% (CI = 42.9 – 49.4) in 2018. Canopy cover was somewhat higher in the open plots in 2014 at 41.2% (CI = 36.6 – 45.9) than in the closed plots at 45.9% (CI = 41.8 – 50.2; $p = 0.05$; Figure 4.4). In subsequent years, there were no significant differences in total canopy cover between treatments (2016: $p = 0.75$; 2017: $p = 0.87$; 2018: $p = 0.14$).

A detailed examination of changes in canopy cover for the major plant groups also found annual differences in cover in the Project area (Figure 4.4). Standing dead litter cover was low in 2014 at 16.1% (CI = 14.0 – 18.6) and higher in the next three monitoring years: 30.3% (CI = 27.3 – 33.5) in 2016, 33.5% (CI = 30.4 – 36.8) in 2017, and 31.1% (CI = 28.1 – 34.3) in 2018 ($p < 0.001$). Graminoids decreased during the same period, suggesting that it is difficult to classify a graminoid as green, living plant material or standing dead litter. Deciduous shrub cover had a weak interaction between year and distance class ($p = 0.01$) where cover was 3.5% (CI = 2.6 – 4.7) in 2014, 3.1% (CI = 2.4 – 4.1) in 2016, 2.9% (CI = 2.2 – 3.7) in 2017, and 2.5% (CI = 1.9 – 3.2) in 2018. Trends in the data for deciduous shrub cover were inconsistent among years.

- In summary, differences in the cover of major plant groups such as ground litter, standing dead litter, graminoids, moss, and lichen may be explained by the potential that 2015 was a large plant growth year adding standing dead litter to the canopy layer and then to the ground layer where ground litter has the potential to obscure moss and lichen during measurements. Although statistically significant, differences in the cover of these major plant groups were consistent across all distance classes; therefore, changes in cover among years is likely the result of climatic variation across all sites in the Project area.

TRENDS

Trends are presented in Figures 4.3 to 4.5, and can be summarized as follows:

- There is annual variation in vegetation abundance in the Project area, but there is no evidence of changes in vegetation abundance as a result of a Project effect. Differences in total ground cover, total canopy cover, and cover between open and closed plots among years were small in magnitude, consistent across all distance classes or showed no consistent pattern in relation to distance from Project infrastructure; therefore, differences have been attributed to natural variation among years rather than a Project-related effect.
- There is annual variation in the cover of some plant groups in the Project area. These differences were found across all distance classes or else trends in the data were inconsistent (i.e., deciduous shrubs); therefore, the variation is attributed to natural variation in plant group cover and there is no evidence to support a Project-related effect in the first four (4) years of monitoring.

The 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) provides further details.

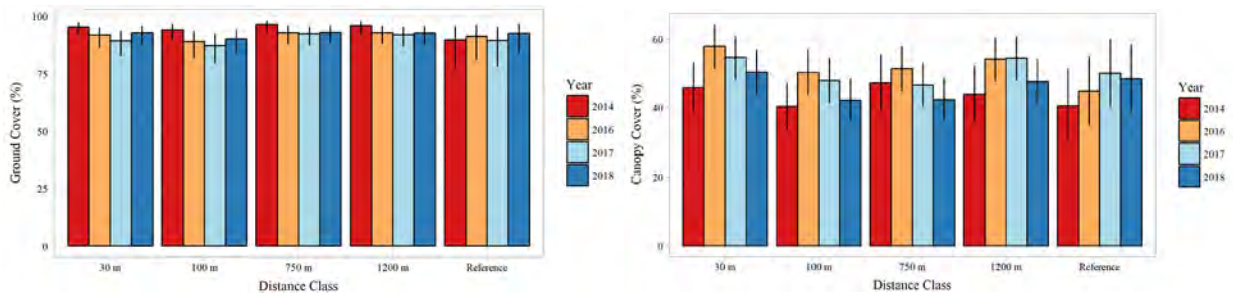


Figure 4.3. Total Ground Cover and Total Canopy Cover by Distance Class and Year

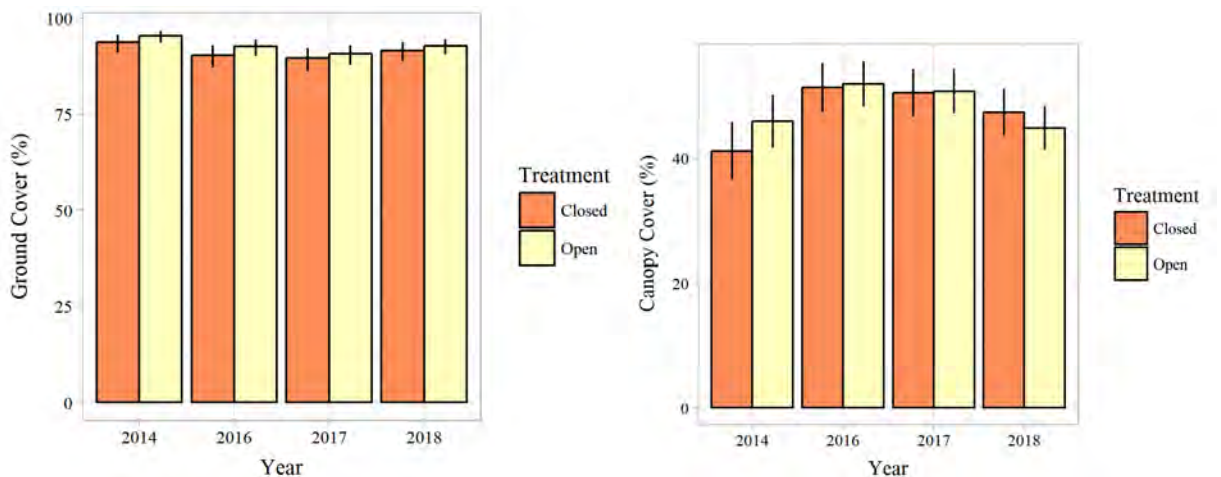


Figure 4.4 Total Ground Cover and Total Canopy Cover by Treatment and Year

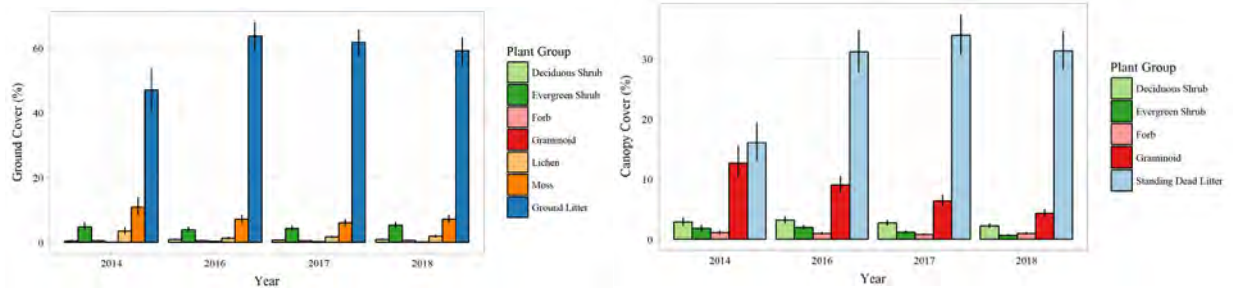


Figure 4.5 Ground Cover and Canopy Cover by Plant Group and Year

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue monitoring 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; Baffinland, 2016g).

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.
Relevant Baffinland Commitments	43, 68
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2014 Terrestrial Environment Annual Monitoring Report (EDI 2015) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records (Meeting No. 13)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

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 (the Mine Site, Milne Inlet, and Tote Road) is surveyed on foot, with some sections surveyed in a vehicle at slow speeds along the Tote Road.

RESULTS

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 were conducted in 2018 as part of the exotic invasive vegetation and natural regeneration monitoring program.

TRENDS

A trend analysis is not applicable currently 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

The exotic invasive vegetation monitoring program will occur again in 2019, in accordance with the frequency outlined for the program in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g).

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status of Compliance	In-Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records (Meeting No. 13, 14)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

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 (6) 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 (1) to two (2) open plots and one (1) 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 relationship to distance from the PDA, while accounting for the potential effect of herbivory. Monitoring completed in 2018 marked the second year that vegetation abundance data were analyzed among years including data from 2014, 2016, 2017, and 2018.

A repeatability study was conducted in 2017 and 2018 at previously established vegetation abundance monitoring sites in the Project area. Sites were randomly selected to be remeasured by returning to the site later the same day or the following day. Plots were remeasured using the point quadrat method and by following the same protocol as the vegetation abundance monitoring program. Data were analyzed to evaluate the repeatability of vegetation abundance monitoring methods using the point quadrat method. Repeatability is a standard approach to quantify measurement error for repeated measurements on the same entity, while controlling for other sources of variation that may be introduced through the measurement process. Data analyzed included percent cover by plant group for the ground cover and canopy cover layers.

Vegetation and Soil Base Metals

The vegetation and soil base metals monitoring program considers three (3) Project components (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 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 contaminants of potential concern (CoPC) were selected for the analysis including arsenic, cadmium, copper, lead, selenium, and zinc. These CoPC 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 (3) 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

There was annual variation in vegetation abundance in the Project area from 2014 to 2018, but no evidence of changes in vegetation abundance because of a Project-related effect. Differences in the cover of major plant groups such as ground litter, standing dead litter, graminoids, moss, and lichen may be explained by the potential that 2015 was a large plant growth year adding standing dead litter to the canopy layer and then to the ground layer where ground litter has the potential to obscure moss and lichen during measurements. Although statistically significant, differences in the cover of these major plant groups were consistent across all distance classes; therefore, changes in cover among years is likely the result of climatic variation across all sites in the Project area.

Vegetation and Soil Base Metals

- Baseline metal concentrations across all 2012 to 2016 vegetation and soil base metals monitoring sites are below Project thresholds.
- No sampling was conducted in 2018 as part of the vegetation and soil base metals monitoring program.

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 were conducted in 2018 as part of the exotic invasive vegetation and natural regeneration monitoring program.

TRENDS

Vegetation Abundance

- There is annual variation in vegetation abundance in the Project area, but there is no evidence of changes in vegetation abundance as a result of a Project effect. Differences in total ground cover, total canopy cover, and cover between open and closed plots among years were small in magnitude, consistent across all distance classes or showed no consistent pattern in relation to distance from Project infrastructure; therefore, differences have been attributed to natural variation among years rather than a Project-related effect.

- There is annual variation in the cover of some plant groups in the Project area. These differences were found across all distance classes or else trends in the data were inconsistent (i.e., deciduous shrubs); therefore, the variation is attributed to natural variation in plant group cover and there is no evidence to support a Project-related effect in the first four (4) years of monitoring.
- For information related to general trends, please refer to PC Condition No. 36 and the 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a).

RECOMMENDATIONS / LESSONS LEARNED

Continue vegetation program monitoring in accordance with the TEMMP and guidance provided by the TEWG.

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.
Relevant Baffinland Commitment	39
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	Interim Closure and Reclamation Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

As described in the Interim Closure and Reclamation Plan (ICRP), a reclamation research program is proposed 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. The Project's primary goal for closure and reclamation is *"to return disturbed areas to viable and (wherever practicable) self-sustaining ecosystems that are compatible with a healthy environment and with human activities in as minimal duration as reasonably practical"*. Guiding principles are to achieve a safe, stable, non-polluting landscape that aligns with a desired/agreed-upon end-land use and aesthetics. Additional site-specific reclamation goals have then been developed/provided for major infrastructure components, such as the Mine Site, Milne Port, and Tote Road. Project objectives for reclamation research are to:

- Identify methods for successful natural revegetation;
- Enhance physical stability; and
- Incorporate principles of landscape aesthetics.

To guide reclamation research, a review of available practices and recent advances from Arctic mine reclamation in Canada's northern territories and Alaska, USA was conducted as part of the 2018 Mary River Project Vegetation Reclamation Plan (EDI, 2019b). Experts were also consulted for current information on reclamation practices in the Canadian Arctic. The reclamation activities and approaches from the following mines were reviewed to compared/contrast revegetation practices and outcomes relevant to the Project:

- Polaris Mine
- Nanisivik Mine
- Red Dog Mine
- Hope Bay Doris North Mine
- Meadowbank Mine

- Diavik Diamond Mine
- Ekati Diamond Mine
- Gahcho Kué Mine
- Con Mine

RESULTS

The 2018 Mary River Project Vegetation Reclamation Plan (EDI, 2019b) provides methods for revegetation and outlines options for future reclamation/revegetation trials in the Project area to ultimately refine Baffinland's proposed reclamation practices. In the Project area, disturbed areas associated with Project development are still being utilised except for a few containment berms and infrastructure pads that have been decommissioned and repurposed for other Project activities.

Upon review of the available information, common themes are that the Arctic environment imposes significant limitations and constraints on plants/ecosystem development. The most critical issues identified refer to (a) the availability of organic topsoil, (b) the probability of moisture retention, and (c) the availability of suitable seed/plant sources. Consequently, primary preparation techniques (addressed by previous reclamation programs) focused on enhancing soil water and nutrient retention to then provide suitable micro-habitats conducive to early-establishment of vegetation.

At some mine sites (Polaris Mine and Nanisivik Mine [both closed]; Hope Bay Doris North Mine and Meadowbank Mine [both currently operating]) no reclamation trials were conducted and post-reclamation monitoring focused only on the physical and chemical stability of waste materials (i.e., recontouring, backfilling and/or capping of disturbed areas). No methods for revegetation were explored and natural revegetation was expected to occur.

At all other mine sites evaluated (Red Dog Mine, Diavik Diamond Mine, Ekati Diamond Mine, Gahcho Kué Mine and Con Mine [all currently operating]) reclamation trials and even progressive reclamation activities were on-going or under development. Greenhouse & field trials in support of reclamation and revegetation focus primarily on surface preparation, substrate composition, soil handling and amendment, and planting/seeding techniques using native species.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

In 2019 Baffinland will be organizing a Mine Closure Working Group to evaluate the implementation and results of reclamation research programs and progressive reclamation projects at Mary River. Baffinland will discuss the findings of the 2018 Mary River Project Reclamation Plan with the Mine Closure Working Group and evaluate study design for the development of representative test plots.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	QIA
Reference	Interim Closure and Reclamation Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

As described in the ICRP, a Reclamation Research program is proposed to identify best practices for promoting natural revegetation 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 the 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.

In 2019, To guide reclamation research, a review of available practices and recent advances from Arctic mine reclamation in Canada's northern territories and Alaska, USA was conducted as part of the 2018 Mary River Project Vegetation Reclamation Plan (EDI, 2019b). Experts were also consulted for current information on reclamation practices in the Canadian Arctic. Upon review of the available information, common themes are that the Arctic environment imposes significant limitations and constraints on plants/ecosystem development. The most critical issues identified refer to (a) the availability of organic topsoil, (b) the probability of moisture retention, and (c) the availability of suitable seed/plant sources. Consequently, primary preparation techniques (addressed by previous reclamation programs) focused on enhancing soil water and nutrient retention to then provide suitable micro-habitats conducive to early-establishment of vegetation.

As outlined in the ICRP Reclamation Research Program – Natural Revegetation, the next step in evaluating revegetation at the Project will be to establish representative test plots for long term study. Baffinland is currently developing an appropriate study design and evaluating potential locations for test plots. The test plot study will be further discussed in 2019 with the Mine Closure Working Group that Baffinland will be organizing.

RESULTS

Not applicable for 2018.

TRENDS

Not applicable for 2018.

RECOMMENDATIONS / LESSONS LEARNED

In 2019 Baffinland will be organizing a Mine Closure Working Group to evaluate the implementation and results of reclamation research programs and progressive reclamation projects at Mary River. Baffinland will discuss the findings of the 2018 Mary River Project Reclamation Plan with the Mine Closure Working Group and evaluate study design for the development of representative test plots.

4.6.6 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 Canada (DFO) 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 also provided valuable feedback 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. For most stakeholders, the use of explosives near or in fish-bearing waters was a key area of concern. Effects to fish and freshwater biota have not been raised in 2018 consultation activities (Appendix B).

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 (DFO, 2007);
- Monitoring of different trophic levels of the freshwater environment (benthics, fish) as part of the AEMP; and
- Monitoring of sedimentation rates in Sheardown Lake to evaluate the potential for dust from the project to affect incubating fish eggs.

Tote Road Fish Use Assessments

Related to the fish habitat offsetting measures associated with the Tote Road authorization, the following works and monitoring was conducted (Baffinland, 2018d):

- All compensation works remain successful (including fish use of the rustic fishway installed at BG-30);
- There was no in-stream construction work in 2018 during periods of flow that required turbidity monitoring;
- Fish use assessments in 2018 were conducted at all fish-bearing sites along the Tote Road;
- There were no fish passage or habitat issues observed at 25 of the 36 fish-bearing crossings assessed;
- An absence of fish in BG-50 downstream was observed again in 2018. Juvenile char typically congregated in the downstream scour pool. Causes of their absence in 2017 and 2018 are unknown but it is suspected to be a result decreased use of the branch in response to the perched culverts.; and
- Issues with fish passage and/or habitat were observed at 11 crossings at the time of the survey in late June, early July 2018. Two of these involved some form of physical obstruction to fish passage (e.g., instream silt fence, cobble piles at the upstream and/or downstream end of culverts) which were removed following inspection and full upstream access restored. survey. Perching of culverts was noted at seven crossings resulting in limited or no access to upstream habitat. Rocky ramps were installed downstream of CV-114 and CV-106, and will be monitored for effectiveness in future summer monitoring programs. Following further observations in August during low flow conditions, the ramp installed in CV-106 used more material than necessary and resulted in subsurface flows impacting fish passage. This ramp's construction will be assessed and redesigned as required in Spring 2019 to ensure that a reduction in available habitat and fish passage does not occur. Another site (CV-104) had a damaged perched upstream end of a culvert, which was successfully repaired

following the early summer survey. Crossings with damaged or perched culverts were targeted by the TREEP to improve all fish passage and any erosion and sedimentation issues.

Freshwater Biota Monitoring Under the AEMP

One component study of the AEMP is the Core Receiving Environment Monitoring Program (CREMP). This monitoring program involves water and sediment quality monitoring (presented in Section 4.6.4) and aquatic biota monitoring (including phytoplankton, benthic invertebrates, and fish) in Mine Sites lakes and streams. The AEMP monitoring was undertaken in 2018 by Minnow Environmental Inc. (2019a) and is reported in detail in the QIA & NWB Annual Report for Operations (Baffinland, 2019a).

The results of the 2018 CREMP indicated some mine-related influences on water and sediment quality of a few of the mine primary receiver systems, but no ecologically significant, adverse, mine-related effects to biota were identified in any of the Mine Site waterbodies based on comparisons to applicable reference conditions or baseline data. This includes: Camp Lake and mine-exposed tributaries, Sheardown Lake and tributaries 1, 9 and 12; and Mary River and Mary Lake.

Lake Sedimentation Monitoring

The principal conclusions of 2017 - 2018 lake sedimentation monitoring study in Sheardown Lake NW are as follows (Minnow Environmental Inc., 2019b):

- Sedimentation rates during the ice-cover period - higher than the mine baseline (2013-2014) and early operational (2014-2015) ice-cover periods;
- Sedimentation rates during the open-water period - within the range of the mine baseline and early operational phases;
- Annualized sedimentation rates - higher than those during the 2013-2014 baseline and 2014-2015 mine early operational phases;
- Trends in sedimentation rates since operating - have not shown a consistent increase from 2014-2015 to 2017-2018;
- Comparison to typical Canadian arctic lakes - sedimentation rates at Sheardown Lake NW in 2017-2018 (as well as for all previous study years) were within the range observed among typical Canadian arctic lakes that have not been influenced by anthropogenic activities;
- Annual sediment accumulation thickness estimates - using site-specific dry bulk density information, were comparable to or lower than annual estimates for arctic lakes of comparable size and/or depth.

The sediment accumulation thickness estimated for the 2017–2018 arctic char egg incubation/larval pre-emergence period at Sheardown Lake NW was well below the threshold effect level of 1 mm of sediment deposition. Overall, these results indicated that no effects on arctic char reproductive success were likely at Sheardown Lake NW as a result of sedimentation rates/accumulation over the 2017-2018 egg incubation/larval pre-emergence period.

Initial lake sedimentation monitoring work had applied a dry bulk density measurement collected at Canadian Shield lakes in Northern Ontario, which was hypothesized to overestimate the actual amount of sediment accumulation at lakes near the mine. In 2017-2018, additional sediment traps were deployed solely to collect sediment for dry bulk density testing. The site-specific dry bulk density data measured from these sediment trap samples was much lower than the dry bulk density measurements from northern Ontario lakes that was adopted in previous lake sedimentation monitoring reports since 2014-2015, confirming the hypothesis stated in previous monitoring reports that the use of the northern Ontario lakes dry bulk density likely overestimated the actual amount of sediment accumulation at lakes near the mine.

Table 4.17 provides an evaluation of the Project's impacts on the freshwater environment, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.17 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 <i>Fisheries Act</i> .	All compensation works are effective. Within FEIS predications
	Culvert perching	Monitoring undertaken in accordance with the 2007 authorization under the <i>Fisheries Act</i> .	Perching of culverts was noted at seven (7) crossings. Effect within FEIS predictions
	Water withdrawals from lakes affecting nearshore fish habitat	Measure/monitor and report water usage in accordance with water licence limits	Water usage generally within water licence limits. Effect within FEIS predictions
	Fish impingements at camp and dust suppression water takes	No monitoring; appropriate screens are used on all intakes	Within FEIS predications

Path Forward

Baffinland plans to continue the implementation of surface water improvements outlined in the TREEP throughout 2019 to address outstanding fish passage concerns at water crossings identified during in the 2018 assessments.

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.
Relevant Baffinland Commitment	64, 65
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Borrow Pit and Quarry Management Plan (Baffinland, 2014d) Q1 Quarry Management Plan (Baffinland, 2017d) QMR2 Quarry Management Plan (Baffinland, 2017e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland maintains the 100 metre buffer from the high water mark to any fish bearing water bodies during the development and operation of the quarries at the Project. Baffinland continues to evaluate active quarries to assess the potential for generating Acid Rock Drainage (ARD) or Metal Leaching prior to and during development. Geochemical investigations have been carried out at the proposed sites, and ARD sources are avoided to the extent practicable. Additionally, Baffinland maintains specific quarry management plans that outline testing requirements to identify potential acid rock drainage material encountered during quarry operation and maintains appropriate buffers to fish bearing waters.

RESULTS

No new quarries were developed in 2018. Existing quarries maintained the 100 metre buffer from the high water mark to any fish bearing water bodies. Construction activities increased in 2018, resulting in the requirement to expand existing quarries at the Project. Analyses for ARD indicators of quarried material were performed as per specific approved quarry management plans to ensure no potential acid generating material was used during construction activities.

TRENDS

Not applicable.

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) and 100 metre buffer from the high water mark to any fish bearing water bodies will be maintained.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Surface Water and Aquatic Ecosystems Management Plan (Baffinland, 2019f) Environmental Protection Plan (EPP; Baffinland, 2016f) Terrestrial Environmental Management and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland continues to perform bi-weekly inspections to ensure all Project-related operations are at a distance greater than 30 metres from any water body, except where authorized under the Type A Water License and DFO Letters of Advice. If infractions are discovered, responsible departments for development areas are actioned to remove materials or infrastructure, and to reclaim the developed area. New proposed development areas must be approved by the Baffinland Site Environment Department to ensure the area has a setback of 30 metres from the high water mark of natural water bodies. Consultants preparing design drawings for new infrastructure are also made aware of the requirement. Baffinland conducts annual training on the Environmental Protection Plan (EPP) for superintendents and managers, and orientation training on the EPP for new contractors. The presentation provides an overview of key Project activities and the required natural vegetation buffers to any waterbodies.

RESULTS

During internal inspections in 2018, temporary laydown of equipment were sited within 30 m of a water body and responsible departments were actioned to address these issues. Baffinland Site Environment Department followed up with further inspections to ensure that infrastructure was relocated or material was reclaimed.

TRENDS

Project operations have maintained the 30-m buffer between water bodies and the condition continues to be enforced.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland personnel continue to monitor all new Project developments to ensure the 30-m buffer condition is adhered to. Baffinland will ensure all requirements and mitigation measures are clearly communicated to Projects contractors.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

Drainage plans for Project sites and silt/sediment control measures used at the Project are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f). A modification to the Type A Water Licence for the implementation of the Milne Port Surface Water Management Plan was approved in 2018. This plan was developed to manage surface water at Milne Port and reduce the volume of surface water in contact with project infrastructure by diverting surface flow using berms, ditching and culverts around and through developed areas of the Project.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The SWAEMP will continue to be followed and enforced at the Project.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (D.G. Wright and G.E. Hopky, 1998)
Ref. Document Link	

METHODS

Not applicable.

RESULTS

No blasting occurred in 2018 within the required setback distances detailed in the DFO guidance document titled "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopky, 1998).

TRENDS

Not applicable. To date, no blasting has occurred within the required setback distances at the Project.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Fisheries and Oceans Canada (DFO)
Reference	Fisheries Authorization No. NU-06-0084 (For Tote Road Water Crossings; DFO, 2007) Fisheries Authorization No. 14-HCAA-00525 (For Ore Dock; DFO, 2014) Fish Habitat Monitoring - 2018 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2018d) 2018 Milne Ore Dock Fish Offset Monitoring Report (Golder, 2018c)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

The two above-referenced *Fisheries Act* Authorizations (DFO, 2007; DFO, 2014) are the regulatory instruments by which Baffinland can demonstrate that it has adhered to the No-Net-Loss Principle. Annual monitoring programs of habitat off-setting works associated with Project fish bearing water crossings (i.e. culverts, bridges) and the Milne Port Ore Dock were undertaken in 2018 as described below.

RESULTS

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

During 2018, assessments of fish bearing water crossings at the Project were completed by a third party Professional Fisheries Biologist in late June and early July. The assessments focused on evaluating the fish bearing water crossings for the presence (or absence) of fish, habitat quality and fish passage success. Habitat surveys involved observations of substrate, flow characteristics, and potential fish use along 50 metre (m) reaches upstream and downstream of each fish bearing water crossing. Fish presence was determined through visual surveys and the use of a backpack electrofisher.

The 2018 Annual Report submitted to DFO (Baffinland, 2018d) summarizes the assessments and corrective actions completed in 2018, and provides recommendations regarding future monitoring and additional corrective actions to be implemented in 2019. The following discussion summarizes the findings outlined in the 2018 Annual Report (Baffinland, 2018d).

During the 2018 assessments, fish were captured or observed at all known fish bearing water crossings at the Project with the exception of water crossings CV-115 and BG-50. Water crossing CV-115 was observed to provide marginal habitat due to low flows. It should be noted that fish have only been captured near CV-115 once since monitoring began in 2009 and has been frequently observed to be dry. At water crossing BG-50, fish were not captured or observed in the right channel in 2018. Water crossing BG-50 consists of two separate crossings; a free-span bridge over the left channel and a set of culverts in the right channel. The culverts were observed to be perched, impacting upstream fish passage in the right channel. However, upstream

habitat at BG-50 remains accessible to fish as a result of no fish passage obstructions being present in the water crossing's left channel.

No fish passage or habitat issues were observed at 25 of the 36 fish bearing water crossings. At the 25 water crossings, no velocity or physical obstructions were identified and fish were captured upstream of each water crossing. Issues with fish passage and/or habitat were observed at 11 fish bearing water crossings. Two (2) of these water crossings, CV-111 and BG-29, involved some form of physical obstruction to fish passage (e.g. cobble piles at the upstream and/or downstream end of culverts) and were promptly addressed following the assessments. Perching of culverts was noted at seven (7) fish bearing water crossings (CV-255, CV-129, CV-114, CV-106, CV-104, BG-50, BG-24,) resulting in limited access to upstream habitat. To promptly address some of the identified concerns, rocky ramps were installed at the downstream end of CV-114 and CV-106 culverts and the upstream of end of CV-104 during 2018.

Assessments conducted in 2018 confirmed that works completed to date at fish bearing water crossings remain successful.

Baffinland continues to routinely inspect fish bearing water crossing at the Project and address identified concerns. Additional works to address concerns identified in the 2018 assessments are planned for 2019. Addressing fish passage concerns at water crossings remains a top priority for Baffinland to ensure compliance with the Project's Tote Road *Fisheries Act* Authorization (DFO, 2007).

Milne Port Ore Dock (*Fisheries Act* Authorization No. 14-HCAA-00525)

Under the *Fisheries Act* Authorization issued for the Milne Port Ore Dock (Ore Dock), Baffinland is required to monitor and report on the structural stability and biological utilization of offsetting measures implemented at the Ore Dock during construction in 2014.

2018 was the fourth year in which monitoring of offsetting measures was conducted. The 2018 monitoring program consisted of:

- Underwater video surveys (drop camera) of the offset habitat to a) document the types and percent cover of the aquatic vegetation colonizing the substrate, and b) identify and quantify the benthic invertebrate and fish observed; Underwater video surveys of the offset habitat to demonstrate the association of fish with the rock substrate; and
- Retrieval of artificial and natural substrate settlement baskets in the vicinity of the Ore Dock to evaluate colonization of benthic invertebrates (encrusting epifauna) and larval fish.

During 2018, underwater video was collected along shore-parallel transects adjacent to the Ore Dock and at 12 stationary video locations. The underwater video was collected to analyze and document the types and percent cover of aquatic vegetation colonizing the coarse rock substrate, and identify and enumerate marine biota (i.e. benthic invertebrates and fish). Methods used during the 2015, 2016 and 2017 video surveys were replicated to extent possible, including monitoring along the same transects and depth ranges monitored in previous years. Underwater video was collected using a remotely operated vehicle (ROV) rather than a simple drop camera that had been used in previous years. Analysis of the underwater video collected showed that the overall percent cover of aquatic vegetation was relatively high throughout the offset habitat and was comparable to or greater than the percent cover reported from previous monitoring years. In identifying and quantifying benthic invertebrates and fish observed in the underwater video, a total of 101 benthic epifaunal invertebrates from twelve (12) distinct taxa, and seven (7) fish from three (3) distinct taxa were observed in 2018. Fish observed associating with the Ore Dock's rock substrate included three (3) Greenland cod and five (5) fourhorn sculpins. Overall, a greater quantity and diversity of benthic invertebrates and fish were observed utilizing the offset habitat in 2018 than in previous years.

As part of the 2018 monitoring program, three (3) settlement baskets were recovered on the west side and east side of the Ore Dock, resulting in a total of six (6) settlement baskets recovered. Settlement baskets recovered from the west side had originally

been deployed by Sikumiut Environmental Management Ltd. (SEM) in 2016 and had been deployed for a total of 24 months. Settlement baskets recovered on the east side of the Ore Dock had been originally deployed by Golder in 2017 and had been deployed for a total of 11 months. Due to the relatively low amount of epifaunal colonization of both sets of settlement baskets, a composite sample of whole rocks and plates from each location were preserved in 10% formalin and submitted for analysis. Analysis of the rocks and plates collected from the settlement baskets identified 1,733 encrusting epifauna from 8 distinct taxa. Identified epifauna included barnacles, wrinkled rock-borers, bryozoan species, clams and polychaetes.

Zooplankton samples collected as part of the 2018 monitoring program identified eleven (11) larval fish, nine (9) cod and two (2) herring. The presence of larval cod in close proximity to the Ore Dock indicates that a larval pool of cod exists to support the adult populations observed around the Ore Dock offset habitat.

A complete discussion of the 2018 monitoring program's methods and results is provided in the 2018 Milne Ore Dock Fish Offset Monitoring Report (Golder, 2018c).

TRENDS

As noted in previous years, habitat compensation works completed along the Tote Road to date remain successful.

Submerged substrate associated with the Ore Dock continues to be colonized by marine biota, including vegetation, benthic invertebrates and fish.

RECOMMENDATIONS / LESSONS LEARNED

2018 assessments of fish bearing water crossings at the Project verify that all previous compensation works at the Project remain successful. During 2018, Baffinland continued to repair and upgrade water crossings at the Project to improve fish passage and surface water drainage, including five (5) fish bearing water crossings. Baffinland continues to routinely inspect fish bearing water crossing at the Project and address identified concerns. Additional works to address concerns identified in the 2018 assessments are planned for 2019. Remedying fish passage concerns at water crossings remains a top priority for Baffinland to ensure compliance with the Project's Tote Road *Fisheries Act* Authorization (NU-06-0084; DFO, 2007). Assessments of fish bearing water crossings will be continued in 2019 as part of the Project's fish habitat monitoring program.

The 2018 monitoring results for the Ore Dock indicate that the offsetting habitat has been successful and that contingency measures are not required at this time. Based on monitoring results collected to date, the coarse rock substrate placed around the perimeter of the Ore Dock in Milne inlet is functioning as designed and in accordance to the conditions set out in the *Fisheries Act* Authorization (No. 14-HCAA-00525; DFO, 2014).

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.
Relevant Baffinland Commitment	64
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Dust Mitigation Action Plan (Golder, 2016a) Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) Metals & Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2018) Metal Mining Effluent Regulations Emergency Response Plan (MMER ERP; Baffinland, 2019b) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c) Sedimentation Mitigation Action Plan (Golder, 2016b) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f) Tote Road Earthworks Execution Plan (TREP; Golder, 2017) 2018 Freshet Monitoring Report (Baffinland, 2019h) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a) 2018 MDMER Annual Report (Baffinland, 2019g)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Wastewater/effluent management practices and procedures are outlined in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (FSWMP; Baffinland, 2019c) and the Metals & Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERP; Baffinland, 2019b). Surface water monitoring, management practices and procedures are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2019f).

Water quality discharge criteria (discharge criteria) for effluent generated by the Project are stipulated in the Type A Water Licence issued by the Nunavut Water Board, and Schedules 4 and 5 of the Metals and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2018).

Prior to discharge, wastewater (e.g. treated sewage, treated contact water, etc.) is sampled to ensure the wastewater's water quality meets the applicable discharge criteria. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken during wastewater discharges to ensure the water quality remains in compliance with the applicable discharge criteria. In the event that water quality sampling during a discharge indicates that

the water quality has changed and is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant wastewater is halted.

Wastewater that does not meet the applicable discharge criteria is treated on-site using approved treatment methods (e.g. sewage treatment plants, mobile oily water treatment systems, etc.) and is not discharged to the receiving environment until it has been confirmed by water quality analysis that the treated wastewater meets the applicable discharge criteria.

All water sampling at the Project is conducted in accordance with the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland; 2017c).

As required by the Type A Water Licence, volumes and water quality analysis of wastewater discharged to the receiving environment are reported to regulators (CIRNAC, NWB) on a monthly and annual basis. As a requirement of MDMER, volume and water quality results for discharges from the surface water management ponds associated with the Crusher Facility and Waste Rock Facility (WRF) at the Mine Site are reported to ECCC on a quarterly and annual basis.

RESULTS

During freshet 2018 (approx. May 15 to June 30), several TSS exceedances at locations monitored under the Type A Water Licence and unauthorized releases of sediment were reported to ECCC, CIRNAC, NWB and the NT-NU Spill Line, and are documented in NT-NU Spill Reports 18-180, 18-182, 18-209, 18-214, and 18-244. Further analysis and discussion of the sediment releases and TSS exceedances reported by Baffinland during freshet 2018, including mitigative and corrective actions taken and planned to address sedimentation concerns at the Project, is provided in the 2018 Freshet Monitoring Report (Baffinland, 2019h) and 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

Effluents generated and managed by the Project in 2018, included sewage, contact water retained in surface water management ponds associated with ore and waste rock facilities and oily water retained in containment areas, such as bulk fuel facilities. Effluent treatment systems operated at the Project in 2018, included:

- Sewage Treatment Plants (STPs) at Milne Port (MP-01) and the Mine Site (MS-01, MS-01B);
- Dissolved Air Flotation (DAF) Treatment System at Milne Port to treat and discharge wastewater stored in Milne Port PWSP (MP-01A);
- Mobile Oily Water Treatment System (OWTS), transported between Project sites as required; and the,
- Wastewater Treatment Plant (WWTP) at the Waste Rock Facility (MS-08), installed prior to freshet 2018.

Discharges of effluent at the Project in 2018 that did not comply with the applicable discharge criteria, involved single isolated events at each of the Mine Site STP (MS-01), the WWTP at the WRF (MS-08) and the mobile OWTS at Mine Site Containment Area MS-HWB-7 (MS-MRY-6). All three (3) events involved minor water quality exceedances of discharge criteria outlined in the Type A Water Licence with no exceedances of MDMER discharge criteria occurring in 2018.

On January 9, 2018, a treated sewage effluent sample collected from the Mine Site STP servicing the Mine Site Accommodation Complex exceeded the applicable discharge criteria for total phosphorus (TP) and total suspended solids (TSS) of 4 mg/L and 35 mg/L, respectively. The elevated TSS concentration (45.3 mg/L) is believed to be result of sampling error while the elevated total phosphorus concentration (4.29 mg/L) is believed to have been caused by temporary upset conditions at the Mine Site STP. The subsequent sampling event of the treated sewage effluent confirmed that both parameters had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated sewage effluent at the Project were observed in 2018.

On August 10, 2018, a treated effluent sample collected from the WWTP at the WRF exceeded the applicable discharge criterion for TSS of 15 mg/L. The elevated TSS concentration (19.3 mg/L) is believed to have been caused by water quality variation in the effluent stream, evidenced by the sample's duplicate having a TSS concentration (14.9 mg/L) below the applicable TSS criterion, and temporary upset conditions at the WWTP. Upon receiving the elevated TSS result, discharge of treated effluent from WWTP was halted until subsequent sampling events confirmed that TSS concentrations had returned to concentrations below the applicable discharge criteria. No other water quality exceedances involving treated effluent at the WRF WWTP were observed in 2018.

On September 4, 2018, a treated oily water effluent sample collected from the mobile OWTS, while stationed at Mine Site Containment Area MS-HWB-7, exceeded the applicable discharge criteria for total lead of 0.001 mg/L. Upon receiving the elevated total lead result (0.00127 mg/L) from the analytical lab, discharge of treated effluent from the mobile OWTS was halted. Due to the close proximity to freeze-up at the Project, subsequent sampling was not undertaken following receipt of the elevated total lead result. Potential causes of the exceedance include lab error, due to the close proximity of the discharge criterion to the analytical minimum detection limit (MDL), and the metals removal media used by the mobile OWTS being spent. No other water quality exceedances involving treated oily water effluent from the mobile OWTS were observed in 2018.

2018 water quality exceedances for effluents monitored under the Type A Water Licence were reported to CIRNAC, the NWB and the QIA in the monthly monitoring reports prescribed by the Type A Water Licence. A full discussion of the Project's 2018 monitoring results under the Type A Water Licence is provided in the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

TRENDS

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

Continued upgrades to Tote Road water crossings and Project surface water infrastructure significantly reduced the amount of TSS exceedances and sediment releases observed and reported by Baffinland during 2018, when compared to 2017.

RECOMMENDATIONS / LESSONS LEARNED

To improve the water quality of surface water drainage at the Project during freshet, Baffinland continues to implement the corrective actions and improvements outlined in the Sedimentation and Dust Mitigation Action Plans and Tote Road Earthworks Execution Plan (Golder, 2016b, 2016a and 2017).

To ensure the accuracy of future water quality sampling results, Baffinland will continue to train all personnel involved with sampling effluents at the Project in the proper sampling practices and procedures, as outlined in the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2017c).

In response to the effluent water quality concerns identified at the WRF in 2017, Baffinland installed and commissioned a wastewater treatment plant at the WRF prior to freshet 2018. The WWTP proved to be very effective at addressing the effluent water quality concerns identified in 2017. As a result, Baffinland will continue to operate the WWTP in 2019 to treat contact water generated at the WRF.

To address the total lead exceedance observed at the mobile OWTS in 2018, the metals removal media will be replaced prior to operation of the mobile OWTS in 2019. In addition, all operators of the mobile OWTS will be thoroughly trained in the System's operation to ensure metals removal media continues to be replaced at the frequency recommended by the media's manufacturer.

Overall, the low frequency of non-compliant discharges involving effluents generated and managed by the Project are evidence of the effectiveness of the Project's wastewater/effluent management practices and procedures. Baffinland will continue to update the Project's management practices and procedures and implement new mitigation measures as required to ensure effluent discharges to the receiving environment are in compliance with applicable water quality discharge criteria.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fish Habitat No Net Loss and Monitoring Plan (Knight Piésold, 2007) Fish Habitat Monitoring - 2018 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2018d) <i>Fisheries Act</i> Authorization No. NU-06-0084 (For Tote Road Crossings; DFO, 2007)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1 Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1

METHODS

A fish habitat monitoring plan was developed by Baffinland to ensure that all measures and works specified in the Fish Habitat No Net Loss and Monitoring Plan (Knight Piésold, 2007), as well as the *Fisheries Act* Authorization (NU-06-0084; DFO, 2007) and amendments, are implemented and are functioning as intended. In 2018, monitoring was conducted at fish bearing water crossings at the Project. The emphasis of the 2018 monitoring program was to assess the presence of fish, habitat quality, and fish passage success at Project fish bearing water crossings.

RESULTS

2018 assessments of Project fish bearing water crossings were completed by a third-party Professional Fisheries Biologist in late June and early July.

During the 2018 assessments, fish were captured or observed at all known fish-bearing crossings, with the exception of water crossings CV-115 and BG-50. Water crossing CV-115 was observed to provide marginal habitat due to low flows. It should be noted that fish have only been captured near CV-115 once since monitoring began in 2009 and has been frequently observed to be dry. At water crossing BG-50, fish were not captured or observed in the right channel in 2018. Water crossing BG-50 consists of two separate crossings; a free-span bridge over the left channel and a set of culverts in the right channel. The culverts were observed to be perched, impacting upstream fish passage in the right channel. However, upstream habitat at BG-50 remains accessible to fish as a result of no fish passage obstructions being present in the water crossing's left channel.

No fish passage or habitat issues were observed at 25 of the 36 fish bearing water crossings. At the 25 water crossings, no velocity or physical obstructions were identified and fish were captured upstream of each water crossing. Issues with fish passage and/or habitat were observed at 11 fish bearing water crossings. Two (2) of these water crossings, CV-111 and BG-29,

involved some form of physical obstruction to fish passage (e.g. cobble piles at the upstream and/or downstream end of culverts) and were promptly addressed following the assessments. Perching of culverts was noted at seven (7) fish bearing water crossings (CV-255, CV-129, CV-114, CV-106, CV-104, BG-50, BG-24,) resulting in limited access to upstream habitat. To promptly address some of the identified concerns, rocky ramps were installed at the downstream end of CV-114 and CV-106 culverts and the upstream of end of CV-104 during 2018.

Assessments of fish bearing water crossings conducted in 2018 confirmed that works completed to date at compensation water crossings remain successful.

TRENDS

Baffinland continues to address damaged and perched culverts at fish-bearing water crossings were identified in 2018.

RECOMMENDATIONS / LESSONS LEARNED

During 2018, Baffinland continued to repair and upgrade water crossings at the Project to improve fish passage and surface water drainage, including five (5) fish bearing water crossings. Baffinland continues to routinely inspect fish bearing water crossings at the Project and address identified concerns. Additional works to address concerns identified in the 2018 assessments are planned for 2019. Remediating fish passage concerns at water crossings remains a top priority for Baffinland to ensure compliance with the Project's Tote Road *Fisheries Act* Authorization (NU-06-0084; DFO, 2007). Assessments of fish bearing water crossings will be continued in 2019 as part of the Project's fish habitat monitoring program.

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).
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998)
Ref. Document Link	N/A

METHODS

Not applicable.

RESULTS

No blasting occurred in 2018 within the required setback distances detailed in the DFO guidance document titled "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopky, 1998).

TRENDS

Not applicable. To date, no blasting has occurred within the required setback distances at the Project.

RECOMMENDATIONS / LESSONS LEARNED

To date there has been no requirement to undertake blasting in or near water, and as such, there has been no 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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fish Habitat Monitoring - 2018 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2018d) 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

In addition to the annual fish use assessments completed near Project water crossings, as discussed in PC No. 47, Baffinland conducts annual fish population assessments for arctic char in Camp Lake, Sheardown Lake, Mary Lake and Reference Lake3 near the Mine Site as part of the Project's Core Receiving Environment Monitoring Program (CREMP). The CREMP is an aquatic monitoring program conducted annually that focuses on evaluating mine-related influences on water quality, sediment quality and/or biota, including arctic char, within aquatic environments located near the Mine Site. Under the CREMP, condition of arctic char populations within monitored lakes are assessed using a non-lethal sampling program that involves capturing and assessing 100 Young-of-Year (YOY) arctic char from nearshore lake habitat via electrofishing and 100 adult arctic char from littoral/profundal lake habitat via gill netting in each monitored lake.

RESULTS

As documented in the 2018 CREMP Monitoring Report, monitoring data collected to date suggest no adverse mine-related effects on arctic char populations within monitored lakes under the CREMP. The 2018 CREMP Monitoring Report, which provides a complete analysis and discussion of 2018 monitoring results, is provided as an appendix to the 2018 QIA & NWB Annual Report for Operations (Baffinland, 2019a).

TRENDS

No adverse mine-related effects on arctic char populations within monitored lakes under the CREMP have been observed to date. Similar to previous years (2015, 2016, 2017), low numbers of arctic char were captured in the littoral/profundal habitat of Reference Lake 3 in 2018 suggesting a lower fish abundance than the other monitored lakes (e.g. Mary Lake, Camp Lake, Sheardown Lake).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland plans to continue the CREMP, described above, to assess the condition of arctic char populations within aquatic environments near the Mine Site.

4.6.7 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. The importance of Baffinland support to regional wildlife monitoring and management initiatives was stressed by the NIRB, the GN and other parties.

Stakeholder Feedback

Caribou has been and continues to be one of the primary focusses of stakeholder concern with respect to the terrestrial environment. The TEWG is a stakeholder body that Baffinland interacts with regarding caribou and other components of the terrestrial environment.

During the environmental review process for the FEIS and FEIS addendum, the potential for sensory disturbance on caribou resulting from the Project was a key issue. Concerns were related to potential 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. Effects to terrestrial wildlife, and in particular the low number of caribou in the area, continue to be expressed in 2018 consultation activities (Appendix B).

Monitoring

Baffinland completes a number of monitoring programs on the terrestrial environment, many of which are conducted 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 recommendations and guidance on Baffinland's terrestrial monitoring programs. The TEWG provides review and comment on the terrestrial environment annual monitoring report, and updates to the monitoring program. Two in-person meetings and two teleconferences are held annually to review the trends and results of all programs and to provide advice to Baffinland regarding future monitoring.

Table 4.18 provides an evaluation of the Project's impacts on the terrestrial environment, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.18 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. 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

Effects of the Project on the terrestrial environment are within FEIS predictions.

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to minimize any potential effects of the Project on the terrestrial environment and wildlife resources. Baffinland will continue to seek input and review monitoring results trends from technical members of the TEWG and with other interested stakeholders. Reporting on each PC condition follows.

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.
Relevant BIM Commitment	46, 47, 49, 50
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 TEWG Meeting Records
Ref. Document Link	Appendix C2

METHODS

Baffinland established the TEWG in 2013. Members of the TEWG include representatives from: Environment and Climate Change Canada, Qikiqtani Inuit Association, Government of Nunavut, Makivik Corporation and Baffinland with technical experts as required. The Mittimatalik Hunters and Trappers Organization joined the group in 2016. WWF-Canada also participates as an observer to the TEWG.

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.

The group meets in-person twice annually and also hosts two interim teleconferences per year.

Draft technical annual reports and other documentation are provided to the group in advance of meetings and an ongoing 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. The 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) was distributed to the TEWG for review and comment on November 25, 2018 two (2) weeks prior to the December 11, 2018 TEWG meeting where the report was discussed.

RESULTS

In 2018, the TEWG held meetings on March 22, June 5, September 20 and December 11. The TEWG provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The TEWG also serves as an advisory group to provide recommendations on appropriate management approaches related to the Project.

The TEWG has guided the development of the Terrestrial Environment Effects Monitoring Plan (TEEMP; Baffinland, 2016g). 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 that is reviewed and adjusted on an annual basis.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the TEWG to review and guide monitoring programs on an annual basis and develop mitigation 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 initiatives.

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).
Relevant Baffinland Commitments	40, 70
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

The TEMMP outlines Baffinland's monitoring programs for terrestrial wildlife and habitat. The plan has been revised based on guidance and recommendations provided by the TEWG and NIRB 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, PRISM plot surveys and seabird research conducted by Environment and Climate Change Canada, and research on cliff-nesting raptor ecology by ArcticRaptors Inc.

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 who participate in the TEWG. The TEWG is engaged regularly to discuss annual monitoring programs for the terrestrial environment. Feedback received from TEWG members is incorporated into annual monitoring reports and updates to the TEMMP where relevant.

Project Certificate Condition No. 51

Category	Terrestrial Wildlife and Habitat - General
Responsible Parties	The Proponent and/or TWEW
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 TWEW, 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.
Relevant Baffinland Commitments	58
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TWEW)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TWEW Meeting Records
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

METHODS

Baffinland has provided financial and logistical support for the Government of Nunavut's (GN's) North Baffin Island caribou survey research on several occasions since 2009. In 2018, Baffinland provided financial and logistical support for the North Baffin Island spring caribou population survey. Baffinland will continue to provide support for future GN caribou surveys, as relevant, to enhance Baffinland's understanding of potential Project-related effects and regional knowledge about wildlife distribution and abundance.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to support the GN's regional caribou surveys, as appropriate. In 2016, the Mittimatalik Hunters and Trappers Organization became a member of the TWEW.

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.
Relevant Baffinland Commitments	N/A
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 of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

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

Baffinland requires all employees to adhere to a stop work policy when wildlife is present, which reduces hazardous conditions.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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> <ul 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. <ul 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.
Relevant Baffinland Commitments	15, 71, 73
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	<ul style="list-style-type: none"> a. In-Compliance b. In-Compliance c. In-Compliance d. Not Applicable e. In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

METHODS

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

- The Caribou Decision Tree presented in the TEMMP directs truck driver responses when caribou are near or crossing the Tote Road;
- Snow bank heights are managed throughout the winter season to decrease potential barriers to caribou movement across the Tote Road, and compliance of snow management is monitored approximately once per month during winter months by Baffinland Site Environment staff; and
- 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 and are conducted once annually.

Refer to TEMMP (Sections 3.3.3 and 4.5.2, and Figure 3-2) for detailed methods.

b. Monitoring and Mitigation Measures

Twenty-four 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 minutes, 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 would commence tracking caribou behaviour and interaction with Project infrastructure and vehicles.

These methods are identified in the TEMMP (Sections 3.3.3 and 4.5).

c. 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 typically conducted by driving slowly (30 km/hr) from the Mine Site to Milne Port 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 intersect 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.

In 2018, the snow track survey was conducted by two Baffinland Site Environment employees, using the methods described above.

These details are included in the TEMMP (Sections 3.3.3 and 4.5.2), and the revised 2018 survey details are included in the 2018 Terrestrial Environment Annual Monitoring Report (Section 4.2.1; EDI, 2019a). 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.

d. Surveillance System

Not applicable in 2018 as the railway has not yet been constructed. The TEMMP (Section 3.3.3), which includes avoiding collisions with caribou will include and updated surveillance system once the railway becomes a viable option.

e. 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

a. 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;
- A stop-work policy is implemented when wildlife in the area could be endangered by work being conducted, including truck driver responses when caribou are near or crossing the Tote Road using the caribou decision tree;
- Continued snow bank height management to ensure barrier-free movement of caribou; and
- Snow tracking surveys have not yet observed caribou tracks due to very low caribou numbers.

b. Monitoring and Mitigation Measures

- A total of 18 hours and 20 minutes of survey effort was conducted during the calving period in 2018;
- No caribou were detected on the landscape during 2018 surveys; and
- Details of previous surveys back-to 2013 are provided in the previous annual reports.

c. Evaluation of Effectiveness of Caribou Crossings

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

d. Surveillance System

Not applicable in 2018 as the south railway was not constructed.

e. Documentation and Reporting

All documentation and reporting protocols have been developed. Neither collisions nor mortality occurred in 2018.

TRENDS

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

Caribou interactions with the Tote Road and vehicles have not occurred; however, training on how to use the Caribou Decision Tree, snow bank height management and snow tracking surveys continue.

Annual monitoring of snow bank heights along the Tote Road since 2014 indicates a rate of compliance between 65-87% (Figure 4.6).

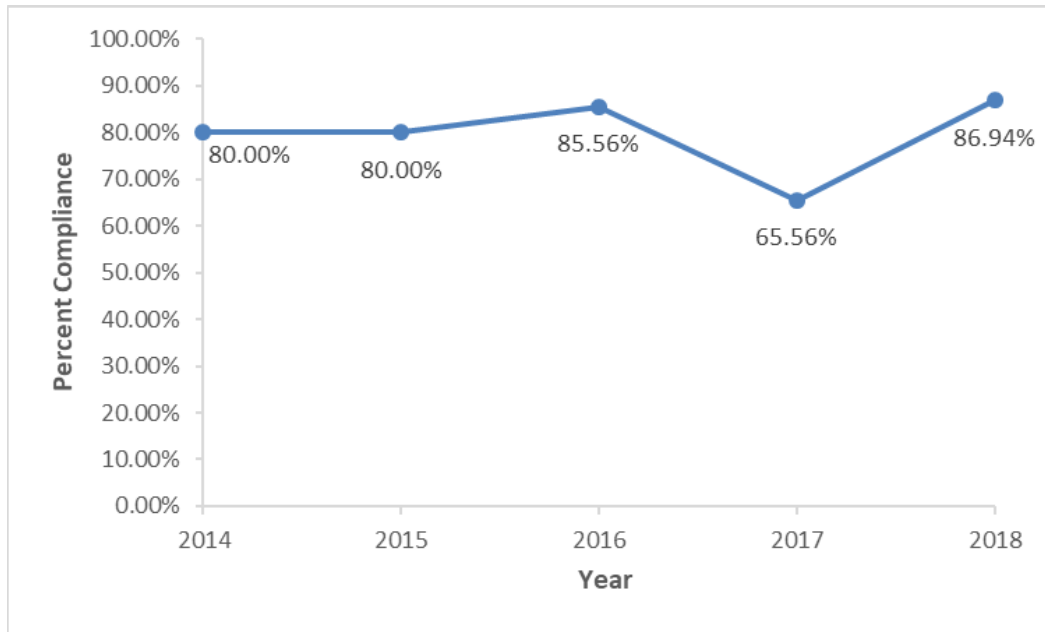


Figure 4.6 Snow Bank Height Compliance Monitoring Results on the Tote Road

a. Monitoring and Mitigation Measures

Based on caribou observed per hours of survey effort, there was a decrease in caribou observations from 2013, when the surveys began, to present (Figure 4.7). These data reflect the regional low caribou numbers of the North Baffin Island herd.

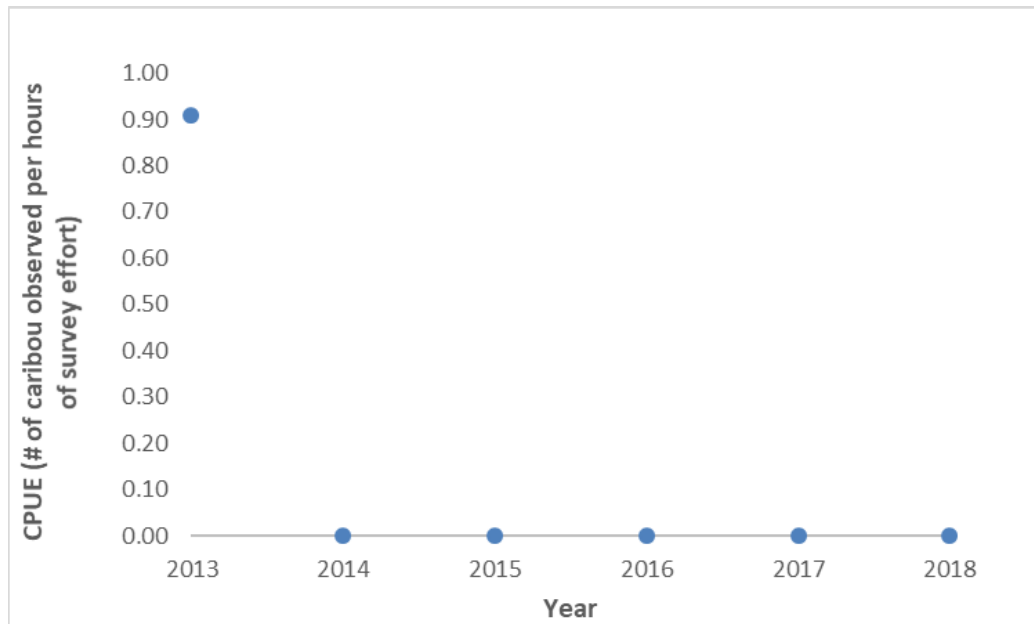


Figure 4.7 Caribou Observations from Height of Land Surveys

b. Evaluation of Effectiveness of Caribou Crossings

No caribou or wolf tracks have been detected during snow tracking surveys along the Tote Road since surveys began in 2014. However, Arctic fox and hare tracks were observed during all survey years (Figure 4.8).

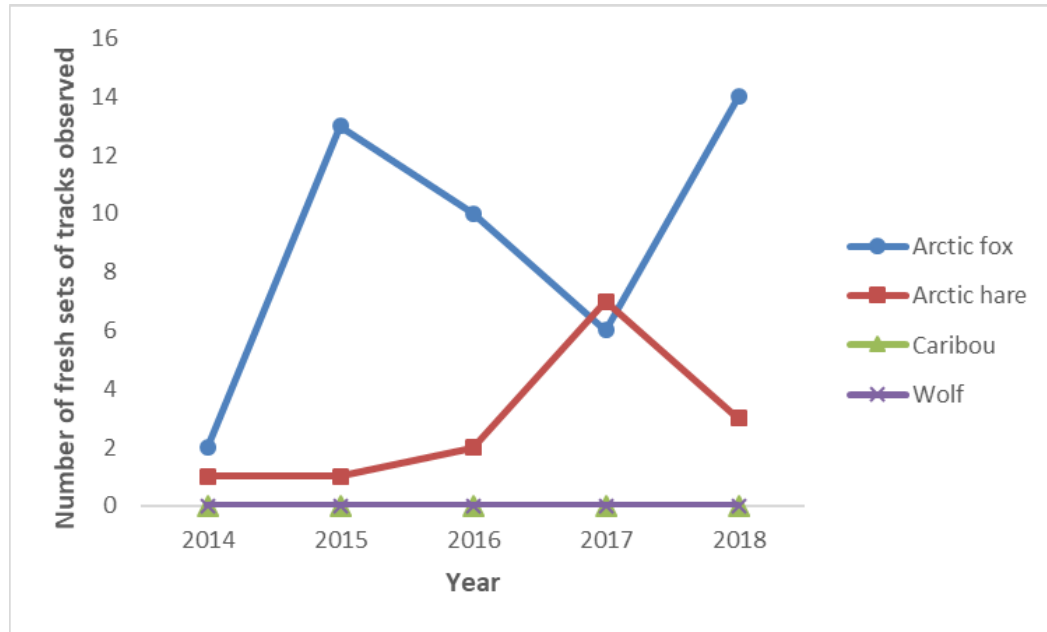


Figure 4.8 Snow Tracking Survey Trends

RECOMMENDATIONS / LESSONS LEARNED

Snow bank height surveys, height of land surveys and snow track surveys will continue annually. Once caribou numbers in the region and in the local study area 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 snow bank height monitoring and snow track surveys will occur more often by on-site staff.

The TEWG is engaged regularly to discuss annual monitoring programs for the terrestrial environment. Feedback received from TEWG members is incorporated into annual monitoring reports and updates to the TEMMP where relevant.

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> <ul 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: <ul 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	Plan to be submitted to the NIRB and the TEWG within 6 months of issuance of a Project Certificate.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Nunavut Impact Review Board
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

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

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Regarding PC Condition No. 54f, Baffinland continues to monitor 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 Baffinland Site Environment staff. The challenges associated with Baffinland addressing PC Condition No. 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 harvest in the region is managed 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; and Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development Area over time.
Relevant Baffinland Commitments	57, 74
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

Not Applicable.

RESULTS

Not Applicable.

TRENDS

Not Applicable.

RECOMMENDATIONS / LESSONS LEARNED

As a result of low caribou numbers, wolf numbers in the region have also declined. Wolf monitoring programs will be re-initiated when wolves and/or caribou are observed near site on a consistent and regular basis (e.g. based on trends observed from the Height of Land monitoring data, or incidental monitoring data), or on observations of local harvesters and as reported to

Baffinland or the TEWG. Monitoring of carnivore dens will continue to be discussed within the TEWG based on discussions within the group and when deemed necessary, Baffinland will re-initiate carnivore den monitoring.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada
Reference	Interim Closure and Reclamation Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

As described in Baffinland's Interim Closure and Reclamation Plan (ICRP), although a large portion of the land within the Project Development Area will be actively used during the Construction and Operation phases of the Project, and where practical, areas that 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 a duration as reasonably practical. The progressive rehabilitation strategy described in the Interim Closure and Reclamation Plan is 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, research and progressive reclamation. The experience gained and lessons learned from the closure of the Nanisivik and Polaris mine sites, which are 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, 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> <ul style="list-style-type: none"> a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	In-Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS AND RESULTS

- a. Updates and descriptions of all baseline data are recorded annually in the terrestrial environment annual monitoring reports.
- b. Inuit are involved in all terrestrial environment annual monitoring programs conducted by Baffinland's consultant when possible. This has included participation in snow track surveys, height of land surveys, and vegetation monitoring. In 2018, one Inuit Baffinland environment technician participated in the vegetation abundance monitoring program.
- c. Where relevant, the terrestrial environment annual monitoring report discusses near-site wildlife observations in relation to available 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 by the Government of Nunavut.

- d. Project Certificate Condition No. 57(d) is addressed in the terrestrial environment 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 environment annual monitoring reports.
- f. The 2018 Terrestrial Environment Annual Monitoring 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.

The average number of ore haul transits per day in 2018 was 219.5 (Figure 4.9); this represents a slight increase in the average daily number of ore haul transits in 2018 compared with 2017 (195 ore haul transits per day). As seen in previous years there are periodic full or partial closures of the Tote Road associated with adverse weather conditions (freeze/thaw, poor visibility, etc.). However, these closures and corresponding decreases in ore haul transits are short-lived and the average daily number of transits was steady through the 2018 calendar year.

Other non-haul truck traffic had an annual average of 37.3 vehicle transits per day, which was only slightly higher than in 2017 (32.3 vehicle transits per day). Therefore, the average daily total vehicle transits (haul and other) on the Tote Road in 2018 was 256.8 vehicle transits per day.

- g. Since 2014, Project Certificate Condition No. 57(g) has been addressed in the terrestrial environment annual monitoring 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 at Milne Inlet in June 2006, which represents the only available long-term data for the Project (2005–2010). Environment Canada operated a climate station at Mary River from 1963–1965; however, the station only recorded measurements during the summer months. These data are included in the terrestrial environment annual monitoring report where relevant. 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, given that this component of the Project is not currently active.

On average, air temperatures in 2018 were somewhat cooler during the summer relative to baseline conditions, 2005–2010. During winter, air temperatures were somewhat warmer at Mary River in 2018 relative to baseline, but colder at Milne Inlet relative to baseline conditions. Air temperatures recorded by Environment Canada at the Mary River meteorological station from 1963–1965 were cooler during the summer months than 2018 air temperatures. There were more days of rainfall, but less amount of rain per day in 2018 at Milne Inlet relative to baseline conditions, while the number of rainfall days and highest recorded rainfall at Mary River was similar to baseline conditions, 2005–2010. Total rainfall recorded annually from 1963–1965 by Environment Canada at the Mine Site was lower than the 2018 total. Wind direction in 2018 at Milne Inlet and Mary River was mostly consistent with baseline wind direction data, 2005–2010, with prevailing north/northwest winds at Milne Inlet and south/southeast winds at Mary River. In both 2018 and baseline conditions, the range in minimum and maximum wind speeds was variable from calm to gusting winds on the upper end

of the Beaufort scale. Wind data was not recorded at the Environment Canada Mary River meteorological station, 1963-1965.

Generally, the snowmelt period in the Project area occurs in June and frost-free conditions last until late August. Snowmelt is initiated when air temperatures rise and remain relatively consistent above 0°C producing surface water from melting snow (Van Bochove et al. 2001, Iwata et al. 2008, NASA 2014). During the snow melt period there is an increase in water availability, longer daylight hours, and higher air temperatures which trigger plant growth and green-up; the beginning of this growth cycle is termed green-up (National Wildfire Coordinating Group 2012). During 2018, air temperatures at the Mary River weather station rose above 0°C on June 6 and remained above freezing until Sept 7. At Milne Inlet, air temperatures rose above 0°C on June 7 and remained above freezing until Sept 3.

- h. The TEMMP addresses Project Certificate Condition No. 57(h). All versions of the TEMMP have been included in the revision table contained within this document. Ongoing updates and changes to monitoring programs are also discussed in the terrestrial environment annual monitoring reports. This PC Condition is seemingly identical to PC Condition No. 58(e).

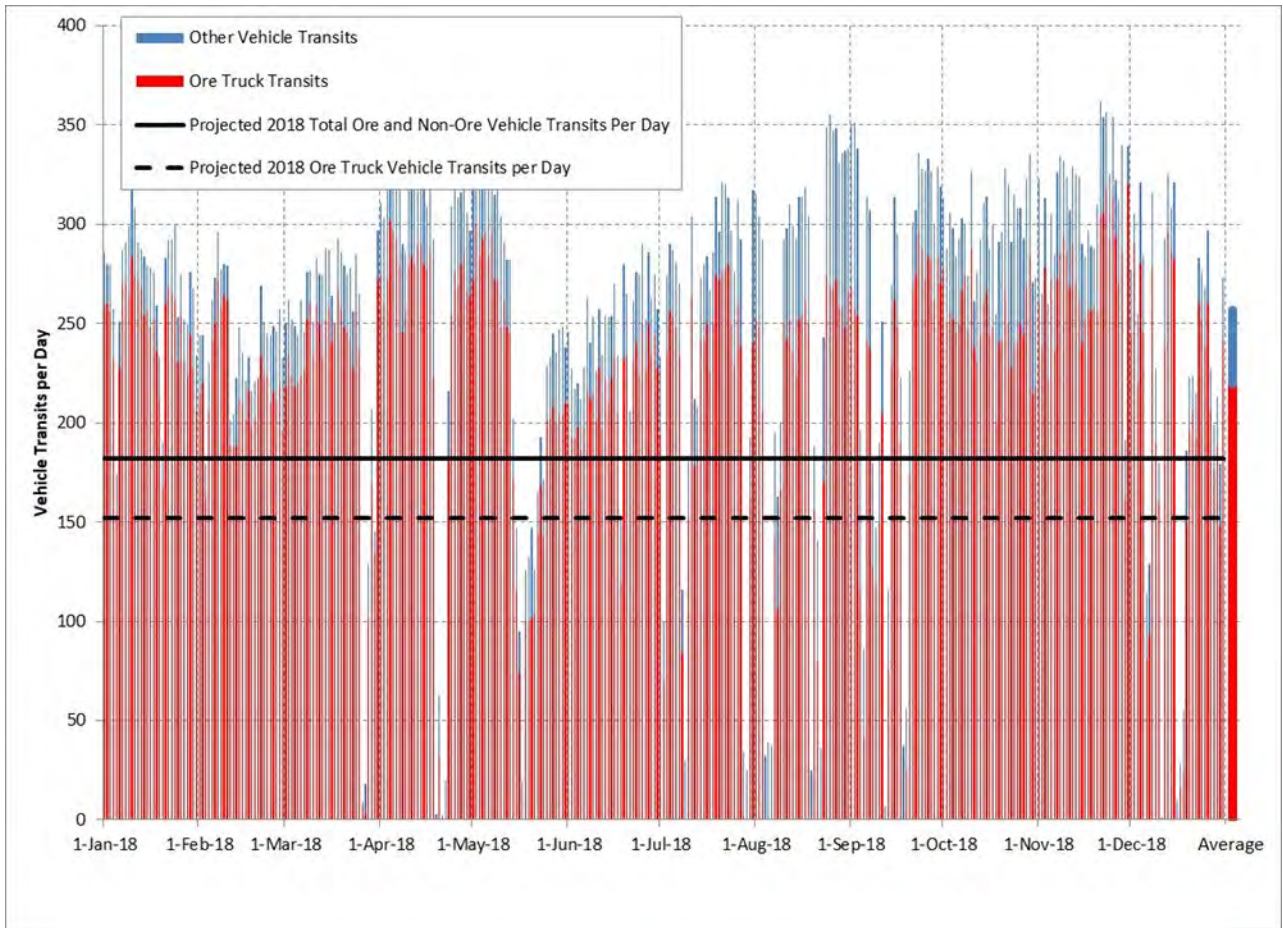


Figure 4.9 Daily Vehicle Transits on the Tote Road in 2018

NOTES:

1. Includes both full ore trucks (red) and all other vehicle transits (blue).
2. The projected maximum number of vehicle passes per day on the Tote Road and the projected number of Ore Haul Truck per day on the Tote Road are also shown.

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. The annual mean ore haul transits and non-haul transits per day increased between 2015 and 2018 (Figure 4.10).
- g. No trends reported.
- h. No trends reported.

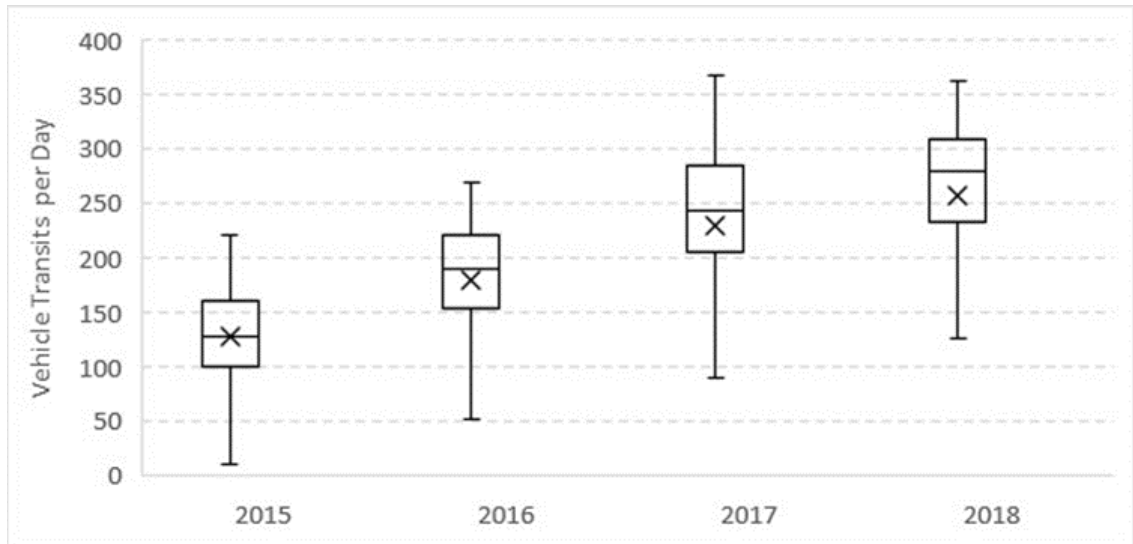


Figure 4.10 Trends in Vehicle Transits on the Tote Road (2015 to 2018)

NOTES:

1. Includes ore haul traffic and other traffic combined.
2. The 'X' in the centre of each box marks the annual mean value, the box displays median, 25th and 75th quartiles, and the whiskers represent the minimum and maximum values.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue monitoring traffic along the Tote Road in 2019 in accordance with the TEMMP.

The definition of snow-melt and green-up will be discussed with the TEWG and Baffinland will determine the best method to collect this data. Additionally, the intended purpose of this project condition and its relation to project effects will be discussed.

The TEWG is engaged regularly to discuss annual monitoring programs for the terrestrial environment. Feedback received from TEWG members is incorporated into annual monitoring reports and updates to the TEMMP where relevant.

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> <ul style="list-style-type: none"> a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails; c. A description of the extent of 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; d. 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; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou 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.
Relevant Baffinland Commitments	60
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	In-Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	<p>Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en</p> <p>Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en</p>

METHODS AND RESULTS

- a. Baffinland does not currently conduct any regional terrestrial environmental monitoring programs but does contribute to and support regional environmental monitoring programs conducted by the Government of Nunavut and Environment and Climate Change Canada, the results of which are discussed at TEWG meetings. There are no known reports of regional trends that can be used to address Part (a).
- b. Part (b) is addressed in the terrestrial environment annual monitoring program 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.

- c. Part (c) is addressed through dustfall sampling. In 2018, there were a total of 33 dustfall sample sites including: nine (9) dustfall samplers located at the Mine Site; six (6) dustfall samplers located at Milne Port; sixteen dustfall samplers divided between two (2) sites along the Tote Road (the North site and South site); and two (2) reference dustfall samplers are located 14 km southwest of the Tote Road.

Dustfall sampling is conducted year-round; however, the winter sampling program is limited to a subset of the sampling sites (16 out of 33 in the 2018 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.

Annual dustfall at the Mine Site sample locations currently falls within predicted levels. The decrease in annual dustfall levels was primarily driven by overall lower dustfall levels in the summer of 2018.

Dustfall at Milne Port continued to exceed predicted threshold levels at all sites except DF-P-07.

Dustfall associated with the Tote Road at both the north and south crossing was less in 2018 than in 2017. The greatest decrease in dustfall was seen at the monitors 30 m distant from the road. There was a smaller decrease in dustfall noted at the 100 m distant monitors. Similar trends were noted at both the north and south crossings. The continued decrease in dustfall deposition was determined to occur mostly in summer months, as dustfall deposition in the summer has decreased since 2016. Conversely, dustfall deposition along the Tote Road in winter months has remained constant since 2016.

The vegetation and soil base metals monitoring program began in 2014 prior to commencing operations and considers three (3) Project components (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 (3) to five (5) 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 contaminants 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. Baseline metal concentrations across all 2012 to 2016 vegetation and soil base metals monitoring sites are below Project thresholds. No sampling was conducted in 2018 as part of the vegetation and soil base metals monitoring program, however the program is planned to be conducted in 2019.

- d. Part (d) is addressed through the annual reporting of the size of the Project footprint, dustfall, road traffic and helicopter overflights.
- e. Part (e) is addressed by the TEMMP. Ongoing updates and changes to monitoring programs are also discussed in the terrestrial environment annual monitoring reports. This Project condition is seemingly identical to Part (h).
- f. Part (f): 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 have been no collar data collected, and no new caribou tracks have been observed. These results are reviewed with the TEWG, within which the QIA 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.

During 2018, several groups of caribou were observed by local Inuit hunters in various locations outside the PDA. In September, five caribou were observed on the west side of Sheardown lake; six caribou were harvested by hunters in late November on their way back to Pond Inlet (exact location of harvest was not reported); and a group of 20 caribou were

observed north of Angajurjualak Lake in early December, with reports of 15 caribou harvested during the month of December. No caribou were seen within the PDA or identified during the Height-of-Land surveys. Caribou have not been observed directly in the Project Development Area (PDA) between 2013 and 2018. This information has been confirmed through Inuit Qaujimagatuqangit received at workshops held in November 2015 and April 2016. Caribou abundance surveys conducted in 2014 by the Government of Nunavut also reported low abundance throughout Baffin Island.

TRENDS

In general, dustfall across the Project area increased from 2014 through 2016 as mine production increased. Dustfall between 2016 and 2018 showed a levelling off or decrease in most sites. Trends at each Project site are summarized below and are presented on Figure 4.11.

- Mine Site (DF-M Stations)** - Dustfall deposition measured at monitoring sites DF-M-01 and DF-M-03 was less in 2018 compared with 2017, however, dustfall at site DF-M-02, located near the air strip indicated a slight increase from 2017. Dustfall at all sites was less in 2018 than in 2016.
- Milne Port (DF-P Stations)** - Dustfall monitoring DF-P-05 indicated an increase in dustfall in 2018 when compared to 2017. Very slight increases or no change was noted at DF-P-01, DF-P-04, -06 and -07.
- Tote Road North (DF-RN Stations)** - Dustfall deposition measured at all monitoring stations in 2018 at the north road have held constant or decreased since 2017.
- Tote Road South (DF-RS Stations)** - Dustfall deposition measured at all monitoring stations at the south road crossing have decreased consistently since 2016.

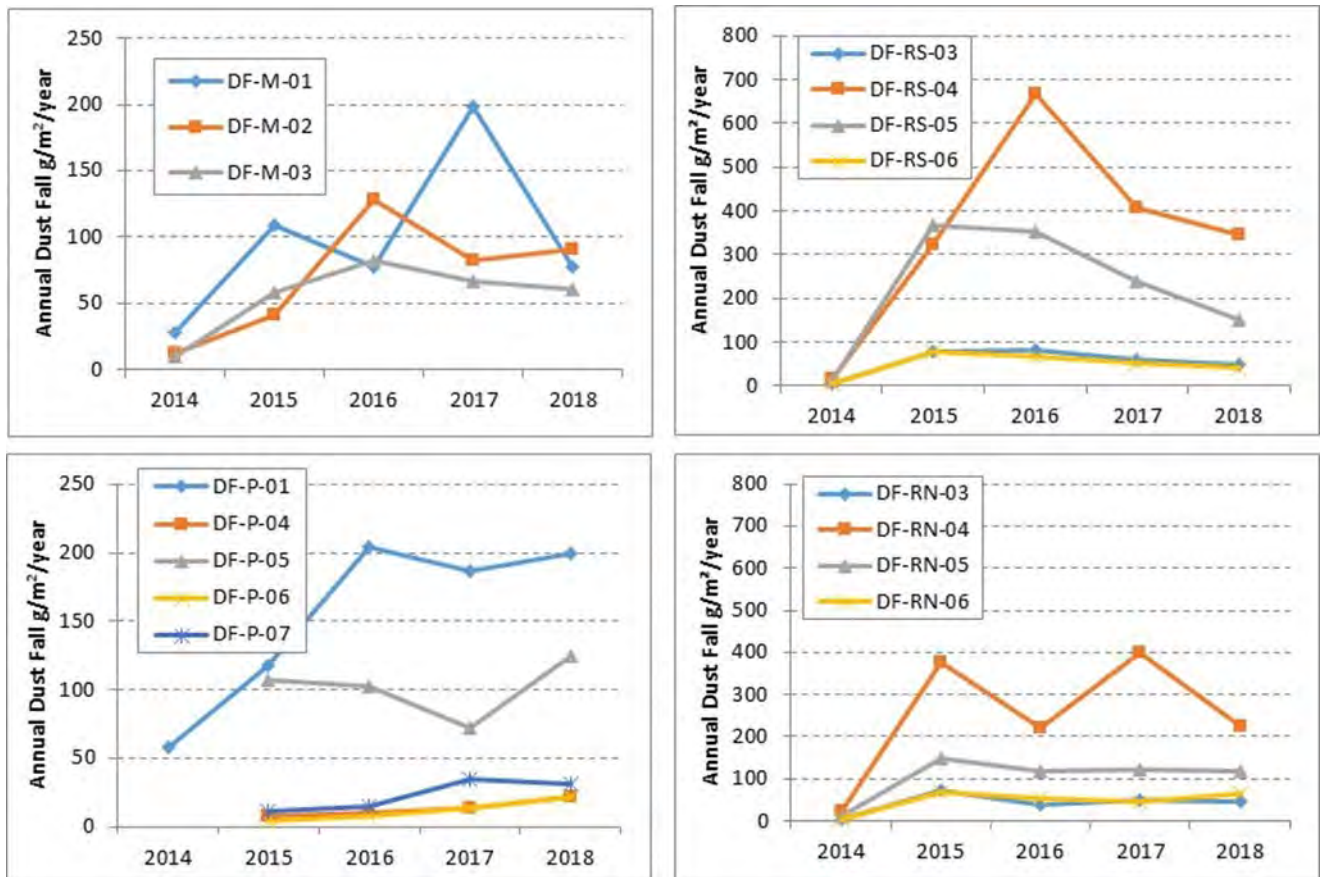


Figure 4.11 Annual Dustfall Trends (2014 to 2018)

RECOMMENDATIONS / LESSONS LEARNED

The following recommendations relate to dustfall:

- Continue monitoring dustfall in 2019 in accordance with the TEMMP;
- Measuring dust on vegetation was investigated in 2018 and will be incorporated into vegetation and soil base metals monitoring, which is planned to be reinstated for the 2019 season. This monitoring would involve an additional laboratory test to evaluate metals accumulated on the surface of the plant (in addition to trace metals uptake).
- Continue ongoing efforts to mitigate the generation of dust in all Project areas including the Mine Site, Milne Port, and the Tote Road through dust suppression, shrouding and stockpile management; and
- Investigate new methods of transportation that will generate less dustfall.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

In consultation with the TEWG, Baffinland implemented a requirement for all helicopter pilots to complete a flight log to track flight data, reason for flight and explanation for lower flight altitudes, when required.

Canadian Helicopters provided flight log data and BIM provided compliance documentation using daily pilot timesheets (with flight details) from May 15 to September 23, 2018 for analysis. Baffinland also provided pilots with GPS coordinates for flight height allowance areas. 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 2018 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. The data sets were then analyzed separately to assess specific flight height allowances using the different areas and elevation values. The flight height data was also cross-referenced with compliance data from daily pilot timesheets, and any flight data

with justifications for flying at lower elevations than required was compliant. Based on this analysis, flight data was organized into the following six categories:

1. Those data within the snow goose area in July and August, where the 1,100 magl elevation requirement was achieved (compliant);
2. Those data within the snow goose area in July and August where the 1,100 magl elevation requirement was not achieved, but lower elevation flying was justified by pilots (compliant);
3. Those data within the snow goose area in July and August where the 1,100 magl elevation requirement was not achieved and no justification for low level flying was given (non-compliant);
4. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was achieved (compliant);
5. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was not achieved, but lower elevation flying was justified by pilots (compliant); and
6. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was not achieved and no justification for low level flying was given (non-compliant).

RESULTS

There is a discrepancy between Project Condition 59 and 71, suggesting that minimum flight height should be 610 magl in all areas, and Project Condition 71 prescribes a minimum flight height of 650 magl. Considering that most, if not all, areas where Baffinland operated in June through September were likely to have migratory birds, the default minimum altitude for the analysis was 650 magl (during point to point travel).

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 in 2018. For transects flown within the snow goose area during the moulting season, compliance was 94%, and compliance within and outside the snow goose area in all months (2018) was 98%.

2018 was the second year that flight height data were cross-referenced with compliance data from daily pilot timesheets. For analytical purposes, flight height data points were designated “compliant” when elevation requirements were achieved, or where pilot’s discretionary rationale for deviating from flight heights was provided. Data points were designated “non-compliant” if they did not meet elevation requirements and no explanation was given. This additional analysis resulted in an increase in helicopter flight height compliance when compared to previous years, as it provided explanations for transits flown lower than the elevation requirements. Some examples given in 2018 to explain low-level flights included:

- Weather;
- Slinging;
- Geophysical survey;
- Other surveys;
- Staking;
- Drop off/pick up;
- Demobilization;
- VIP tours (e.g. QIA and CIRNAC inspection tours)
- Sampling; and
- Evacuations.

This additional analysis showed that when considering rationale provided by pilots for low-level flying, most low-level data points were compliant. For example, of all the compliant points within the snow goose area during the moulting season,

only 8% were $\geq 1,100$ magl, and the other 92% were $< 1,100$ magl with reasons given by pilots. Similarly, when looking at all compliant points within and outside the snow goose area in all months, only 6% were ≥ 650 magl, and the other 94% were < 650 magl with reasons given by pilots. The high percentage of low-level compliant flights in 2018 is similar to what was observed in 2017, and will likely continue in future years as the majority of helicopter work conducted at Mary River either requires low-level flying for safety/operational reasons (e.g. slinging, surveys), or involves multiple short distance flights whereby helicopters are unable to reach the required elevations between take-off and landing sites (e.g. staking, sampling, drop offs/pickups). In 2018, the most common reasons stated by pilots for flying below the elevation requirements were: surveys, slinging and drop offs/pickups. Most compliant transits that met the elevation requirements in 2018 tended to be long distance flights, where pilots were airborne long enough to reach and maintain the required elevations. Overall, 2018 flight height compliance was high both inside and outside the snow goose area, despite there being nearly eight times more transits outside the snow goose area than inside, and almost double the amount of overall transits compared to 2017.

TRENDS

Helicopter flight height compliance inside the goose area during moulting period was 94%, which was like 2017 (95%) and considerably higher than 2015 (55%) and 2016 (10%) (Figure 4.12). This increase was largely due to an additional analysis performed in 2017 and 2018, which considered justifications provided by pilots for many of the transits flown below the elevation requirements. Helicopter flight height compliance within and outside the goose area in all months was higher in 2018 (98%) than 2017 (76%), 2016 (33%) and 2015 (40%). The increase in compliance in was likely due to the additional analysis performed, as well as improved documentation of the rationale for low-level flights by pilots and Baffinland staff in 2018 (Figure 4.12).

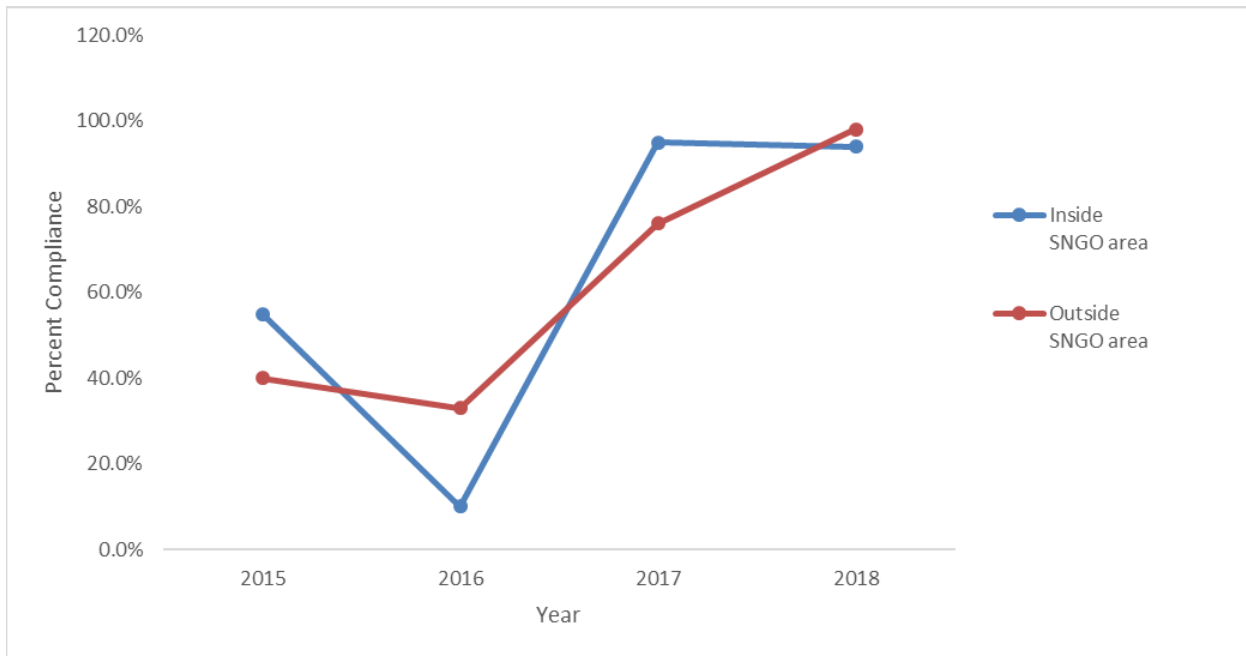


Figure 4.12 % Compliance of Flights Inside the Goose Area during the Moulting Season and Within and Outside the Goose Area in All Months (2015 - 2018)

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with their helicopter provider to improve flight height compliance by continuing to communicate elevation requirements and improving documentation of rationale for not meeting the requirements.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	N/A
Reference	Borrow Pit and Quarry Management Plan (Baffinland, 2014d) Environmental Protection Plan (Baffinland, 2016f)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

Baffinland submitted a Borrow Pit 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 has 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2016f) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

The Environmental Protection Plan outlines the 'stop work' when wildlife is in the area policy.

RESULTS

Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered (at risk of immediate injury or death) by work being conducted.

The term "endangered" was defined by the TEWG as at risk of physical injury or death.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Weapons on Site Policy (Baffinland, 2013c) Hunting and Harvesting Policy (Baffinland, 2013d)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 that 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 within the Project Development Area. All visitors and visitor activities are tracked through a human use log, provided in the terrestrial annual monitoring reports.

RESULTS

No incidences of Project personnel hunting or fishing within lands leased to Baffinland occurred in 2018. A total of 354 hunters visited the Project site in 2018 to hunt near the Project area. Baffinland accommodated all individuals, providing support when required for breakdowns and maintenance issues.

TRENDS

During operations, 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG) and with local Hunter and Trappers Organizations (HTOs)
Reference	2018 Community Engagement Records, 2018 TEWG Meeting Records
Ref. Document Link	Appendix B, Appendix C2

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.

In addition to the MHTO's participation in the Working Groups, Baffinland also met with other local HTOs throughout the year to provide an update on the Project and the Phase 2 Proposal. These meetings are listed in Table 4.19.

Table 4.19 2018 Meetings with Local HTOs

Hunter and Trapper Organization	Date
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	March 21 2018
Hall Beach Hunters and Trappers Organization	April 5, 2018
Igloodik Hunters and Trappers Organization	April 6, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	June 6, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	June 7, 2018
Clyde River Hunter and Trappers Organization	June 11, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	June 12, 2018
Arctic Bay Hunter and Trappers Organization	June 13, 2018
Igloodik Hunters and Trappers Organization	June 14, 2018
Hall Beach Hunters and Trappers Organization	June 15, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	August 30, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	October 11, 2018
Mittimatalik Hunters and Trappers Organization (Pond Inlet) Arctic Bay Hunter and Trappers Organization	November 19-22, 2018

Hunter and Trapper Organization	Date
Mittimatalik Hunters and Trappers Organization (Pond Inlet)	November 27-28, 2018

RESULTS

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.

The 2018 monitoring for mammals included a number of surveys designed to enhance baseline data and monitor the effects of construction activities on caribou. Specific surveys included:

- Snow track surveys;
- Snow bank height monitoring;
- Height of land caribou surveys; and
- Incidental observations and wildlife log.

The 2018 surveys were designed based on input previously received from MHTO members who had participated in the height of land surveys.

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 local HTOs.

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> <p>a. Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.)</p> <p>b. Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).</p>
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Environment Climate Change Canada, Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	<p>Environmental Protection Plan (Baffinland, 2016f)</p> <p>Waste Management Plan (Baffinland, 2018c)</p> <p>2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)</p>
Ref. Document Link	<p>Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en</p> <p>Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en</p>

METHODS

Waste management buildings are situated at both the Mine and Port sites. The waste management buildings house a dual chamber incinerator designed for optimal incineration of approved specific wastes, including food wastes. Design constraints at the Project site limited the ability to situate the Waste Management Building(s) 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 (EPP) and the Waste Management Plan (which includes the Incinerator Operation Procedure as an appendix). Employees are trained on animal attractant policies upon arrival at 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, storage in closed top bins or sealed seacans, and prompt removal for incineration inside the enclosed Waste Management Building(s). 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 also been installed on kitchen and accommodation buildings on the Project site to prevent carnivores accessing under buildings. In 2018 Baffinland began construction of new Sailivik camp accommodations complex at the Mine Site. Metal Skirting is currently being installed to comprehensively cover the complex and will be completed by Fall 2019.

RESULTS

Both the Environmental Protection Plan and Waste Management Plan incorporate carnivore interaction and attractant mitigation measures and policies, which continued to be implemented in 2018. 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. Landfill gates and fencing were added in 2018 improve control over waste management practices on site and reduce potential animal interactions.

Carnivore interactions have been minimized however still do occur with Arctic fox. Arctic fox site habituation has proven to be a challenge even while mitigating animal attractants on site. Animal interactions are documented and discussed in the 2018 Terrestrial Environment Annual Monitoring Report.

Metal Skirting on accommodation and kitchen complexes continued to be repaired and maintained in 2018. Metal skirting is currently being installed on the new Sailivik accommodations complex being constructed at the Mine Site.

TRENDS

Carnivore and/or Arctic Fox interactions have gradually increased over the life of the Project as it grows in scale, however fewer interactions occurred in 2018 as compared to 2017 validating the success of improved waste management practices implemented on site. Incineration, animal attractant mitigation measures and metal skirting installation continue to be implemented.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to mitigate wildlife interactions at the Project area by training, enforcing, and monitoring waste management practices and guidelines. Management attend mandatory Environment Protection Plan training, which is then passed on to all employees. Included in the EPP are wolf, polar bear, fox, and caribou protection measures and waste management guidelines that are continually updated and implemented. Incineration and proper waste sorting are the most prominent deterrents used. Wildlife attractants such as food scraps and human waste are sorted and sealed in animal proof containers and incinerated on site. Posted around each site are waste sorting guidelines that clearly define where food and other attractants should be placed. Other deterrents used is metal skirting to minimize wildlife entry under buildings. Wire skirting is used under the main camps at both sites to ensure no wildlife such as foxes or hares den underneath. Feeding of wildlife is strictly prohibited and noncompliance is dealt with accordingly.

4.6.8 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) have 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. Effects to birds were not raised in 2018 consultation activities (Appendix B).

Monitoring

Baffinland's bird monitoring program includes the following:

- Pre-clearing nest surveys;
- Cliff-nesting raptor occupancy and productivity surveys;
- Raptor occupancy and productivity surveys.
- Active migratory bird nest surveys; and
- 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 4.20 provides a summary of the main activities in 2018 in relation to the birds, and an impact evaluation in comparison to the predictions outlines in the FEIS and FEIS Addendum.

Table 4.20 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. Two nests were found in 2018, both of which were near the Mine Site. In each of these locations, construction activities were delayed until post fledging. Surveys will continue to be required whenever clearing vegetation within the migratory bird nesting season.	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. Helicopter flight height compliance inside the goose area during moulting period was high in 2018, at 94%.	Effect negligible
	Influences on health		Effect did not occur
	Mortality	One bird mortality was observed in 2018. A migratory songbird (American pipit) was incidentally captured and found dead during the small mammal trapping program.	One mortality was observed, but within FEIS predictions

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. Baffinland will continue to support regional monitoring of shorebirds, including species at risk in conjunction with CWS. AMBNS surveys will continue in future years prior to any proposed land disturbance and/or clearing during the breeding bird window, and raptor monitoring will continue to focus on multiple nesting territory visits in 2019. Baffinland is currently in discussion with ECCC on plans to deploy passive sound recording devices to detect red knot vocalizations in 2019/2020.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (EPP; Baffinland, 2016f) 2017 TEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

Supervisory training is delivered by the Baffinland Site 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 training delivered to employees.

In 2018, on-site training of Bird Nest Surveys was performed by EDI to the Baffinland Site Environment Department.

Baffinland endeavours to perform construction activities outside of the bird nesting season. If construction activity is required in undisturbed areas during bird nesting seasons (e.g. between May 31 and August 31), Active migratory bird nest surveys are conducted in accordance with the *Migratory Birds Convention Act, 1994*. Construction has five days to commence from the time that a migratory bird presence survey is conducted. A new survey is completed if construction does not commence in this five-day timeline. The results of these surveys are provided to the TEWG for review on a yearly basis.

RESULTS

In 2018, Baffinland continued to monitor all new construction activities around the new camp and laydown areas. A total of 16.34 hectares were surveyed between June 8 and August 8, 2018. No disturbance or destruction of migratory bird nests or their young were recorded.

TRENDS

Baffinland Site Environment Department employees have continued to receive annual training on performing bird surveys through its consultant, EDI. Baffinland Site Environment Department employees have also continued to raise awareness of all Baffinland employees and contractors on the importance of preventing the disturbance of all wildlife and habitats at all Project sites through EPP training.

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.
Relevant Baffinland Commitments	75
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

Baffinland concentrates new ground disturbance outside of the breeding bird season and conducts active migratory bird nest surveys in areas that are disturbed in the breeding season, prior to disturbance. Surveys were conducted using the rope-drag method, as recommended by Canadian Wildlife Services (CWS). Surveys are conducted with a minimum of three observers by walking slowly through the area with the rope drag, looking for nests and birds displaying nesting behaviour. When bird nests are found, Baffinland establishes clear zones of avoidance based on species-specific nest setback distances included in the TEMMP (Table 3-1).

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 following guidelines for 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.
Relevant Baffinland Commitments	75
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Environment and Climate Change Canada (ECCC)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Environment and Climate Change Canada (ECCC) provides input to the development of mitigation and monitoring strategies for Species at Risk via participation in the TEWG. Section 3 of the TEMMP speaks to mitigation and monitoring strategies relevant to all wildlife that could interact with the Project, including species at risk.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Baffinland is currently working with ECCC on plans to deploy passive sound recording devices to detect red knot vocalizations in 2019/2020. CWS is recommending that the sound recorders be deployed for at least two breeding seasons, in suitable red knot habitats at different locations to achieve the best results. If red knot are detected, CWS may recommend future monitoring.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	In-Compliance
Stakeholder Review	Environment and Climate Change Canada (ECCC), Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

METHODS

Through discussions with ECCC, Baffinland installed reflectors on guy wires at the communication towers established for the Project and will continue to do so on any new infrastructure as required. It was determined that strobe lights were not a relevant mitigation measure as most 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 it does not present any risks to operating the Project safely.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Strobe lights were found to not 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 to be 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

In 2018, approximately 232,355 m² of land was disturbed for Project infrastructure. Of the approximate areas cleared, 36% of the work was done outside of the breeding bird window. During the breeding bird window, approximately 83,388 m² of land was cleared while 163,358 m² was surveyed through active migratory bird nest surveys. Given that the 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 recommendations have been made by the TEWG that an alternative method would be more successful.

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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 are included in Table 3-1 of the TEMMP (Baffinland, 2016g).

RESULTS

Two songbird nests were located in 2018 during Active Migratory Bird Nest Surveys. A snow bunting nest was found on July 26 within the MS-08 waste rock pond expansion, where several young were observed around the nest area. An American pipit nest was found on the crusher pond access road on July 27 with newly hatched young in the nest. Both nests were buffered 100 m, according the recommended set-back distances outlined in the TEMMP and site development was delayed at both sites until it was confirmed that nesting was complete.

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	<p>Subject to safety requirements, the Proponent shall require all Project related aircraft to maintain a cruising altitude of at least:</p> <ul style="list-style-type: none"> • 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; and • 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019); Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g)
Ref. Document Link	<p>Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en</p> <p>Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en</p>

METHODS

In consultation with the TEWG, Baffinland implemented a requirement for all helicopter pilots to complete a flight log to track flight data, reason for flight and explanation for lower flight altitudes, when required.

Canadian Helicopters provided flight log data and BIM provided compliance documentation using daily pilot timesheets (with flight details) from May 15 to September 23, 2018 for analysis. Baffinland also provided pilots with GPS coordinates for flight height allowance areas. 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 2018 in relation to 1,100 magl elevation requirement and 2) those data within and outside the snow goose area in all months (2018) in relation to 650 magl. The data sets were then analyzed separately to assess specific flight height allowances using the different areas and elevation values. The flight height data was also cross-referenced with compliance data from daily pilot timesheets, and any flight data with justifications for flying at lower elevations than required was compliant. Based on this analysis, flight data was organized into the following six categories:

1. Those data within the snow goose area in July and August, where the 1,100 magl elevation requirement was achieved (compliant);
2. Those data within the snow goose area in July and August where the 1,100 magl elevation requirement was not achieved, but lower elevation flying was justified by pilots (compliant);
3. Those data within the snow goose area in July and August where the 1,100 magl elevation requirement was not achieved and no justification for low level flying was given (non-compliant);
4. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was achieved (compliant);
5. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was not achieved, but lower elevation flying was justified by pilots (compliant); and
6. Those data within and outside the snow goose area in all months where the 650 magl elevation requirement was not achieved and no justification for low level flying was given (non-compliant).

RESULTS

There is a discrepancy between Project Condition 59 and 71, suggesting that minimum flight height should be 610 magl in all areas, and Project Condition 71 prescribes a minimum flight height of 650 magl. Considering that most, if not all, areas where Baffinland operated in June through September were likely to have migratory birds, the default minimum altitude for the analysis was 650 magl (during point to point travel).

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 in 2018. For transects flown within the snow goose area during the moulting season, compliance was 94%, and compliance within and outside the snow goose area in all months (2018) was 98%.

2018 was the second year that flight height data were cross-referenced with compliance data from daily pilot timesheets. For analytical purposes, flight height data points were designated “compliant” when elevation requirements were achieved, or where pilot’s discretionary rationale for deviating from flight heights was provided. Data points were designated “non-compliant” if they did not meet elevation requirements and no explanation was given. This additional analysis resulted in an increase in helicopter flight height compliance when compared to previous years, as it provided explanations for transits flown lower than the elevation requirements. Some examples given in 2018 to explain low-level flights included:

- Weather;
- Slinging;
- Geophysical survey;
- Environmental surveys;
- Staking;
- Drop off/pick up;
- Demobilization;
- Regulatory Site Visits and Tours (e.g. QIA, MHTO, CIRNAC inspection tours)
- Sampling; and
- Evacuations.

This additional analysis showed that when considering rationale provided by pilots for low-level flying, most low-level data points were compliant. For example, of all the compliant points within the snow goose area during the moulting season, only 8% were $\geq 1,100$ magl, and the other 92% were $< 1,100$ magl with reasons given by pilots. Similarly, when looking at all compliant points within and outside the snow goose area in all months, only 6% were ≥ 650 magl, and the other 94% were

< 650 magl with reasons given by pilots. The high percentage of low-level compliant flights in 2018 is similar to what was observed in 2017, and will likely continue in future years as the majority of helicopter work conducted at Mary River either requires low-level flying for safety/operational reasons (e.g. slinging, surveys), or involves multiple short distance flights whereby helicopters are unable to reach the required elevations between take-off and landing sites (e.g. staking, sampling, drop offs/pickups). In 2018, the most common reasons stated by pilots for flying below the elevation requirements were: surveys, slinging and drop offs/pickups. Most compliant transits that met the elevation requirements in 2018 tended to be long distance flights, where pilots were airborne long enough to reach and maintain the required elevations. Overall, 2018 flight height compliance was high both inside and outside the snow goose area, despite there being nearly eight times more transits outside the snow goose area than inside, and almost double the amount of overall transits compared to 2017.

TRENDS

Helicopter flight height compliance inside the goose area during moulting period was 94%, which was like 2017 (95%) and considerably higher than 2015 (55%) and 2016 (10%) (Figure 4.13). This increase was largely due to an additional analysis performed in 2017 and 2018, which considered justifications provided by pilots for many of the transits flown below the elevation requirements. Helicopter flight height compliance within and outside the goose area in all months was higher in 2018 (98%) than 2017 (76%), 2016 (33%) and 2015 (40%). The increase in compliance in was likely due to the additional analysis performed, as well as improved documentation of the rationale for low-level flights by pilots and Baffinland staff in 2018 (Figure 4.13).

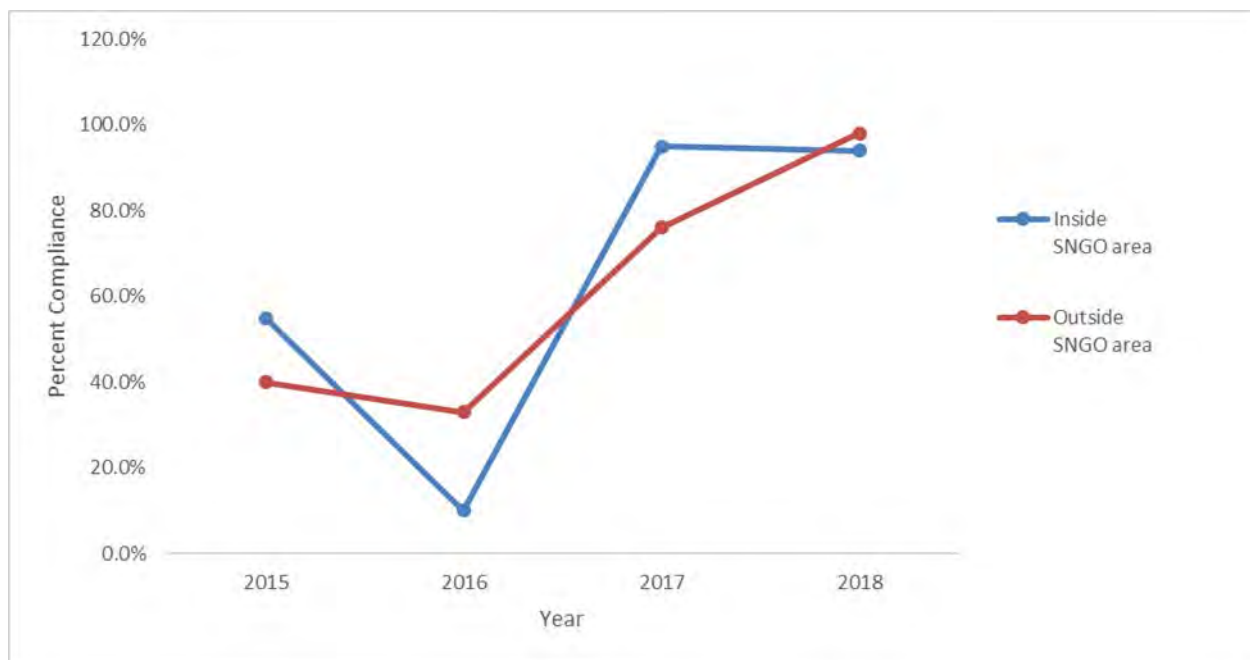


Figure 4.13 Percent compliance for Flights inside the Goose Area during the Moulting Season and Within and Outside the Goose Area in all Months from 2015 - 2018

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with their helicopter provider to improve flight height compliance by continuing to communicate elevation requirements and improving documentation of rationale for not meeting the requirements.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Transport Canada, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2016f) 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) 2018 TEWG Meeting Records
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C2

METHODS

In 2018, Project personnel directed pilots 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 Environmental Protection Plan (EPP). Using the software Skytracker, 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 and daily toolbox talks are held within each department. In addition, flight height compliance was incorporated into the helicopter contract Baffinland holds with Canadian Helicopters. Random audits of flight-logs were also completed throughout the season to help ensure compliance with requirements.

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 in 2018. For transects flown within the snow goose area during the moulting season, compliance was 94%, and compliance within and outside the snow goose area in all months (2018) was 98%.

Low level flying was conducted at the pilot's discretion and was primarily due to weather conditions, movement of equipment and personnel, or safety concerns during flight (e.g. visibility). Required monitoring programs that required low-level surveys also contributed to flights below the elevation requirements.

TRENDS

Helicopter flight height compliance inside the goose area during moulting period was 94%, which was like 2017 (95%) and considerably higher than 2015 (55%) and 2016 (10%). This increase was largely due to an additional analysis performed in 2017 and 2018, which considered justifications provided by pilots for many of the transits flown below the elevation requirements. Helicopter flight height compliance within and outside the goose area in all months was higher in 2018 (98%) than 2017 (76%), 2016 (33%) and 2015 (40%). The increase in compliance in was likely due to the additional analysis performed, as well as improved documentation of the rationale for low-level flights by pilots and Baffinland staff in 2018.

RECOMMENDATIONS / LESSONS LEARNED

2018 was the second year that flight height data were cross-referenced with compliance data from daily pilot timesheets. For analytical purposes, flight height data points were designated “compliant” when elevation requirements were achieved, or where pilot’s discretionary rationale for deviating from flight heights was provided. Data points were designated “non-compliant” if they did not meet elevation requirements and no explanation was given. This additional analysis resulted in an increase in helicopter flight height compliance when compared to previous years, as it provided explanations for transits flown lower than the elevation requirements. In 2018, the most common reasons stated by pilots for flying below the elevation requirements were: surveys, slinging and drop offs/pickups. Most compliant transits that met the elevation requirements in 2018 tended to be long distance flights, where pilots were airborne long enough to reach and maintain the required elevations.

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 monitor Project-related effects on migratory 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Marine Environment Working Group (MEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI 2019) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records
Ref. Document Link	Management Plan available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Report available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Appendix C2

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 robust design required to detect nesting raptor response to disturbances associated with the Project. That program has evolved since 2012 to accommodate statistical data requirements and is described in the TEMMP and terrestrial environment annual monitoring reports.

Since 2012, Baffinland has provided financial support to Environment and Climate Change Canada's (ECCC's) breeding bird PRISM plot surveys and seabird research programs in the region. The ongoing research results of those programs are reported separately by ECCC's National Research Centre. These programs continued in 2018.

Since the start of the construction phase, Baffinland has conducted active migratory birds nest surveys for areas of planned disturbance. Pre-clearing nest surveys were conducted by Baffinland Site Environment Department staff over the 2018 nesting season. At the beginning of the migratory bird nesting season, Baffinland Site Environment Department staff were trained on methods to conduct nest searching surveys as well as in the identification of common species found in the area. 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 preclearing 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 active migratory bird nest surveys can be found in the 2018 Terrestrial Environment Annual Monitoring Report.

RESULTS

In 2018, CWS conducted 14 PRISM plot surveys within a 100 km radius of the Mary River Mine Site, and another 24 plots in other areas of North Baffin Island. No new species were observed during the surveys that haven't already been reported during other monitoring studies at Mary River. Some of the plots surveyed were located in good red knot habitat; however, no red knot were observed. Baffinland contributed funds and logistical support in the form of helicopter re-fuels for these surveys.

Active Migratory Bird Nest Surveys are conducted in areas that need to be cleared and/or disturbed during the migratory bird nesting season. Two songbird nests were located in 2018 during Active Migratory Bird Nest Surveys. A snow bunting nest was found on July 26 within the MS-08 waste rock pond expansion, where several young were observed hopping around the nest area. An American pipit nest was found on the crusher pond access road on July 27 with newly hatched young in the nest. Both nests were buffered 100 m, according to the recommended set-back distances outlined in the TEMMP and site development was delayed at both sites until it was confirmed that nesting was complete.

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 factors such as distance to disturbance and distance to nearest neighbour (individually and as an interaction) have no negative effect on occupancy or reproductive success at the raptor guild level and for rough-legged hawk. However, there is weak evidence ($p = 0.05$) that distance to disturbance influenced reproductive success at peregrine falcon nesting sites near mine infrastructure.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to support seabird research and breeding bird PRISM plot survey efforts on a schedule conducive to ECCC's migratory bird monitoring efforts in the Baffin region. CWS and Baffinland are currently discussing the potential deployment of passive sound recording devices to detect red knot vocalizations in 2019.

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 area. Baffinland will continue with the cliff nesting raptor program until results determine that no further surveys are 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.
Relevant Baffinland Commitments	57, 77
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of Compliance	In-Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016g) 2018 TEWG Meeting Records (Appendix C2)
Ref. Document Link	Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Bird monitoring and survey programs are conducted as follows:

Peregrine falcon, rough-legged hawk, and gyrfalcon (baseline studies and ongoing monitoring since 2011):

- Known nest sites are surveyed annually. As part of these surveys, crews also attempt to locate new nest sites in suitable areas. All nesting sites are categorized into distance bins from Project infrastructure to assess the potential effects of disturbance.
- Spring occupancy surveys (indicates number of pairs that attempt to breed) and summer productivity surveys (to measure nesting success by counting the number of young that reach fledging age) are used to collect demographic information on raptor populations.

Common and king eider as well as shorebird diversity:

- Shoreline Surveys (2012 and 2013).
- Shoreline surveys were conducted to detect which species were present in the area, locations of nests, and their proximity to shoreline to assess potential effects of ship wakes. Surveys consisted of beach sweeps scanning for birds, bird activity, and potential nest sites. All shore types were surveyed regardless of perceived shorebird and waterbird nesting potential.
- In 2012, 104 kilometres of shoreline along Steensby Inlet were surveyed. Surveys were conducted north of the proposed Steensby Port area, the port area itself, and south of the port to the mainland area adjacent the islets at the mouth of Steensby Inlet.
- In 2013, 135 kilometres of shoreline along Milne Inlet were surveyed.

- East Bay Island migratory bird research (2018).
- Regional studies conducted by ECCO on the influence of climate change and resource development on arctic marine birds, particularly eiders.

Songbird and shorebird diversity:

- Baseline bird surveys were conducted from 2006–2008, resulting in 32 species being identified in the area.
- PRISM Plot Surveys (2012, 2013 and 2018).
- In 2012 and 2013, 80 and 13 (respectively), 300 m x 400 m PRISM plots were selected and surveyed. A total of 93 plots (11.2 km²) were surveyed in the two years.
- In 2018, CWS conducted 14 PRISM plot surveys within a 100 km radius of the Mary River Mine Site and another 24 plots in other areas of North Baffin Island.
- PRISM surveys were conducted using two or three crew members walking along north-south transects with a 25-meter spacing. Average survey intensity was 51 minutes per plot.
- Each plot was ground-truthed and classified as having either good, medium or poor suitability based on the classification methods used for PRISM plots. Good plots are those containing greater than 50% of wetland habitat types; poor plots were those containing greater than 50% of sparsely vegetated uplands, barren areas, and bare gravel; and medium plots were those habitats containing a mix of vegetated uplands, heaths, and drier grasslands.
- Bird Encounter Transects (2013).
- Bird encounter transects were conducted to monitor Project effects on tundra breeding songbirds and shorebirds.
- Conducted 45 transects extending 1.5 km perpendicular from the Project Development Area. Transects were divided into 100 m segments and all birds seen or heard along a segment were recorded.

Red knot:

- Red knot, a species at risk, were identified as a species that may be found on site and observers were aware of their potential presence during all surveys. Specific red knot surveys were conducted in 2014 & 2015 along Phillips Creek and the shoreline around Milne Port.

Seabird migration and wintering:

- Staging Waterfowl and Waterbird Surveys at Milne Inlet (2015).
- Staging surveys were conducted to determine species composition, abundance and use of river mouths by staging waterfowl and waterbirds.
- Phillips Creek and Tugaat River are close to the shipping routes and were chosen as investigation sites, while Robertson River was selected as a control site since no shipping activity was proposed nearby.
- Staging surveys involved three observers at each site using binoculars and spotting scopes to scan the water and nearby upland sites for birds and other wildlife.

Seabird research on shipping routes

- Marine habitat use by thick-billed murre on Coates Island (2018):
 - ECCC sampling included: breeding timing, reproductive success and diet to assess future impacts of planned shipping activity and climate change.
- East Bay Island migratory bird research (2018):
 - ECCC research included: investigating relationships between polar bears, eiders and diminishing sea ice; identifying key seabird marine habitats, particularly in shipping areas; physiological mechanisms linking climate variability, reproduction and survival of arctic-breeders; and, investigating effects on changing sea ice regimes on eider reproduction and population dynamics.

RESULTS

Peregrine falcon, rough-legged hawk, and gyrfalcon:

- Arctic Raptors Inc. conducted raptor surveys in 2011 and 2012 as part of the Project's terrestrial baseline surveys and have conducted annual raptor monitoring surveys since 2013. Results are reported in detail in the Annual Monitoring Reports.
- In 2018, site occupancy, brood size, and nest success were monitored for all known nest sites located within 10 km from the PDA (the Raptor Monitoring Area). Areas with high nest-site suitability for cliff-nesting raptors located between known nest sites were also surveyed.
- A total of 166 nesting sites have been detected in the Raptor Monitoring Area, 163 nesting sites were monitored in 2018.
- Of these, 61 sites were occupied by raptors in 2018; 48 by peregrine falcon, 11 by rough-legged hawk, one by gyrfalcon, and one by common raven.
- In 2018, small mammal abundance monitoring was conducted to confirm the cyclical occupancy of rough-legged hawks in conjunction with the small mammal cycle. No small mammals were captured in 2018.

Common and king eider as well as shorebird diversity:

- Steensby Inlet Shoreline Surveys (2012).
- A total of 40 nests were found, representing six species (Canada goose, semipalmated plover, herring gull, American pipit, lapland longspur, and snow bunting).
- No colonies of waterfowl or other birds were observed during the surveys, on ferrying flights, or in transit between transects.
- Numerous other bird species were documented but none displayed nesting behaviour within the shoreline study area.
- Milne Inlet Shoreline Surveys (2013).
- Two nesting colonies - one glaucous gull, the other mixed glaucous and Thayer's gulls were located. Outside of the nesting colonies, nest densities were lower than those observed at Steensby Inlet in 2012. One site with two potential eider nests from the previous year was located. No active eider or other seabird nests were located.
- A total of 1,016 birds, representing 23 different species were observed during the survey. The most common species included long-tailed duck, king eider, and glaucous gull.

Songbird and shorebird diversity:

- PRISM Plot Surveys:
 - In 2012, 80 rapid PRISM plots were completed and a total of 507 individual birds from 13 different species were observed.
 - In 2013, 13 rapid PRISM plots were completed in the northern sections of the RSA and a total of 90 individual birds from 7 different species were observed.
 - Similar species composition and densities were detected in the 2012 and 2013 surveys.
 - Shorebird densities were relatively low compared to those observed at other nearby study sites.
 - In 2018, CWS conducted 14 PRISM plot surveys within a 100 km radius of the Mary River Mine Site and another 24 plots in other areas of North Baffin Island, no new species were observed during the surveys that haven't been reported during other monitoring at Mary River. Some of the plots surveyed were considered good red knot habitat; however, no red knot were observed. Preliminary results provided by CWS indicated that 2018 was a low productivity year for shorebirds in the Mary River area and densities appeared lower than previous surveys in 2012/2013.
- Bird Encounter Transects:
 - Observed a total of 424 birds and a total of 18 species.
 - No evidence of a relationship between distance from the road/PDA and the number of birds was detected.
- 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 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.

Red knot:

- Red knot were not detected during these surveys, but biologists and Baffinland Site Environment Department continue to be aware of their potential presence while on site; and
- Red knot were observed incidentally by Wayne Renaud in 2007 at Camp Lake, Mary River.
- The deployment of passive sound recording devices to detect red knot vocalizations was scheduled for 2018, but due to logistical constraints, the deployment has been deferred to 2019/2020.

Seabird migration and wintering:

- Staging waterfowl surveys.
- Fifteen staging waterfowl surveys were completed at three sites between June 10 and 15, 2015.
- A total 411 individuals of 20 different bird species were observed.
- All species observed had previously been documented within the RSA.
- Species diversity and abundance were greatest at the Phillips Creek site with 15 species and lowest at the Tugaat River mouth with 11 species.

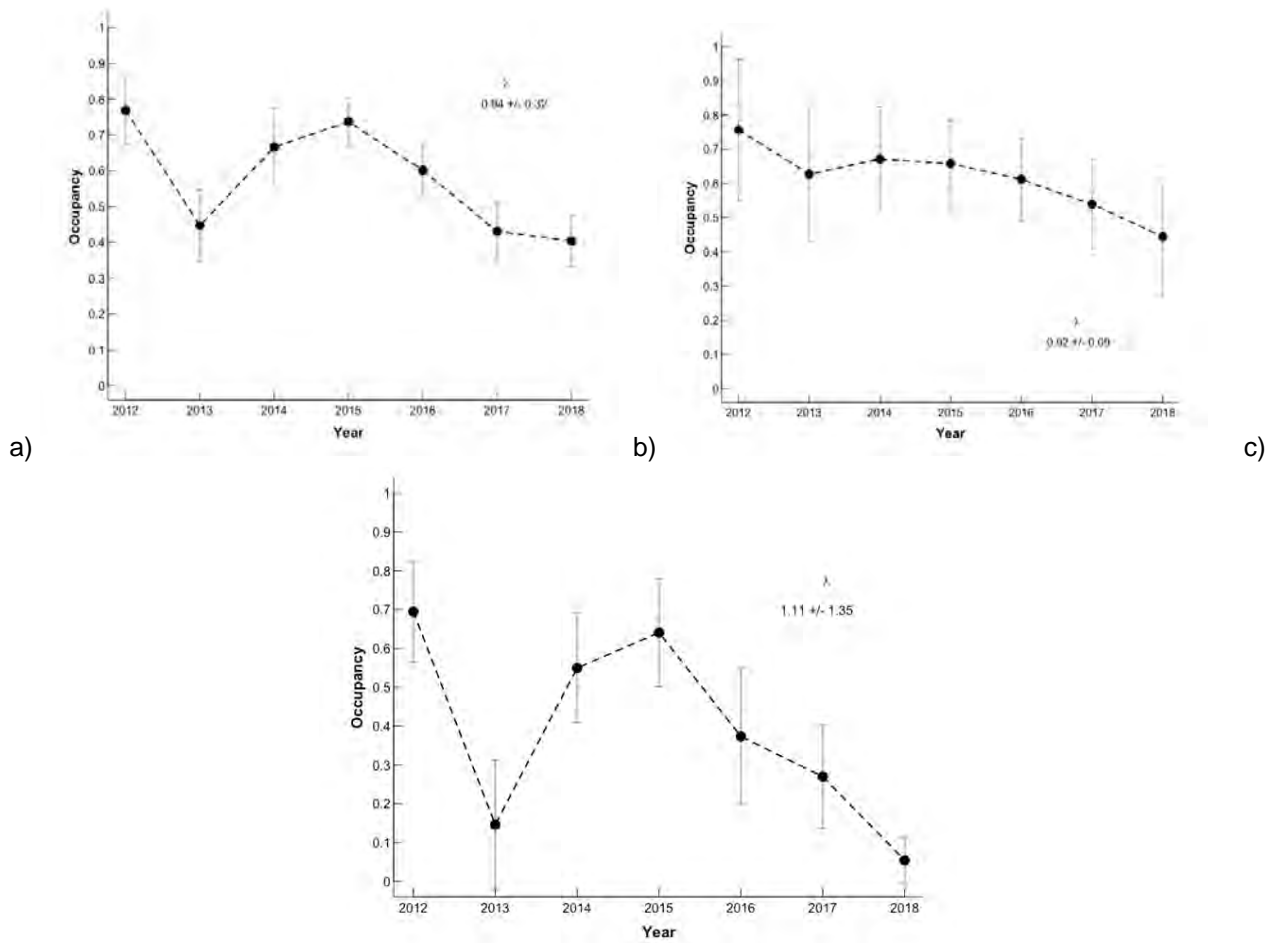
Seabird research on shipping routes

- Marine habitat use by thick-billed murres (2018):
 - Since 2010, counts of thick-billed murres on Coates Island have been lower than the long-term average, suggesting a decline.
 - Shifts in prey species since the 1990's may be due to reduced summer ice cover.
 - Data on distribution, habitat use, foraging behaviour, foraging range, and energetics were also collected.

- East Bay Island migratory bird research (2018):
 - Shifts in sea ice extent in Foxe Basin result in polar bears arriving at East Bay Island early, allowing bears to opportunistically forage on common eider eggs.
 - It is predicted that endocrine disruption chemicals (EDCs) in eiders, combined with climate change may produce a decline in nest attentiveness, causing impacts to duckling health.
 - Eiders are able to use different foraging strategies, which may help eiders adapt to changing sea ice conditions, though further studies are needed.
 - Eider hens with key energetic hormones have larger clutches and higher duckling survival rates.

TRENDS

Although annual variation in productivity for peregrine falcons and rough-legged hawks is apparent (Figure 4.14), it is most likely representative of natural variability associated with variation in prey availability and weather rather than due to any influence of disturbance (Figure 4.14 and Table 4.21). A potential ongoing decline in peregrine falcon occupancy and weak evidence that distance to disturbance may be associated with reduced reproductive success is noted. For those nesting sites near the Tote Road and other infrastructure, it would be prudent to mitigate activity as much as possible. It is possible that breeding pairs that were nesting close to mine infrastructure have simply established new nesting sites further away from infrastructure that have yet to be detected by survey crews, and if so, the effect is on the distribution of nesting sites, rather than on the size of the breeding population *per se*. For rough-legged hawks, occupancy appears to be cyclical (approximately 4-year oscillation), and strongly suggest that occupancy (and therefore count of nestlings) is associated with the natural lemming cycle, which is also known to cycle approximately every four years. Occupancy of potential nesting sites by gyrfalcon in the Raptor Monitoring Area (RMA) have been too low to monitor annual trends. Based on the analysis to account for distance to disturbance and distance to nearest neighbour individually, and as an interaction, it appears that there is no negative effect of these factors on occupancy (i.e., estimates \pm standard errors of λ overlap with 1.0) or reproductive success (i.e., p values > 0.05) for both species. Future monitoring will continue to focus on multiple nesting territory visits annually.



NOTES:

1. Annual Estimates include \pm standard errors.
2. Raptor guild (a), peregrine falcon (b), and rough-legged hawk (c) within the Raptor Monitoring Area.

Figure 4.14 Annual Estimates of Raptor Nesting Territory (2012 to 2018)

Table 4.21 Summary Statistics for Raptor Survey Effort and Detections at Known Raptor Nesting Sites within the RMA (2011 to 2018)

Variable		Year							
		2011	2012	2013	2014	2015	2016	2017	2018
Effort	Total nesting sites known annually	96	106	107	126	158	161	166	166
	New sites found annually	0	10	1	19	32	3	5	0
	Count of sites checked	87	106	89	124	148	141	166	163
	% known sites checked	91%	100%	83%	98%	94%	88%	100%	98%
	Count of checked sites occupied	56	72	30	77	99	70	63	61
	% checked sites occupied	64%	68%	34%	62%	67%	50%	38%	37%
	Count of sites checked twice annually	4	71	59	97	127	106	166	163
Detections ¹	Count of sites no raptors detected	31	34	59	47	49	71	103	102
	Count of sites PEFA detected	27	26	29	43	50	48	50	48
	Count of sites RLHA detected	26	44	1	31	47	18	5	11
	Count of sites GYRF detected	3	0	0	1	1	2	2	1
	Count of sites CORA detected	0	1	0	1	0	1	6	1
	Count of sites GLGU detected	0	1	0	0	1	1	0	0
	Count of sites SNOW detected	0	0	0	1	0	0	0	0

NOTE:

1. Peregrine falcon (PEFA), rough-legged hawk (RLHA), gyrfalcon (GYRF), common raven (CORA), glaucous gull (GLGU), snowy owl (SNOW).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue the monitoring programs as described in the TEMMP and will continue to collect opportunistic information when qualified biologists are on site. Monitoring to date has found that bird densities of most species are not sufficient to monitor Project effects (i.e., songbirds, shorebirds, eiders, red knot, and gyrfalcon). To date, trend analysis has only been conducted for cliff-nesting raptors. In 2018, Baffinland contributed funds to marine bird research on southern shipping routes. Baffinland will continue to support marine bird research (thick-billed murre, common eider) conducted by ECCC in the northern (Cape Graham Moore) and southern shipping routes (Digges Sound, East Bay, and Hudson Strait). CWS and Baffinland are currently discussing the potential deployment of passive sound recording devices to detect red knot vocalizations in 2019.

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.
Relevant Baffinland Commitment	N/A
Reporting Requirement	To be provided within the Annual Report to the NIRB.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2016f) 2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) 2018 TEWG Meeting Records (Appendix C2)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Prior to construction on undisturbed land, the appropriate approvals must be obtained, and construction plans must adhere to the Environment Protection Plan. Baffinland also restricts any overland movement of equipment or personnel which are required to operate to existing site roads and laydowns, to minimize the overall Project footprint; any unauthorized land disturbance or deviation from the PDA is reported as an incident and is investigated.

RESULTS

Baffinland has completed all construction within the Potential Development Area (PDA) and the current Project footprint is smaller than what was assessed in the FEIS, which assumed the entire PDA would be disturbed.

TRENDS

To-date, construction activities for the Project have remained within the PDA.

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.

4.6.9 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 4.5.11). These conditions encompass the development of a comprehensive environmental effects monitoring program and the establishment of the Marine Environment Working Group (MEWG).

Stakeholder Feedback

The marine environment has been a key focus of stakeholder interest and concern. This includes marine mammals (discussed in Section 4.5.11) 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 during the Environmental review period of the FEIS and FEIS addendum was the potential for the Project to impact the fisheries resources at both Steensby Inlet and Milne Inlet. Key stakeholders focused on the marine environment include local communities, the Mittimatalik Hunters and Trappers Organization, 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 and by providing other reporting or Project updates, as necessary. Effects to the marine environment from ore dust has been raised as a concern in 2018 consultation activities (Appendix B).

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 (AIS) - Sampling for the presence/absence of aquatic organisms (zooplankton, benthic infauna, benthic infauna, macroflora, encrusting epifauna, fish).
- Ballast Water Monitoring - Monitoring of salinity levels in ballast water to verify exchange of ballast in accordance with Ballast Water Management Regulations.

Table 4.22 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

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

Table 4.22 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. Metal concentrations in sediment samples collected in 2018 generally correlated with sediment physical composition.	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.)	None of the macroflora, benthic epifauna, or fish taxa observed during the AIS surveys in 2018 were identified to be invasive	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 follows.

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.
Relevant BIM Commitment	40, 51, 84, 85, 79
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Marine Biological and Environmental Baseline Surveys Milne Inlet 2014 (SEM, 2015a) 2014 MEEMP Report (SEM, 2015b) 2015 MEEMP Report (SEM, 2016a) 2015 AIS Monitoring Report (SEM, 2016b) 2016 MEEEMP and AIS Monitoring Report (SEM, 2017a) 2017 MEEMP and AIS Monitoring Report (Golder, 2018d) Draft 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	

METHODS

MEEMP:

A Marine Environmental Effects Monitoring Program (MEEMP) was developed in 2015 following completion of marine biological baseline studies at Milne Port during 2013 and 2014. The MEEMP includes annual monitoring to detect potential Project-related effects on marine water and sediment quality, benthic invertebrates, marine vegetation, and fish and fish habitat. The MEEMP sampling design is based on EEM guidance from Environment Canada (2012) and includes statistical approaches to detecting potential Project-induced impacts on the marine environment. Detailed information on study design and sampling methodology is available in the annual monitoring reports for the MEEMP (SEM, 2015b; 2016a; 2017a; Golder, 2018d; 2019a).

In 2018, Baffinland undertook a fifth consecutive year of environmental effects monitoring (EEM) at Milne Port and in Milne Inlet. Vertical water quality profiling was conducted at nineteen (19) sampling stations in Milne Inlet to collect surface-to-bottom measurements of conductivity, temperature, depth, dissolved oxygen, pH, turbidity and chlorophyll a. Discrete water quality samples were collected at four (4) sampling stations near the effluent discharge point in Milne Port (distributed in a radial design) to monitor for potential changes in water quality due to site drainage and operational discharges (including iron ore stockpile run-off). Sediment samples were collected along four (4) transects (West, East, Coastal and North) surveyed in previous years (2014-2017) as part of a radial gradient design that allowed for monitoring effects as a function of distance from the ore dock point source, in consideration of potential contaminant issues (e.g., ore dust, hydrocarbon deposition) and/or physical impacts (sediment re-suspension and transportation) in the marine environment. Fish sampling was conducted throughout the Milne Port area using gill net, Fukui trap, angling and beach seine sampling methods. Collected fish were

identified to species and measured for length/weight before being released. Incidental fish mortalities were retained for aging, body burden, stomach content, and toxicology analyses.

Several modifications to the MEEMP were introduced in 2018 in consultation with the MEWG. This included:

- Discontinuing the use of epifauna³ and epiflora⁴ as effect indicators for marine benthic community based on a distance-gradient design. Infauna⁵ was introduced as a new effect indicator to replace epifauna/epiflora for this component of the MEEMP. Infaunal samples were collected along three transects (East, West and Coastal) consistent with the program's radial gradient transect design and in concert with sediment sampling.
- Addition of underwater video surveys conducted within permanently established belt transect plots to evaluate potential Project effects on epifauna and epiflora using a Before/After-Control/Impact design. Monitoring was conducted using a remotely operated vehicle (ROV)-based underwater video system. Five belt plots were installed in an exposure area and four belt plots were installed in a nearby reference area.
- The number of sediment samples analyzed for hydrocarbon was reduced from three samples to one sample at each station, as hydrocarbon concentrations have been below detection limits (DL) in all samples to date.
- Two new sediment sampling stations were added along the East Transect to account for a proposed second ore dock associated with the Phase 2 Proposal. Sampling at both existing and new stations was undertaken in 2018 and will continue in 2019 for comparative purposes.
- A local shellfish species (*Hiattella arctica*) was added as an additional effects indicator for the fish sampling program. This new species was added in case finfish species (Arctic char or sculpin) cannot be collected in sufficient numbers to support statistical power requirements. Measurement endpoints included body weight to length ratio and tissue (body burden) analysis.
- The duration of the fish sampling program was extended to occur over the full open-water season for better representation of the shipping season.

AIS Monitoring Program:

Baffinland's Aquatic Invasive Species (AIS) monitoring program was developed in 2015 as part of the MEEMP to detect non-native species potentially introduced to Milne Inlet via ballast water discharges or hull biofouling. AIS surveys targeted lower trophic levels, including zooplankton, benthic infauna, epifauna and fish. Biophysical surveys were initially conducted in 2014 to enhance baseline data (collected in 2008 and 2013) by supplementing existing species inventory datasets for marine flora and fauna prior to the start of shipping operations at Milne Port. AIS surveys in 2015 and 2016 (SEM, 2016a, 2016b, 2017) focused on detection of marine organisms not previously identified in Milne Port as primary indicators of invasion (i.e., early warning of AIS introductions in the Project area). Surveys were based on a Before/After experimental design focusing on areas with the highest likelihood of marine invasion. Since ballast water releases only occur in Milne Port (either at the ore dock or at existing anchorages in Milne Port), data collection was focused on the marine areas surrounding the Milne Port infrastructure. In 2017, the AIS monitoring program was expanded to include sampling sites near Ragged Island to capture potential AIS at existing anchorage locations in this area. In 2018, AIS monitoring continued in Milne Port and at Ragged Island and included zooplankton sampling, benthic infauna sampling, video surveys for macroflora and benthic epifauna, sampling for fish and mobile epifauna, settlement surveys for encrusting epifauna, and video surveys of ore carrier hulls for detection of biofouling organisms.

Identification of any newly detected taxa identified during annual AIS monitoring efforts are thoroughly investigated to determine if the organism is invasive or non-native. All taxa are compared against a global invasive species database (Molnar

³ benthic invertebrates living on the substrate

⁴ marine vegetation attached to the substrate (e.g. kelp)

⁵ benthic invertebrates living within the substrate

et al. 2008), as well as a known invasive species list within the National Risk Assessment for Introduction of Aquatic Nonindigenous Species to Canada by Ballast Water (Casas-Monroy et al. 2014). In addition, a comprehensive literature review is conducted for each newly identified organism to assess what is known on their home range, distribution, life cycle processes, and habitat preferences. This information is used to determine if the newly identified species is considered non-native to the Arctic region. Monitoring thresholds were implemented to establish protocols for evaluating taxonomic data to determine if mitigation measures need to be implemented. Depending on the species and the relative risk it poses to the native biological community, thresholds may consist of a single occurrence of an invasive species, or evidence that the species has become established in the area through reproduction and/or range expansion. Detailed information on the AIS program study design and sampling methodology is available in the 2018 MEEMP and AIS Monitoring Report (Golder, 2019b).

RESULTS

Physical properties of the water column during summer were shown to be influenced by freshwater input, particularly at the head of Milne Inlet. Strong vertical stratification was persistent throughout the entire inlet; however, a horizontal gradient in salinity and temperature was also observed in the upper water column extending from the head to the mouth of Milne Inlet. Surface water was shown to increase in temperature and decrease in salinity in a southward gradient, indicating stronger freshwater runoff influence at the head of the inlet at Milne Port. Below the pycnocline, water was uniformly cold and saline throughout the inlet. Below 15 to 25 m depth, temperature was less than 0°C and salinity was above 30 PSU, comparable to open ocean conditions, at both the head and mouth of the inlet. Chlorophyll *a* and dissolved oxygen concentrations were low indicating low phytoplankton productivity during the time of the surveys. Water in Milne Inlet was clear with turbidity consistently below 0.1 NTU throughout most of the water column and higher turbidity (0.5 to 8 NTU) at the surface, which was most likely associated with surface runoff from land.

All water quality parameters measured in 2018 were within ranges typical of background conditions previously observed or below the analytical detection limits used in previous monitoring years (2014–2017). All water quality parameters analyzed in 2018 (nitrates, arsenic, cadmium, chromium, mercury, silver and naphthalene) were below applicable CCME WQG⁶. PAHs were below detection limits in all samples collected between 2015–2018. Fecal coliform bacteria levels measured in 2018 were also below detection limits.

Sediment samples were analyzed for particle size composition, organic content, metals and hydrocarbons. Particle size composition was generally consistent with results from previous years (2014 through 2017). Metal concentrations were generally correlated with sediment physical composition. In general, metal concentrations, when detected, were higher in areas with a higher proportion of fines. Arsenic concentrations exceeded CCME and BC Interim Sediment Quality Guidelines (ISQGs; 7.24 mg/kg) at three stations but did not exceed the CCME Probable Effect Level (PEL). Arsenic concentrations also exceeded the T₂₀⁷ benchmark (7.4 mg/kg; Buchman, 2008) at two (2) stations and exceeded Effects Range-Low (ERL) of 8.2 mg/kg (Buchman, 2008) at one (1) station. Exceedances of CCME ISQG for arsenic were also reported in previous years (2014 through 2017). Nickel concentrations in 2018 exceeded the T₂₀ benchmark (15 mg/kg) at five (5) stations. Nickel concentrations also exceeded NOAA Threshold Effect Level (TEL) of 15.9 mg/kg at two (2) stations. No CCME sediment quality guidelines exist for nickel; however, nickel concentrations in 2018 were below BC Working ISQG (30 mg/kg) and PEL (50 mg/kg). Observed exceedances for arsenic and nickel are not considered to be Project-related, as neither chemical element is associated with ore processing at Mary River (Baffinland, 2012) and both were recorded in similar high concentrations during baseline surveys (SEM, 2015a). Also, exceedances for nickel were only observed at certain far-field stations located over two kilometers from the ore dock. It is presumed that elevated arsenic and nickel concentrations in these areas are likely naturally occurring.

⁶ Canadian Council of Ministers of the Environment (CCME) – Canadian Water Quality Guidelines {WQG} for The Protection of Aquatic Life (CCME 2002)

⁷ Chemical concentrations corresponding to 20% probability of observing toxicity

Volatile organic compounds, extractable petroleum hydrocarbons, and PAHs were, with few exceptions, below detection limits in sediment samples. PAHs were detected at three stations and concentrations of volatile organic compound dichloromethane were detected at three stations. Concentrations of PAHs acenaphthylene and dibenz(a,h)anthracene in one of the stations of the North transect exceeded CCME and BC ISQGs. No other organic compound exceeded sediment quality guidelines and benchmarks during the 2018 sediment program.

Fines content remained stable between the five years of sampling on the West and East transects. On the Coastal Transect, there was an estimated increase in percent fines at the 1,000-m and 1,500-m distances between 2014 and 2016, although the 2018 estimates showed no change from 2014 indicating no consistent trend between years. On the North Transect, a significant increase in percent fines was estimated at transect origin between 2014 and 2015, followed by a small decline in 2016 and no further changes throughout 2017-2018. Overall, there were no significant changes in percent fines between 2014 and 2018 on any of the four transects.

Iron concentrations in sediment showed interannual changes at some locations on the West and East transects during the five study years, while no significant changes in iron concentrations were observed on the Coastal or North Transects. Between 2014 and 2018, significant increases in iron concentrations, based on observed fines content, were observed at 500 m and 1,500 m from the ore dock on the West Transect and at 500 m and 1,000 m on the East Transect. When iron concentrations were corrected to minimum or maximum transect-specific fines content, significant increases between 2014 and 2018 were estimated only at 50 and 1,000 m from the ore dock on the East Transect (no corrected estimates were done for 0 m). Although not significant, gradual annual increases were estimated at 500 m and 1,000 m on the West Transect between 2015 and 2018, at 50 m and 500 m on the East Transect between 2016 and 2018, and at 1,000 m on the East Transect between 2016 and 2018. No significant changes in the same direction were observed in two consecutive years over the 2014-2018 period.

A revised approach for monitoring marine benthic communities in Milne Port was introduced in 2018 using permanent belt transect plots in a control and reference area, and infaunal sampling stations along four transects as part of the distance-gradient design (in concert with sediment sampling). Data collected in 2018 will be compared to 2019 monitoring results when available. In general, benthic community composition appeared to be consistent with that observed during the 2014 to 2015 surveys. For epibenthos, both total abundance and taxonomic richness were lower in the belt transect plots than recorded on previous (2014-2017) transect surveys. This was expected given the smaller area sampled using the belt transect plots. For infauna, mean density, taxa richness and species diversity values in 2018 were mostly within ranges observed in the 2017 AIS benthic infaunal samples (Golder, 2018d), with the exception of several samples on the West and North Transects which demonstrated lower values. As in previous years, polychaetes were the most abundant taxa at all stations sampled in 2018, followed by crustaceans and bivalves.

Fishing effort in 2018 yielded greater sampling sizes than in previous years both in terms of total catch (403 fish) and gill net catch per unit of effort (CPUE; mean 3.38 and standard deviation (SD) 3.35 fish/h). Relative taxonomic composition of fish in the Milne Port area did not change considerably from previous studies with catches being dominated by three species; Arctic char, fourhorn sculpin and shorthorn sculpin (comprising 98% of the total catch). Other recorded fish species included Arctic sculpin, Arctic cod and northern sandlance.

As in previous years, gill net sampling proved to be the most effective fish collection method, yielding 93% of the total catch. Gill nets in 2018 also yielded highest total catch and CPUE in comparison to previous years. Beach seine was the most efficient method of sampling in terms of the CPUE when recalculated to number of fish caught per hour (mean 20 and SD 23.6 fish/h). However, beach seining was limited to certain nearshore areas and could only be deployed for short durations (several minutes). Fukui traps were less effective and less efficient in 2018 than in previous years, yielding both the lowest total catch and lowest CPUE recorded since 2013.

A total of 26 incidental Arctic char mortalities were retained for sex, age, stomach content and body burden analysis (14 females and 12 males - ranging from 5 to 17 years in age). Female Arctic char were on average slightly older than males (average age of 11 years vs. 10 years) and larger than males (average length 410 mm vs. 397 mm; average weight 901 g vs. 705 g). However, male Arctic char has a greater maximum length (514 mm vs. 508 mm) and maximum weight (1480 g vs. 1470 g) than females. No relationship between body length and age was observed, indicating body size is not a good predictor for Arctic char age in the Milne Port area. No significant differences in the length-to-weight relationships were observed between 2017 and 2018 for the three most dominant species (Arctic char, fourhorn sculpin and shorthorn sculpin) despite much smaller sampling sizes in 2017.

Concentrations of metals in Arctic char tissue analyzed for body burden in 2018 were consistent with those reported in previous years (2010-2017). No samples exceeded the Health Canada guideline (0.5 mg/kg) for mercury in fish tissue for human consumption. Tissue samples from opportunistically collected clams, *Hiatella arctica*, were analyzed to determine body burden of metals as a supplement to fish tissue analysis. Concentrations of most metals in *H. arctica* tissues were higher compared to levels in Arctic char tissue sample, aside from mercury which was lower in *H. arctica*. Mercury concentrations in all *H. arctica* tissue samples were below the Health Canada guideline for human consumption.

Detailed results of the 2018 MEEMP are presented in Golder (2019b).

In 2018, a total of 44 zooplankton species were identified during AIS sampling in 2018 at Milne Port and Ragged Island. Four of these species were not recorded during baseline studies or during previous AIS monitoring campaigns. None of the newly observed zooplankton taxa in 2018 were listed in the identified invasive or non-indigenous species databases. A total of 349 benthic invertebrate taxa were identified during AIS sampling in 2018 at Milne Port and Ragged Island. Forty-six (46) of these taxa were not recorded during baseline studies or during previous AIS monitoring campaigns. An analysis of the available literature and species databases indicated that most of the newly identified taxa had known ranges that include Arctic waters or had unknown northern limits with ranges reaching into the north Atlantic and Norwegian Sea. These taxa presumably could have ranges that extend to Arctic waters. A new sabellid worm (*Pseudofabricia* sp. nr. *aberrans*) was identified in the deep-water infaunal samples collected from Milne Port in 2018. This was the first year infaunal sampling occurred at the deep-water stations. A specimen of the same genus but not identified to species level was recorded in benthic infaunal samples collected in 2017 (Golder, 2018d). Currently, the only species described for this genus is *aberrans* with the only known range in the Mediterranean Sea and is presumed to be endemic to that region (Giangrande and Cantone 1990; Cepeda and Lattig 2016; WoRMS 2019). *P. aberrans* is not listed in the global invasive species database (Molnar et al. 2008), or as a known invasive species list within the National Risk Assessment for Introduction of Aquatic Nonindigenous Species to Canada by Ballast Water (Casas-Monroy et al. 2014). It is unclear whether the specimens recorded in Milne Inlet belong to a cryptic species of the same genus or its range is greater than currently described. Representative samples have been sent to a separate laboratory for confirmative taxonomic analysis. Further investigations into the status of *P. sp. nr. aberrans* is in progress in consultation with DFO.

Three fish species (Arctic cod, herring, and pricklyback) were observed in 2018 that were not previously recorded in the AIS database. However, Arctic cod had previously been observed at Milne Port during underwater video surveys conducted in 2016 as part of the Project's Habitat Offset Monitoring Program (SEM, 2017b). Atlantic herring have been documented on the north end of Baffin Island, and pricklyback species are documented to inhabit the Arctic Ocean. Therefore, it is unlikely that any fish species caught or observed during the 2018 AIS monitoring program are non-indigenous or invasive.

Underwater video surveys of the three ore carriers indicated that the ship hulls were mostly free of biofouling (i.e., growth) except for small areas on the sterns of two of the ore carriers where some colonization by aquatic organisms was identified. On the first ore carrier, colonizing organisms belonged to an undetermined species of barnacle. On the second ore carrier

surveyed, the biofouling organisms could not be positively identified on the video because of low lighting conditions and limited camera resolution; and no physical samples of the biofouling organisms could be collected based on where the biofouling was located (restricted access).

Detailed results of the 2018 AIS monitoring program are presented in Golder (2019b).

TRENDS

Five years of AIS monitoring has yielded a relatively large dataset of marine organisms residing in Milne Port and Milne Inlet. To date, no confirmed invasive species have been identified in the Project area. Further investigations into the status of several new species identified during the AIS program are in progress in consultation with DFO, with representative specimens sent to a second laboratory for confirmatory taxonomic analysis.

RECOMMENDATIONS / LESSONS LEARNED

The MEEMP study design, data collection methodology and results are reviewed yearly with the MEWG. Recommendations from the MEWG assist in refinements to the program, enhancement of existing mitigation measures, and development of adaptive management measures (when and where applicable).

Annual AIS and MEEMP results will continue to be presented to the MEWG on an annual basis, and adjustments to the programs 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)	All Phases
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.
Relevant BIM Commitment	46, 49, 51
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

Baffinland established a MEWG in 2013. Members include representatives from: 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 also participate as observers.

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.

The group meets in-person twice annually and also hosts two interim teleconferences per year.

Draft technical annual reports and other documentation are provided to the group in advance of meetings and an ongoing 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 provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The MEWG also serves as an advisory group to provide recommendations on appropriate management approaches related to the Project.

The MEWG has guided the development of the Marine Environment Effects Monitoring Program (MEEMP), and also reviews and provides comments on other draft marine environment monitoring reports.

In 2018, the MEWG held meetings on March 15, June 6, September 13 and December 10.

TRENDS

The MEWG has successfully provided valued input into the Baffinland annual marine monitoring programs.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MEWG to review and guide marine monitoring programs for the Project on an annual basis and develop mitigation measures or action plans as and when needed.

Baffinland, with support from the QIA and other members of the MEWG has put a strong emphasis on continuing existing programs 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Ice Conditions and Ship Access to the Milne Inlet Port Site - Mary River Iron Ore Project - Final Report. Amended in 2015. (ENFOTEC 2015).
Ref. Document Link	N/A

METHODS

A 2011 ice conditions study by ENFOTEC Technical Services Inc. (ENFOTEC) was included in Appendix 3G of the FEIS. This ice study report is updated periodically to incorporate new information on ice conditions along the Northern Shipping Route and ship access to Milne Inlet / Milne Port with a focus on planning for open-water shipping by tracking dates of ice break-up and re-freeze. An updated ice conditions study for the ERP was provided in 2015 (ENFOTEC 2015).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The ice condition report for the Northern Shipping Route (Milne Port) will be updated periodically as new data becomes available. The ice condition study for the Southern Shipping Route (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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Canadian Hydrographic Service (CHS)
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland entered into a collaborative cost-sharing agreement with Canadian Hydrographic Service (CHS) for their nautical charting program. The CHS also 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Emergency Response Plan (Baffinland, 2018e) Oil Pollution Emergency Plan - Milne Inlet OPEP (Baffinland, 2017f) Shipping and Marine Wildlife Management Plan (Baffinland, 2016h) Spill at Sea Response Plan (Baffinland, 2015b) Spill Contingency Plan (Baffinland, 2017g)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

Accidents and malfunctions were assessed for the ERP Phase of the Project, and a risk register for the Project was developed to identify potential risks, the likelihood of the accidental event occurring, the level of consequence associated with each accidental event, and applicable emergency response plans (FEIS, 2014 Volume 9). The risk register is an integral part of Baffinland's Environmental Management System, and various potential risks including Project-related shipping accidents are addressed in several management plans, including:

- Emergency Response Plan;
- Oil Pollution Emergency Plan - Milne Inlet OPEP;
- Shipping and Marine Wildlife Management Plan;
- Spill at Sea Response Plan; and
- Spill Contingency Plan.

Training of Baffinland staff on the Milne Inlet Oil Pollution Emergency Plan (OPEP) was conducted by a qualified marine spill response contractor between July 20-22, 2018. This ensured that Baffinland is ready to respond to potential spills along the shipping route within the Inlet. Oil Spill Response Inc. has continued to be retained to respond to significant spills that occur. Baffinland continued to improve marine spill response ability at the Port in 2018, beyond standard requirements for a Level 1 Oil handling Facility, procuring additional spill response booms, skimmers and other materials. Baffinland is committed to ensuring that adequate resources are allocated to the development and deployment of emergency and spill response capabilities within the Project.

RESULTS

OPEP training occurred in 2018. A mock spill exercise was performed to ensure spill readiness. Baffinland has invited communities of the North Baffin Region to participate and observe training. Required equipment for a Class 1 Oil Handling Facility was met. No spills occurred during fuel transfers.

A minor release of gear oil from a contracted marine work tug occurred on July 22 2018 in Milne Inlet. Notification was provided to the Canadian Coast Guard and the Hamlet of Pond Inlet and Hunter and Trappers Organization. Once the tug returned to Milne Port Baffinland deployed oil containment booms and sorbents to contain release. An investigation revealed that 30 L of gear oil had been released in Milne Inlet as a result of a gear box failure. It appeared that the oil quickly dissipated due to weather and wave conditions. Baffinland confirmed with CCG that additional spill recovery methods were not recommended and the tug was cleared by CCG for operation. A follow-up spill report was issued to ECCC, CIRNAC and QIA on August 22.

TRENDS

Baffinland is committed to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills and any other Project-related shipping accidents.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically procure resources and equipment to respond to any Project-related shipping accidents in the unlikely event that these occur.

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.
Relevant BIM Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Mary River Project - FEIS (Baffinland, 2012) Mary River Project - Addendum to the FEIS. June 2013 (Baffinland, 2013a) Mary River Project - Addendum to the FEIS (Baffinland, 2018x) TDS #22 - Ship Wake and Propeller Wash Assessment. (Golder, 2018e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Ship wake effects on shorelines were assessed in the FEIS and the FEIS Addendum for the Early Revenue Phase (Baffinland, 2012 and 2013a), and it was concluded that no measurable changes would occur.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Should changes to the current shipping routes be proposed, Baffinland will undertake the required assessment.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Mary River Project – FEIS. February 2012 (Baffinland, 2012)
Ref. Document Link	N/A

METHODS

Baffinland understands that the intent of this condition was to address concerns related to potential erosional effects of ship wakes from purpose-built Baffinland ore carriers on shorelines along the southern shipping route. In this case, the same carriers would be conducting repeated voyages and wake effects could be compared to modeling predictions made in the FEIS (Baffinland, 2012). 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 if and/or when ore carriers are commissioned for the Southern Shipping Route.

Project Certificate Condition No. 83

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
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 install tidal gauges at Steensby and Milne Port to monitor sea levels and storm surges.
Relevant BIM Commitment	N/A
Reporting Requirement	The Proponent shall summarize and supply these monitoring results to NIRB in the annual Project report.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Oceanographic Data Processing – Baffinland Ballast Water Study, Milne Inlet 2014-15 (ASL, 2015) Technical Memo – Tide Gauge Collection at Milne Port During 2017 Open-water Season (Golder, 2018b) 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	N/A

METHODS

Milne Port:

In 2014, tide data was collected using a tidal gauge installed at Milne Port (ASL, 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 2015 or 2016. As such, no tidal data were collected or are available from Milne Port for the 2015 or 2016 reporting periods. Baffinland re-installed a tide gauge system at Milne Port and resumed tidal monitoring on-site during the 2017 and 2018 open-water season. The purpose of the tide gauge was to extend the tidal data set (starting in 2014) and provide insight to relative sea level and storm surges at the project site. Tide monitoring instrumentation consisted of an RBRconcerto CTD (RBR) sensor programmed to continuously measure pressure, temperature, and conductivity. The instrument was mounted on a steel ladder located on the west end of the existing ore dock. The ladder provided a consistent mounting point (i.e. repeatable position and elevation from year to year) that can be installed as part of standard port operations. A steel plate at the top of the ladder was surveyed with a Real Time Kinematic Global Positioning System (RTK GPS) survey instrument. The elevation and position of the top plate of the ladder was surveyed using five survey points and the average elevation of the five points has been used to reference the position of the tide gauge to the Canadian Geodetic Vertical Datum (CGVD).

Steensby Port:

No tidal gauge systems were installed at Steensby Port in 2018, as that component of the Project is currently inactive.

RESULTS

Milne Port:

A continuous time-series of water level, temperature, and conductivity data was collected from June 30 to October 19, 2018. Water level data recorded at Milne Port indicated typical fluctuations resulting from tidal forcing. During the measurement period, a total of seven neap-spring tidal cycles were observed.

Detailed results of tidal gauge and salinity/temperature monitoring are provided in the 2018 MEEMP and AIS Monitoring Program Report (Golder, 2019b).

Steensby Port:

No activities took place at Steensby Port during 2018.

TRENDS

Trends cannot be currently evaluated based on the available data (2014, 2017 and 2018) and without an assessment of site-specific land uplift/subsidence rates (i.e. local relative sea level at the site and regional and site-specific (as available) geodetic elevation data).

RECOMMENDATIONS / LESSONS LEARNED

Milne Port:

The tide gauge system will be re-deployed at Milne Port during summer of 2019 and the relative tide gauge position will be surveyed with an RTK GPS, with the intention of continuing annual monitoring of relative sea levels and storm surges at the site. A tide gauge monitoring plan has been developed (Golder, 2018b) which provides guidelines for annual management and maintenance of the tide gauge station such that a long-term record of water levels at Milne Port during the open-water season can be developed. To support a future trends analysis, Baffinland is considering conducting a desktop review in 2019 of local relative sea level at the site and regional and site-specific (as available) geodetic elevation data.

Steensby Port:

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

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Final Environmental Impact Statement (FEIS; Baffinland, 2012) Addendum to the FEIS (Baffinland, 2013a) Addendum to the FEIS (Baffinland, 2018x) 2017 MEEMP and AIS Monitoring Report (Golder, 2018d) TDS #20 - Hydrodynamic Modelling Report - Milne Port (Golder, 2018f) Draft 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

In the FEIS (Baffinland, 2012) and the FEIS Addendum for the ERP (Baffinland 2013a), it was predicted that installation of the ore dock will have minimal effect on local sediment transport and that Project operations were not likely to result in significant adverse effects on water or sediment quality. These impact predictions were used to inform the MEEMP sampling design (2014 through to 2018) including the selection of sample locations and analytical parameters.

Hydrodynamic Modelling: In 2018, Golder was contracted to perform hydrodynamic and sediment transport modelling at the head of Milne Inlet near Milne Port in support of the Phase 2 Proposal. The Hydrodynamic Modelling Report for Phase 2 operations is included as a Technical Support Document (TSD 20; Golder, 2018f) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018a). A qualitative three-dimensional hydrodynamic and sediment transport model was developed in the Delft3D-4 suite to assess the sediment transport near Milne Port. The qualitative model consisted of a regional domain and a local domain informed with measured bathymetry and fit to local land boundaries. The potential sediment transport resulting from idealized northeast wind conditions were simulated for pre and post-Phase II construction scenarios. The results were qualitatively validated to satellite imagery of the head of Milne Inlet.

MEEMP: Baffinland's monitoring efforts at Milne Port include an ongoing assessment of potential Project-related introductions of metals to the marine environment that would have the potential to bio-accumulate in the marine food chain. The 2018 MEEMP (Year 5 of the Program) included marine water and sediment quality sampling, as well as various levels of biological sampling including fish tissue collection for analysis of metals (body burden). Monitoring sites for marine water quality were located offshore of the effluent discharge in a radial gradient design with increasing distance in three directions from the discharge point. The monitoring program was designed to monitor for potential changes to water quality due to site drainage discharge (including iron ore stockpile run-off) to the marine environment at Milne Port. Five distinct sampling events were completed in August of 2018. Water quality samples were analyzed for general parameters, nutrients, metals and hydrocarbons, with screening against CCME Water Quality Guidelines (WQG) where applicable.

The sampling design for the 2018 sediment program was based on a radial gradient pattern originating at the Milne ore dock. The radial pattern is designed to detect potential Project-related effects based on a gradient of key components with numerical indicators (e.g., percent fines and metal concentrations in sediment) with increasing distance from the point source (ore dock and effluent discharge). The statistical design was based on repeated measures (RM) distance regression analyses with each station re-sampled annually. From the point source, stations are established along the distance gradient which allows for physical, chemical and biological changes to be assessed spatially. Analysis of covariance (ANCOVA) was applied to baseline and monitoring data to compare gradients in the regression line to determine if monitoring results are significantly different than baseline conditions.

Sediment samples were collected along four transects extending in a radial pattern from the Milne ore dock. Along the East and West transects, sediment sampling stations were located along the 15-m depth contour at approximately 0 m, 250 m, 500 m, 1,000 m, and 1,500 m from the existing ore dock. Along the Coastal Transect, sampling stations were located at the same 15-m depth contour at approximately 500 m, 1,000 m, 2,000 m, and 4,000 m from the East Transect. Along the North Transect, sampling stations were located at approximately 0 m, 250 m, 500 m, 1,000 m, and 2,000 m from the existing ore dock and depths ranging from 37 m to 100 m. Three replicate samples were collected from each sampling station. In addition to nineteen (19) long-term sediment stations established in 2014 and surveyed annually, the 2018 program included two (2) additional sediment stations B-2 and B-5 along the East transect. These two stations were added to account for a proposed new ore dock (located east of the existing ore dock) as part of the Phase 2 Proposal.

Sediment samples were analyzed for particle size composition, organic content, metals and hydrocarbons. Measured concentrations were screened against the CCME Interim Sediment Quality Guidelines (ISQGs) and Probable Effect Level (PEL) guidelines for sediment.

Incidental fish mortalities during the MEEMP surveys were retained for analysis of metal concentrations in tissue (body burden). Analysis of shellfish species *Hiatella arctica* tissue for body burden was added to the MEEMP in 2018.

RESULTS

Hydrodynamic Modelling: Detailed results of the hydrodynamic and sediment transport modelling are presented in TSD #20 (Golder, 2018f) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018a).

MEEMP: Detailed results from marine water and sediment quality sampling and fish toxicological analyses are presented in the 2018 MEEMP and AIS Monitoring Report (Golder, 2019b), with a brief summary provided below.

All water quality parameters measured in 2018 were within ranges typical of background conditions previously observed or below the analytical detection limits used in previous monitoring years (2014-2017). All water quality parameters analyzed in 2018 (nitrates, arsenic, cadmium, chromium, mercury, silver and naphthalene) were below applicable CCME WQG⁸. PAHs were below detection limits in all samples collected between 2015-2018. Fecal coliform bacteria levels measured in 2018 were also below detection limits.

Sediment samples were analyzed for particle size composition, organic content, metals and hydrocarbons. Particle size composition was generally consistent with results from previous years (2014 through 2017). Metal concentrations were generally correlated with sediment physical composition. In general, metal concentrations, when detected, were higher in areas with a higher proportion of fines. Arsenic concentrations exceeded CCME and BC Interim Sediment Quality Guidelines (ISQGs; 7.24 mg/kg) at three stations but did not exceed the CCME Probable Effect Level (PEL). Arsenic concentrations also exceeded the T₂₀⁹ benchmark (7.4 mg/kg; Buchman, 2008) at two stations and exceeded Effects Range-Low (ERL) of 8.2 mg/kg (Buchman, 2008) at one station. Exceedances of CCME ISQG for arsenic were also reported in previous years (2014 through 2017). Nickel concentrations in 2018 exceeded the T₂₀ benchmark (15 mg/kg) at five stations. Nickel concentrations also exceeded NOAA Threshold Effect Level (TEL) of 15.9 mg/kg at two stations. No CCME sediment quality guidelines exist for nickel; however, nickel concentrations in 2018 were below BC Working ISQG (30 mg/kg) and PEL (50 mg/kg). Observed exceedances for arsenic and nickel are not considered to be Project-related, as neither chemical element is associated with ore processing at Mary River (Baffinland, 2012) and both were recorded in similar high concentrations during baseline surveys (SEM, 2015a). Also, exceedances for nickel were limited to certain far-field stations located over two kilometers from the ore dock. It is presumed that elevated arsenic and nickel concentrations in these areas are likely naturally occurring.

Volatile organic compounds, extractable petroleum hydrocarbons, and PAHs were, with few exceptions, below detection limits. PAHs were detected at three stations and concentrations of volatile organic compound dichloromethane were detected at three stations. Concentrations of PAHs acenaphthylene and dibenz(a,h)anthracene in one of the stations of the North transect exceeded CCME and BC ISQGs. No other organic compound exceeded sediment quality guidelines and benchmarks during the 2018 sediment program.

Fines content remained stable between the five years of sampling on the West and East transects. On the Coastal Transect, there was an estimated increase in percent fines at the 1,000-m and 1,500-m distances between 2014 and 2016, although the 2018 estimates showed no change from 2014 indicating no consistent trend between years. On the North Transect, a significant increase in percent fines was estimated at transect origin between 2014 and 2015, followed by a small decline in 2016 and no further changes throughout 2017-2018. Overall, there were no significant changes in percent fines between 2014 and 2018 on any of the four transects.

Iron concentrations in sediment showed interannual changes at some locations on the West and East transects during the five study years, while no significant changes in iron concentrations were observed on the Coastal or North Transects. Between 2014 and 2018, significant increases in iron concentrations, based on observed fines content, were observed at 500 m and 1,500 m from the ore dock on the West Transect and at 500 m and 1,000 m on the East Transect. When iron concentrations were corrected to minimum or maximum transect-specific fines content, significant increases between 2014 and 2018 were estimated only at 50 and 1,000 m from the ore dock on the East Transect (no corrected estimates were done for 0 m). Although not significant, gradual annual increases were estimated at 500 m and 1,000 m on the West Transect between 2015 and 2018,

⁸ Canadian Council of Ministers of the Environment (CCME) – Canadian Water Quality Guidelines {WQG} for The Protection of Aquatic Life (CCME 2002)

⁹ Chemical concentrations corresponding to 20% probability of observing toxicity

at 50 m and 500 m on the East Transect between 2016 and 2018, and at 1,000 m on the East Transect between 2016 and 2018. No significant changes in the same direction were observed in two consecutive years over the 2014-2018 study period.

Concentrations of metals in Arctic char tissue analyzed for body burden in 2018 were consistent with those reported in previous years (2010-2017). No samples exceeded the Health Canada guideline (0.5 mg/kg) for mercury in fish tissue for human consumption. Tissue samples from opportunistically collected clams, *Hiatella arctica*, were analyzed to determine body burden of metals as a supplement to fish tissue analysis. Concentrations of most metals in *H. arctica* tissues were higher compared to levels in Arctic char tissue sample, aside from mercury which was lower in *H. arctica*. Mercury concentrations in all *H. arctica* tissue samples were below the Health Canada guideline for human consumption.

TRENDS

No clear long-term trends were established in sediment accumulation or iron concentrations. Additional years of monitoring will contribute to ongoing trend analysis.

RECOMMENDATIONS / LESSONS LEARNED

MEEMP: All water quality samples collected in 2018 were below the applicable water quality guidelines for all tested parameters. Concentrations of iron and aluminum were above detection limits; however, these parameters do not have established limits in the CCME guidelines. Temporal and spatial variability were generally low among water samples collected throughout the water quality program. Water sampling should be repeated in 2019 following the same procedures outlined in the MEEMP Report (Golder, 2019b).

Iron concentrations showed gradual increases at the 50-m station of the East Transect since 2016, and at the 1,000-m station of the same transect since 2015. However, these increases were only significant at the 50-m station between 2016 and 2017 (following a significant decrease observed between 2015 and 2016), and at the 1,000 m-station between 2015 and 2017 (following a decrease observed between 2014 and 2015). No significant increases of iron concentrations when corrected to fines content were detected in the West, North and Coastal transects. It is recommended that the sediment sampling program conducted annually since 2014 continue in 2019 to further evaluate changes in sediment chemistry and composition

Body burden analysis is recommended to continue for incidental fish mortalities. Sculpin, Arctic char and *H. arctica* remain recommended species for body burden analysis.

As the MEEMP evolves and additional data become available for analyses, the design and approach to analyses can be continuously revisited to optimize the statistical power for interpreting change. Other approaches to interpreting the statistical relationships beyond linear regression could also be explored. For example, a quadratic or logarithmic equation might be a better option for evaluating data trends.

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.
Relevant BIM Commitments	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	None
Reference	Final Environmental Impact Statement (FEIS; Baffinland, 2012) Addendum to the FEIS (Baffinland, 2013a) Addendum to the FEIS (Baffinland, 2018a) TSD 22 - Ship Wake and Propeller Wash Assessment (Golder, 2018e)
Ref. Document Link	N/A

METHODS

Not applicable - Baffinland understands that the intent of this condition was to address concerns related to potential ship-induced sediment redistribution from propeller wash and ship wake effects for shipping operations in Steensby Port and along the southern shipping corridor. No sediment dispersion (i.e., hydrodynamic) modelling was completed for Milne Port or along the Northern Shipping Route in support of the FEIS (Baffinland, 2012) or the FEIS Addendum for the Early Revenue Phase (ERP) (Baffinland, 2013a).

In 2018, Golder was retained to perform a ship wake and propeller wash assessment update. The Ship Wake and Propeller Wash Modelling Report for Phase 2 operations is included as a Technical Support Document (TSD) 22 (Golder, 2018e) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018a).

RESULTS

Ship wake modelling results for the Phase 2 Proposal indicated that ship generated waves (wakes) were expected to be minimal along the Northern Shipping Route with an estimated maximum wave height of 0.12 m near the sailing line and less than 0.05 m at distances greater than 1-km from the sailing line. The wake height is primarily constrained by the vessel speed limit of 9 knots along the shipping route. Any significant wave heights from wind-generated waves are estimated to exceed ship generated wave heights during both average and peak wind conditions.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will review the requirement for updating ship wake modelling along the Southern Shipping Route when activities are renewed at Steensby Port.

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.
Relevant BIM Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	None
Reference	N/A
Ref. Document Link	N/A

METHODS

Not applicable. 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.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will develop a monitoring plan to verify predictions of sediment redistribution resulting from propeller wash in shallow locations along the shipping route if and/or 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.
Relevant BIM Commitment	85
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Oceanographic Data Processing - Baffinland Ballast Water Study, Milne Inlet 2014-15 (ASL, 2015) Ocean Circulation and Ballast Water Dispersal in Milne Inlet, Baffin Island (CORI, 2014) Data Report for the 2015-2016 Observational Oceanography Program in Milne Inlet (CORI, 2016) Mary River Project - Addendum to the FEIS (Baffinland, 2018a) Tech Memo - Tide Gauge Collection at Milne Port During 2017 Open-water Season (Golder, 2018b) TDS 18 - Ballast Water Dispersion Modelling Report (Golder, 2018g) 2015 MEEMP Report (SEM, 2016a) 2016 MEEEMP and AIS Monitoring Report (SEM, 2017a) 2017 MEEMP and AIS Monitoring Report (Golder, 2018d) Draft 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

Ballast water dispersion modelling was undertaken in 2014 by Coastal and Ocean Resources Inc. (CORI) on behalf of Baffinland prior to the start of commercial shipping of iron ore at Milne Port (CORI, 2014; 2016). Oceanographic data collected in the model region, including Conductivity-Temperature-Depth (CTD) data, ocean current data (via deployment of Acoustic Doppler Current Profilers or ADCPs), hydrology data, atmospheric data, and bathymetric data, were used to determine basic ocean conditions and to prepare gridded fields for the initial and boundary conditions for the model. The model was validated using ADCP and CTD data collected in Milne Inlet in 2014. Modelling results were used to inform sampling sites for Baffinland's AIS monitoring program in 2015 and 2016.

In 2018, Golder was retained to perform updated ballast water dispersion modelling in Milne Inlet. The Ballast Water Dispersion Modelling Report for the Phase 2 Proposal was included as a Technical Support Document (TSD) 18; Golder, 2018g) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018a). A three-dimensional hydrodynamic model was developed in the MIKE3 suite to assess the discharge of ballast water in Milne Inlet. The model was calibrated and validated to oceanographic data collected in the model region in 2014 by CORI (CORI, 2014). This included Conductivity-Temperature-Depth (CTD) data, ocean current data (via deployment of Acoustic Doppler Current Profilers or ADCPs), hydrology data, atmospheric data, and bathymetric data. However, data near Milne Port was not available.

Following the development of the updated ballast water dispersion model, additional oceanographic data were collected in Milne Inlet, specifically near Milne Port in 2018 as follows:

- Oceanographic data (ocean currents and CTD measurements) were collected by Golder in 2018 (Golder, 2019b) for the purpose of providing ocean current, water level and CTD data needed to validate the improved ballast water model.

In addition, the following oceanographic data have been collected to address other NIRB Conditions:

- Water level data were collected at a tide gauge installed at the Milne Port ore dock by Golder in 2017 and 2018 (Golder, 2018b; 2019a).
- CTD data has been collected annually as part of the MEEMP between 2014 and 2018 (SEM, 2016a; 2017a; Golder, 2018d; 2019a).

RESULTS

Detailed results of the updated ballast water dispersion modelling are presented in Technical Support Document (TSD) 18 (Golder, 2018g) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018a). Results indicate that ballast water is diluted by a factor of 1,000 within 1.5 km of the discharge location. Ballast water discharged at the ore dock is expected to reach Ragged Island where it is diluted by a factor of 500,000 to 1,000,000 times.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Oceanographic data collected in 2018 (as listed above) will be used to validate the improved ballast water dispersion model reflective of current Project operations. This includes the 2018 oceanographic data that consists of measurements obtained in 2018 near Milne Port and Bruce Head, not previously available, as well as additional water level data at the Port and CTD profiles collected as part of the MEEMP. This task addresses a recent request from the Board (issued as part of NIRB's review of the 2017 Annual Report) for Baffinland to utilize oceanographic and bathymetric data collected between 2014 and 2017 to develop an updated ballast water dispersion model for the current Project operations, independent of the assessment of the Phase 2 proposal.

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.
Relevant BIM Commitment	85
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2015 AIS Monitoring Report (SEM, 2016b) 2016 MEEEMP and AIS Monitoring Report (SEM, 2017a) 2016 Milne Ore Dock Fish Offset Monitoring Report (SEM, 2017b) Draft 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

Baffinland's AIS monitoring program was developed in 2015 as part of the MEEMP to detect non-native species potentially introduced to Milne Inlet via ballast water discharges or hull biofouling. AIS surveys targeted lower trophic levels, including zooplankton, benthic infauna, epifauna and fish. Biophysical surveys were initially conducted in 2014 to enhance baseline data by supplementing existing species inventory datasets for marine flora and fauna prior to the start of shipping operations at Milne Port. AIS surveys in 2015 and 2016 (SEM, 2016b; 2017a) focused on detection of marine organisms not previously identified in Milne Port as primary indicators of invasion (i.e., early warning of AIS introductions in the Project area). Surveys were based on a Before/After experimental design focusing on areas with the highest likelihood of marine invasion. Since ballast water releases only occur in Milne Port (either at the ore dock or at existing anchorages in Milne Port), data collection was focused on the marine areas surrounding the Milne Port infrastructure. Monitoring thresholds were implemented to establish protocols for evaluating taxonomic data to determine if mitigation measures need to be implemented. Depending on the species and the relative risk it poses to the native biological community, thresholds may consist of a single occurrence of an invasive species, or evidence that the species has become established in the area through reproduction and/or range expansion. In 2017, the AIS monitoring program was expanded to include sampling sites near Ragged Island to capture potential AIS at existing anchorage locations in this area. In 2018, AIS monitoring continued in Milne Port and at Ragged Island and included zooplankton sampling, benthic infaunal sampling, underwater video surveys for macroflora and benthic epifauna, sampling for fish and mobile epifauna, settlement surveys for encrusting epifauna, and video surveys of ore carrier hulls for detection of biofouling organisms. Detailed information on the 2018 sampling methodology is available in the 2018 MEEMP and AIS Monitoring Report (Golder, 2019b).

RESULTS

Detailed results of the 2018 AIS monitoring program are presented in the 2018 MEEMP and AIS Monitoring Report (Golder, 2019b), with a summary provided below.

In 2018, a total of 44 zooplankton taxa were identified during AIS sampling at Milne Port and Ragged Island, of which three (3) of these taxa were not observed during previous AIS monitoring or baseline surveys. None of the 44 zooplankton taxa recorded in 2018 were identified as invasive to the Canadian Arctic region. A literature review of known geographic distribution for each taxa confirmed that each newly observed taxa was either known to occur in the Arctic, or identified at a higher taxonomic level (e.g., genus, family, class), which contained species known to occur in the Arctic. It is possible that some specimens that could not be identified to species level from the samples collected in 2017, or those with poorly defined species ranges, could in fact be invasive or non-native to the Arctic region; however, the literature in the Arctic is limited for these species and is not complete enough to establish accurate species ranges.

In 2018, a total of 349 benthic invertebrate taxa were identified during AIS sampling at Milne Port and Ragged Island, of which 46 were not observed during previous AIS monitoring and baseline surveys. An analysis of the available literature and species databases indicated that most of the newly identified taxa had known ranges that include Arctic waters or had unknown northern limits with ranges reaching into the north Atlantic and Norwegian Sea. One exception to this was a new species of sabellid worm (*Pseudofabricia* sp. nr. *Aberrans*) identified in the deep-water infaunal samples collected from Milne Port in 2018 (noting that 2018 was the first year infaunal sampling was conducted at deep-water stations). A specimen of the same genus but not identified to species level was recorded in benthic infaunal samples collected in 2017 (Golder, 2018d). Currently, the only species described for this genus is *aberrans* with the only known range in the Mediterranean Sea and is presumed to be endemic to that region (Giangrande and Cantone 1990; Cepeda and Lattig 2016; WoRMS 2019). *P. aberrans* is not listed in the global invasive species database (Molnar et al. 2008), or as a known invasive species list within the National Risk Assessment for Introduction of Aquatic Nonindigenous Species to Canada by Ballast Water (Casas-Monroy et al. 2014). It is unclear whether the specimens recorded in Milne Inlet belong to a cryptic species of the same genus or occupy a range greater than currently described. Representative samples have been sent to a second laboratory for confirmative taxonomic analysis. Further research into the status of *P. sp. nr. aberrans* is in progress in consultation with DFO.

All of the macrofloral and benthic epifaunal taxa recorded during the 2018 AIS monitoring surveys were observed during previous AIS monitoring and baseline surveys. None of these were identified as invasive to the Arctic region.

Three fish species (Arctic cod, herring, and prickleback) were recorded in 2018 that were not observed during previous AIS monitoring and baseline surveys. However, Arctic cod are well documented in Milne Inlet and Eclipse Sound and have been previously recorded at Milne Port during underwater video surveys conducted in 2016 as part of the habitat offset monitoring program (SEM, 2017b). Atlantic herring have also been documented on the North end of Baffin Island, and prickleback species are known to inhabit the Arctic Ocean. Therefore, these species are not considered invasive or non-indigenous to the Project area.

Underwater video surveys of the three ore carriers indicated that the ship hulls were mostly free of biofouling (i.e., growth) except for small areas on the sterns of two of the ore carriers where some colonization by aquatic organisms was identified. On the first ore carrier surveyed (Arkadia), colonizing organisms belonged to an undetermined species of barnacle. On the second ore carrier surveyed (Golder Saguenay), the biofouling organisms could not be positively identified on the video because of low lighting conditions and limited camera resolution; and no physical samples of the biofouling organisms could be collected based on where the biofouling was located (restricted access at ~7m below the surface).

TRENDS

Five years of AIS monitoring has yielded a relatively large dataset of marine organisms residing in Milne Port and Milne Inlet. To date, no confirmed invasive species have been identified in the Project area. Further investigations into the status of several new species identified during the AIS program are in progress in consultation with DFO, with representative specimens sent to a second laboratory for confirmatory taxonomic analysis. Additional years of AIS monitoring will provide for a more comprehensive AIS database to serve as a basis for determining whether changes are occurring as a result of Project shipping.

RECOMMENDATIONS / LESSONS LEARNED

Annual AIS results will continue to be presented to the MEWG on an annual basis, and adjustments to the programs will be made as needed.

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> <ul style="list-style-type: none"> a. Invasive species b. Seasonal oceanography c. Ballast water quality and quantity d. Receiving water quality; e. Residual physical, chemical, and/or biological effects e. Any risk assessment analysis regarding ballast water exchange and treatment efficacy in arctic waters
Relevant BIM Commitment	85, 86
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Work Group (MEWG)
Reference	<p>(Casas-Monroy et al., 2014) (Chan et al., 2012) (Chan et al., 2013) Mary River Project - Addendum to the FEIS. June 2013 (Baffinland, 2013a) Mary River Project - Addendum to the FEIS Baffinland. September 2018 (Baffinland, 2018x) Risk Assessment for Potential Introduction of Aquatic Nonindigenous Species through Ballast Water Discharge at Milne Port (SEM, 2013) TSD 17 - Marine Environment Effects Assessment (Golder, 2018h) TSD 21 - Risk Assessment for Introduction of AIS from Ballast Water (Golder, 2018i) 2018 MEWG Meeting Record</p>
Ref. Document Link	Appendix C1

METHODS

As described in the annual update for PC Condition No. 87, AIS surveys were conducted at Milne Port from 2014 to 2018, with expansion of the AIS monitoring program in 2017 and 2018 to include additional sampling locations near established anchorages at Ragged Island and ships' hull monitoring for potential biofouling.

A risk assessment for the potential introduction of aquatic nonindigenous species through ballast water discharges at Milne Port was completed in 2013 prior to the start of commercial shipping of iron ore at Milne Port. Detailed methodology for the semi-quantitative risk assessment is presented in SEM (2013), presented as Appendix 8B-4 of the FEIS Addendum (Baffinland, 2013a). The methodology that was applied closely followed methods described by Chan et al. (2012, 2013), which allowed for a comparison of invasion risks between Milne Port and other Canadian Arctic ports servicing international merchant vessels.

All bulk carriers servicing Milne Port, including those for the 2018 shipping season, conduct mid-ocean ballast water exchange as required by federal Ballast Water Control and Management Regulations. Baffinland conducts ballast water monitoring of all

carriers arriving at Milne Port prior to ballast water discharge as a part of compulsory ship inspections to verify their compliance with the Ballast Water Control and Management Regulations and IMO's D-1 standards.

RESULTS

The risk assessment undertaken in support of the ERP (SEM, 2013) determined that shipping operations under the ERP of the Project were unlikely to significantly increase the potential for AIS introductions as a consequence of ballast water discharges or ship hull fouling at Milne Port.

TRENDS

Five years of AIS monitoring has yielded a relatively large dataset of marine organisms residing in Milne Port and Milne Inlet. To date, no confirmed invasive species have been identified in the Project area. Further investigations into the status of several new species identified during the AIS program are in progress in consultation with DFO, with representative specimens sent to a second laboratory for confirmatory taxonomic analysis.

RECOMMENDATIONS / LESSONS LEARNED

Ongoing annual AIS monitoring will add to the current AIS dataset for determining whether changes are occurring as a result of Project shipping that could have biological consequences on marine ecosystem health in Milne Inlet.

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.
Relevant BIM Commitment	57,87
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Transport Canada, Marine Environmental Working Group (MEWG)
Reference	Ballast Water Management Plan (Baffinland 2019j) International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). Available at: http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships'-Ballast-Water-and-Sediments-(BWM).aspx . Accessed on 14 September 2017. (IMO 2017) Discussion paper: Canadian implementation of the ballast water convention. Available at: http://meopar.ca/uploads/BWW_Doc_4_Discussion_Paper.pdf . Accessed on 13 November 2017. (Transport Canada 2012)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland has developed a comprehensive, stand-alone Ballast Water Management Plan (BWMP) that is reflective of its current and future shipping operations under the Phase 2 Proposal (Baffinland 2019j). The BWMP includes information on applicable legislation, BWMP program objectives, monitoring responsibilities, sampling equipment specifications, detailed technical procedures for sampling and analyses, comprehensive QA/QC procedures, and adaptive management measures for implementation during non-compliance events. The BWMP identifies procedures to manage and monitor ship ballast water in a manner consistent with applicable regulations, guidelines, and terms and conditions of the Project Certificate. The BWMP includes a Standard Operating Procedure (SOP) which provides detailed instructions for salinity testing of ballast water tank on carriers calling at Milne Port, including directives for accessing on-board ballast tanks, selecting ballast tanks for testing, equipment set-up and deployment, detailed sampling and data entry procedures, guidance on instrument calibration, maintenance and storage, and reporting requirements.

In response to the threat of the introduction and spread on non-native species through ballast water, the International Maritime Organization (IMO) adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments (i.e., the Ballast Water Management (BWM) Convention). The BWM Convention was recently ratified and

entered into force on 8 September 2017. Under the BWM Convention, all ships are required to have an International Ballast Water Management Certificate, their own Ballast Water Management Plan (BWMP), and a comprehensive record of ballast water exchange and monitoring results recorded in an on-board ballast water record book (with a detailed record of when ballast water is taken on board, when it is circulated or treated for BWM purposes, and when it is discharged into the ocean). Ships also need to record accidental or other exceptional discharges of ballast water to the marine environment.

The BWM Convention includes two performance standards for the discharge of ballast water: D1 and D2. The D1 standard concerns ballast water exchange, which must be undertaken within open ocean areas, defined as waters >200 nautical miles from land and in seas >2000 m deep. The D2 standard covers approved ballast water treatment systems. All ships entering Canadian waters must currently meet the D1 standard. The D2 standard will come into force over a phased time period depending on each ship's date of construction and the timing of its International Oil Pollution Prevention (IOPP) certificate renewal survey, which is required every five years. All new build ships must meet the D2 (treatment) standard after entry into force (8 September 2017). For existing ships, the BWM Convention requires that either the D1 (exchange) or D2 (treatment) standard is met after entry into force (8 September 2017). However, as ballast water exchange (D1) is not considered an ideal method of ballast water management, the BWM Convention requires compliance with D2 (treatment) upon a ship's first IOPP Certificate renewal survey occurring after 8 September 2017.

The D-2 standard (treatment) specifies a maximum number of organisms and indicator microbes that are allowed to be discharged to the receiving marine environment according to the schedule set by the IMO. At this point in time, sampling and analysis methodologies to test for compliance with the D-2 standard have not been fully developed by the IMO yet. It is acknowledged in the IMO guidelines that although significant technical advances and refinements have been made in this area since the adoption of the Convention, there are still numerous issues to be resolved. Administrations are still undertaking research to define the most appropriate methods to test for compliance, and the best way to collect, handle and analyze samples. However, it is expected that in due course, appropriate guidance will become available once full compliance testing regimes are developed and the applicable regulators have had time to gain experience and develop best practice in ballast water sampling and analyses.

To date, none of the ore carriers servicing Milne Port have been subject to the D2 standard (ballast water treatment). All bulk carriers servicing Milne Port, including those during the 2018 shipping season, conducted mid-ocean ballast water exchange as required by federal Ballast Water Control and Management Regulations (D1 standard). As a matter of due diligence, Baffinland conducts ballast water sampling in one randomly selected ballast water tank on all ore carriers arriving at Milne Port prior to ballast water discharge to verify their compliance with the Regulations and the IMO's D1 standard.

In 2018, all bulk carriers that called at Milne Port during the shipping season were boarded by a Baffinland environmental representative that conducted salinity testing of the ship's ballast water before it was approved for release in Milne Port and before loading of the carrier could begin. In these instances, a single ballast tank on the vessel was tested for salinity concentration using a calibrated water quality meter (i.e. YSI Pro 30) to confirm that ballast water salinity levels were above 30 ‰ (parts per thousand), prior to being authorized by the port captain to discharge in Milne Port. Salinity levels were consistent with mid-ocean exchange requirements for vessels conducting a transoceanic voyage (salinity of mid-Atlantic seawater, where open-water exchange takes place, is typically in the range of 34-35 ‰).

It is important to note that it is the ship operators/owners are the responsible party for ensuring their ships are compliant with federal ballast water regulations and the BWM Convention. To facilitate the administration of ballast water management and treatment procedures on board each ship, a responsible officer is designated to ensure the maintenance of appropriate records and to ensure that ballast water management and/or treatment procedures are followed, recorded, and reported in accordance with the regulations. There are no specific legal obligations on the part of port and harbour authorities in relation

to overseeing ballast water management or treatment procedures on behalf of the ship owner/operators, including for testing of ballast water or reporting ballast water readings to the federal authority.

RESULTS

Ballast water salinity was measured in all ore carriers (n=71) that called at Milne Port in 2018. Results are presented in Table 4.23. Salinity measurements for all vessels except for one ranged between 30.0 to 35.5 PPT, which was compliant with federal Ballast Water Regulations. One exception occurred on August 30, 2018 where ballast water tested on the Nordpol measured 20.6 PPT. Golder and Baffinland confirmed that this vessel had exchanged ballast water for freshwater in Port Alfred Canada and that the freshwater could be discharged in Milne Port as the vessel was coming directly from another Canadian Port located within the Canadian Exclusive Economic Zone (i.e., it did not arrive at Milne Port directly from international waters).

Table 4.23 2018 Ship Ballast Water Salinity Test Results

Vessel	Date	Salinity	Tank Tested
Nordic Oasis Voy 1	24-07-2018	35 %	Cargo hold no.4 WB
Nordic Oshima Voy 1	25-07-2018	35 %	Cargo Hold no.4
Sagar Samrat Voy 1	26-07-2018	31 %	Cargo hold no.4
Nordic Odin Voy 1	28-07-2018	31.7 %	Cargo hold no.4
Nordic Olympic Voy 1	29-07-2018	34.5%	Hold #4
Nordin Odyssey Voy 1	30-07-2018	31.5%	DBT 5/6 Port Side
Golden Opportunity Voy 1	31-07-2018	34.4%	Manhole No.4
Nordic Orion Voy 1	31-07-2018	35.5%	Cargo Hold Hold 4
Arkadia Voy 1	01-08-2018	31.9%	Manhole no.3
Golden Ice Voy 1	03-08-2018	31.1%	3 Starboard Side
Golden Saguenay Voy 1	04-08-2018	30%	4 Port Side
NS Yakuita Voy 1	05-08-2018	34%	5 Starboard Side
Golden Pearl Voy 1	06-08-2018	34.1%	2 Port side
Golden Bull Voy 1	07-08-2018	35%	1 Starboard side
Golden Amber Voy 1	08-08-2018	33.8%	5 Port side
Golden Brilliant Voy 1	10-08-2018	34.8%	1 Port side
Golden Ruby Voy 1	11-08-2018	34%	5 Port side
Golden Strength Voy 1	12-08-2018	35.2%	3 Starboard side
Rio Grita Voy 1	13-08-2018	33%	1 Port/Starboard side
Rio Tamara Voy 1	14-08-2018	33.8%	2/3 Starboard side
Golden Suek Voy 1	15-08-2018	33.3%	1 Port side
Golden Opal Voy 1	18-08-2018	34.3%	4 Starboard side
Nordic Oshima Voy 2	19-08-2018	32%	5/6 Starboard side
Sagar Samrat Voy 2	21-08-2018	34.3%	4 Starboard side
Nordic Oasis Voy 2	22-08-2018	33.8%	Cargo Haul No. 4
NS Energy Voy 1	23-08-2018	32.4%	4 starboard
Nordkap Voy 1	24-08-2018	33.1%	2 port side
Golden Diamond Voy 1	25-08-2018	35.4%	5 port side

Vessel	Date	Salinity	Tank Tested
Nordic Olympic Voy 2	27-08-2018	32.6%	5/6 starboard
Nordic Odyssey Voy 1	28-08-2018	33.2%	Cargo Hold 4
Nordic Orion Voy 2	28-08-2018	33.6%	4 port side
NS Yakutia Voy 2	29-08-2018	31.8%	5 starboard
Golden Ice Voy 2	30-08-2018	32.6%	4 portside
Nordpol Voy 1	31-08-2018	20.6%	4 portside
Sea Neptune Voy 1	01-09-2018	33.1%	5&6 portside
Golden Opportunity Voy 2	02-09-2018	31.9%	5 portside
Golden Saguenay Voy 2	03-09-2018	32.4%	4 port side
Golden Pearl Voy 2	06-09-2018	33.9%	5star board
AM Hamburg Voy 1	07-09-2018	34.25%	4 portside
Arkadia Voy 2	07-09-2018	34.2%	4 Starboard
Golden Amber Voy 2	07-09-2018	33.5%	5 starboard
Golden Bull Voy 2	08-09-2018	34%	4 port side
Nordic Odin Voy 2	10-09-2018	34.3%	Cargo hold No. 4
Golden Ruby Voy 2	11-09-2018	34.6%	5 port side
Golden Brilliant Voy 2	12-09-2018	34.3%	4 port side
Rio Grita Voy 2	13-09-2018	34.4%	5/6 port side
Bulk Destiny Voy 1	14-09-2018	34.5%	4 port side
Nordic Oshima Voy 3	15-09-2018	34.5%	cargo hold no.4
Federal Tambo Voy 1	16-09-2018	33.7%	Fore Peak ballast tank
Golden Suek Voy 2	17-09-2018	34.1%	3 port side
Golden Strength Voy 2	18-09-2018	34.7%	3 starboard
Nordic Bothnia Voy 1	18-09-2018	34.3%	Cargo hold no.3
Rio Tamara Voy 2	19-09-2018	34.2%	2/3 port side
Golden Opal Voy 2	20-09-2018	33%	5 port side
Sagar Samrat Voy 3	21-09-2018	34.1%	C/H 4 (booby hatch)
Nordic Oasis Voy 3	22-09-2018	32.5%	2/3 port side
Golden Diamond Voy 2	23-09-2018	32.7%	5 port side
NS Energy Voy 2	23-09-2018	32.3%	5 port side
Nordkap Voy 2	24-09-2018	33.7%	4 port side
Golden Ice Voy 3	26-09-2018	34.3%	5 port side
NS Yakutia Voy 3	28-09-2018	34.3%	5 starboard
Nordic Orion Voy 3	29-09-2018	33.1%	CH. 4 (booby hatch)
Golden Opportunity Voy 3	03-10-2018	33.3%	5 starboard
Golden Pearl Voy 3	03-10-2018	32.9%	5 port side
Nordpol Voy 2	04-10-2018	32.7%	3 port side
Golden Amber Voy 3	05-10-2018	32.3%	5 port side
Nordic Olympic Voy 3	06-10-2018	32.4%	5/6 port side

Vessel	Date	Salinity	Tank Tested
Nordic Odin Voy 3	08-10-2018	33.9%	4 (booby hatch)
Nordic Oshima Voy 4	13-10-2018	33.8%	4 CH (booby hatch)
Arkadia Voy 3	14-10-2018	33%	3 Port side
Nordic Odyssey Voy 2	15-10-2018	34.1%	No. 4 CH (Topside cover of cargo hold)

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement and, as necessary, update the Ballast Water Management Plan (BWMP) to maintain compliance with Canadian and international regulations. With Canada’s ratification of the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (IMO 2017) that entered into force on September 8, 2017 (IMO 2017), ships are now required to incorporate an on-board ballast water treatment system to meet D-2 performance standards and further reduce the potential for invasive species introductions. Newly built ships must now meet the D-2 standard, while the requirements for existing ships will be implemented over a phased period up to 2024 in coordination with the renewal of each ship's International Oil Pollution Prevention Certificate (IOPPC). Until then, all ships will continue ballast water exchange outside the Canadian Exclusive Economic Zone (EEZ). Baffinland has updated its BWMP to reflect this new legislation.

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 Mammal 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.
Relevant BIM Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Compliance
Stakeholder Review	Transport Canada, Marine Environment Working Group (MEWG)
Reference	Ballast Water Management Plan (Baffinland 2019j) Ballast Water Control and Management Regulations (SOR/2011-237). Government of Canada. Last amended in 2017-02-13. Available at: http://laws-lois.justice.gc.ca/eng/regulations/SOR-2011-237/ . Accessed on 14 February 2018 (Transport Canada 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland's stand-alone Ballast Water Management Plan describes Baffinland's commitment and steps taken to verify that vessels calling at Milne Port 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 under the *Canada Shipping Act* (SOR/2011-237). The Milne Port BWMP includes on-board inspection of ship logs by a Baffinland representative to confirm mid-ocean ballast water exchange has occurred, and on-board testing of ballast water in a single random tank for each ship calling at Milne Port to verify that it meets the regulation for salinity (at least 30 ppt) prior to discharge.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement and, as necessary, update the Ballast Water Management Plan (BWMP) to maintain compliance with Canadian and international regulations. With Canada's ratification of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO 2017) that entered into force on September 8, 2017, ships are now required to incorporate on-board ballast water treatment to meet D-2 performance standards. Newly built ships must immediately meet the D-2 standard, while requirements for existing ships will be phased over a period up to 2024 in coordination with the renewal of each ship's International Oil Pollution Prevention Certificate (IOPPC). Until then, all ships will continue ballast water exchange outside the Canadian Exclusive Economic Zone (EEZ).

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Compliance
Stakeholder Review	Transport Canada, Marine Environmental Working Group (MEWG)
Reference	Draft 2018 MEEMP and AIS Monitoring Report (Golder, 2019b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

To address PC Condition No. 91, ship hull biofouling monitoring was included into the 2018 MEEMP and AIS Monitoring Program (Golder, 2019b). The program consisted of conducting underwater video surveys of the hulls of several ore carriers berthed at the ore dock using an ROV-based underwater video system. Surveys were conducted along a series of horizontal transects along the hulls of the ore carriers, interspaced to cover a representative range of depths of the submerged hulls. Much of the effort was focused on areas of the hull where biofouling was most likely to occur (e.g., chain lockers, bulbous bow and stem, sea-chain grating, stern tube, rope guard, propeller nose cone and blades, rudder side, bottom, leading and trailing edges). The collected video recordings were later examined by qualified biologists to identify potential biofouling species to the lowest practical taxonomic level.

As outlined in the update for PC Condition No. 87, in addition to ship hull monitoring, AIS monitoring that included zooplankton, macroflora, benthic epifauna and infauna, fish and encrusting epifauna, has been conducted every summer in Milne Port and at Ragged Island. AIS surveys conducted as part of the MEEMP are designed to detect potential AIS introductions primarily from ship ballast water releases but also from ship fouling.

RESULTS

As shown in Table 4.24, a total of 32 ROV transects were conducted alongside three (3) ore carriers docked in Milne Port between August 3 and 5, 2018. A total of 302 minutes of video footage was collected of the ship hulls. The video was subsequently analyzed by an experienced marine biologist to assess the presence or absence of AIS on the ship hulls. Surveys of the Arkadia and Golden Ice ore carriers consisted of transects along each of the four corners of the ship hull (i.e. starboard stern, starboard bow, port bow, port stern). No signs of biofouling were identified from video collected along any of the transects of the Golden Ice ore carrier in 2018. Transects conducted along the Arkadia and Golden Saguenay did, however, detect a small amount of biofouling at the stern of the ship near the propeller on both ore carriers. The biofouling observed at the stern of the Arkadia was identified as encrusted barnacles (*Balanomorpha* - species undetermined). The observed growth on the stern area of the Golden Saguenay carrier could not be positively identified. The biofouling was observed at an approximate water depth of -8.6 and -7.3 m respectively, which was too deep for sample collection using the planned hull scraping methods.

Table 4.24 Ship Hull biofouling monitoring effort in 2018

Date	Carrier	Location of Survey	Number of Transects	Transect Depths (m)	Survey Effort mm:ss)	Evidence of Biofouling
3 August 2018	Arkadia	Starboard stern	3	1, 3, 5	27:25	No signs of biofouling
		Starboard bow	3	1, 4, 7	26:51	
		Port bow	4	1, 3, 7, 10	54:51	
		Port stern	4	1, 3, 6, 9	44:31	
		Stern and propeller	1	8	10:02	Barnacles observed near propeller
4 August 2018	Golden Ice	Starboard stern	3	2, 5, 9	27:27	No signs of biofouling
		Port stern	3	1, 4, 8	27:21	
		Port bow	4	2, 4, 7	36:31	
		Starboard bow	2	2, 5	12:18	
5 August 2018	Golden Saguenay	Starboard stern	3	1, 4, 7	24:36	Unidentified potential growth near propeller
		Port stern†	2	2, 5	11:20	

No non-native or invasive zooplankton, benthic epifauna, macroflora or fish taxa were found during 2018 AIS studies. The status of one of the newly identified benthic infauna species, *Pseudofabricia* sp. nr. *aberrans*, could not be determined. The species has only been described as endemic in the Mediterranean Sea and was not identified in the invasive species databases. This species may have been present in the Project area before 2018 but went undetected since it inhabits deeper water sediment areas which were sampled for the first time in 2018. Due to these uncertainties, *P.* sp. nr. *aberrans* cannot be positively identified as an AIS in Milne Inlet at this time. Further investigations into the status of *P.* sp. nr. *aberrans* is in progress in consultation with DFO. A representative sample has been sent to a second laboratory for confirmatory taxonomic analysis.

TRENDS

The underwater video survey of the three ore carriers showed that most of the hulls were free of biofouling with exception of small areas at the sterns of two ships where some amounts of colonization by aquatic organisms were found. Only colonizing taxa (barnacles) of one of the ships was identified.

RECOMMENDATIONS / LESSONS LEARNED

Due to the limits of identification using solely the video footage, with no sample collection possible given the location and depth of the observed biofouling, identification to species or genus level was not possible. Future ship hull monitoring surveys should aim to collect video footage using high definition cameras which were not available for the 2018 AIS survey due to technical constraints of the ROV available for the program.

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.
Relevant BIM Commitment	10, 108, 110
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Emergency Response Plan (Baffinland, 2018e) Spill Contingency Plan (Baffinland 2017f) Oil Pollution Emergency Plan – Milne Inlet (Baffinland 2017e) Spill at Sea Response Plan (Baffinland 2015b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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. Oil Pollution Emergency Response training and spill response exercises are conducted annually. Timing of the training corresponds with ship-to-shore fuel transfer events at Milne Port. In 2018, training of Baffinland staff on its Oil Pollution Emergency Plan (OPEP) was conducted by spill response consultant Navenco Marine on July 20-22, 2018. The training encompassed classroom and hands-on spill response techniques including a mock exercise for potential port oil spills during ship-to-shore transfer. The training also included an audit inspection to confirm that Baffinland's spill response equipment and training requirements were in compliance with the OPEP and Transport Canada regulations for Baffinland's Class 1 Oil Handling Facility. General land-based spill response training is periodically reviewed with the Mine Rescue Team; however, this does not apply to the OPEP. 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	106
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Communities of Hall Beach and Igloolik
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	8
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	8
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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> <p>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:</p> <ul style="list-style-type: none"> • Pinch points; • The approaches into Steensby Inlet and Milne Inlet; • Shallow water and shorelines; and, • Areas that have been identified as having high flows and/or high concentrations of marine mammals, marine fish or seabirds. <p>b. Open water and, where applicable, ice-covered conditions</p> <p>c. Spill volumes up to and including loss of a full tanker cargo</p> <p>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</p>
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Transport Canada Marine Safety. Canadian Coast Guard
Reference	Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season – Milne Inlet, Eclipse Sound, Pond Inlet (AMEC Foster Wheeler, 2015) Spill at Sea Response Plan (Baffinland, 2015b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

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 from the 2015 report 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

The spill modelling results highlight the importance of spill prevention and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

If changes to the shipping practices are proposed for future phases of the Project, updated spill modelling will be conducted.

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.
Relevant BIM Commitment	11, 106
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Transport Canada Marine Safety, Canadian Coast Guard
Reference	Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season – Milne Inlet, Eclipse Sound, Pond Inlet (AMEC Foster Wheeler, 2015) Spill at Sea Response Plan (Baffinland, 2015b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 from the 2015 report 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

The spill modelling results highlight the importance of spill prevention and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

If changes to the shipping practices are proposed for future phases of the Project, updated spill modelling will be conducted.

4.6.10 Marine Wildlife (PC Conditions 99 through 128)

Thirty-one (31) PC conditions (including 125 and 125a) relate to the potential effects 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 potential 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 and other regulatory reporting, as necessary. The communities expressed concerns during the FEIS and FEIS addendum environmental review process about potential impacts to marine mammals, mainly narwhal in Pond Inlet and walrus in Igloolik; community awareness of shipping activities; and the potential for the Project to impact potential fisheries resources in Steensby and Milne Inlets. Nunavik, represented by the Makivik Corporation, expressed concern over potential impacts of shipping on marine mammal populations in Hudson Strait.

The potential effects of increased shipping on marine wildlife was expressed in 2018 consultation activities (Appendix B). Noise was raised as a concern during 2018 community meetings, in relation to the underwater noise-levels causing less marine life near Pond Inlet and more near Arctic Bay (Appendix B). Fewer narwhal were present in the Pond Inlet – Eclipse Sound – Milne Inlet area in 2018, and as such, fewer narwhal were harvested in 2018 compared to previous years.

Support for the continuation of the Bruce Head Narwhal Monitoring Study, which was not conducted in 2018, was also expressed, with a request for additional monitoring stations.

Monitoring

Baffinland implements a number of marine mammal monitoring programs. In 2018, marine environment monitoring programs undertaken by Baffinland included the following:

- Marine Environmental Effects Monitoring Program (water, sediment, invertebrates and fish) around the ore dock;
- Aquatic invasive species (AIS) Monitoring Program;
- Ore Dock Marine Fisheries Habitat Offset Monitoring Program; and
- Tremblay Sound Narwhal Tagging Program, in partnership with Fisheries and Oceans Canada (DFO).

Five (5) underwater acoustic monitoring stations were deployed near Bruce Head in 2018 to document ambient underwater noise levels along the shipping corridor, monitor marine mammal presence, and to compare measured (actual) ship noise levels to estimated ship noise levels determined through underwater noise modelling. Acoustic monitoring results suggested that shipping activities in 2018 had minimal influence, and may have disturbed narwhal or seriously impacted their listening space at most 1% of the recording period.

Table 4.25 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

To the extent that Project impacts on marine mammals can be evaluated, the effects of the Project are within FEIS predictions.

Table 4.25 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 of landfast ice	No project interactions to monitor in 2018	N/A
	Hearing impairment and/or damage caused by sound from construction activities	No in-water construction in 2018	N/A
	Disturbance caused by airborne and/or underwater sound from construction, shipping and aircraft	Five (5) underwater acoustic monitoring stations deployed near Bruce Head in 2018	Acoustic monitoring results demonstrated minimal impact on narwhal Effects within FEIS predictions
Narwhal	Masking of environmental sounds caused by vessel and construction sound	Five (5) underwater acoustic monitoring stations deployed near Bruce Head in 2018	Acoustic monitoring results demonstrated minimal impact on narwhal Effects within FEIS predictions
Bowhead Whales	Mortality from collisions with vessels and blasting during construction	No collisions were noted by 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 2018.	Effects 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 follows.

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.
Relevant BIM Commitment	81
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Baffinland Marine Environmental Effects Monitoring Plan (Baffinland 2016k)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

PC Condition No.99 applies to the construction phase of the Project and completion of supplemental baseline assessments. The Project is currently in the Early Revenue Phase and supplemental baseline assessments are now complete (pre-2018). These have been submitted to NIRB and are also available on Baffinland's share site (website). Current effort is focused on environmental effects monitoring (EEM) using a number of different EEM programs that focus on detection of potential Project effects on marine mammals and the marine environment. Detailed information on EEM study design and sampling methodology are available in Baffinland (2016k).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

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.
Relevant BIM Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

There is currently no winter shipping occurring as part of the Mary River Project so there is no need to address fuel spills during winter months in the Shipping and Marine Wildlife Management Plan.

RESULTS

Not applicable in 2018.

TRENDS

Not applicable in 2018.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will update the Shipping and Marine Wildlife Management Plan 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> <ul 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: <ul 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).
Relevant BIM Commitment	Not Applicable
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG), Nunavut Impact Review Board
Reference	2014-2016 Shore-based Monitoring Program (Smith et al., 2016) 2017 Bruce Head Shore-based Monitoring Program (Golder, 2018j) Draft 2014-2017 Integrated Report - Bruce Head Shore-based Monitoring Program (Golder, 2018k) Draft 2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner, 2019) Draft 2017 Narwhal Tagging Report - Technical Data Report (Golder, 2019c) 2018 MEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en Appendix C1

METHODS

- a. No activity took place at Steensby Port in 2018. This phase of the project is currently inactive.
- b. Inuit were actively involved in the planning and execution of the 2018 monitoring programs (2018 MEEMP and AIS Monitoring Program, 2018 Habitat Offset Monitoring Program at Milne Port, 2018 Bruce Head Vessel-based Monitoring Program, 2018 Ship-Based Observer (SBO) Program and the 2018 Tremblay Sound Narwhal Tagging Program). A training workshop was provided in Pond Inlet in late July 2018 for all Inuit participants in the 2018 Monitoring Programs. Practical technical training was also provided on-site for those participants successfully employed on the 2018 Monitoring Programs
- c. As a follow-up to the 2018 field programs, Baffinland conducted face-to-face meetings in Pond Inlet with the Mittimatalik HTO (MHTO) (28–29 Nov 2018) as well as the 2018 Inuit program participants (29 Nov 2018) to provide a recap of the 2018 monitoring programs, to review and discuss preliminary monitoring results, and to solicit input on program design and program planning for the 2019 Monitoring Programs. Baffinland’s monitoring programs strive to actively involve local participation and 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 members, and Inuit are employed by Baffinland to assist with the programs.
- d. Baffinland’s ongoing development and refinement of monitoring programs and protocols considers input from local community members (e.g., concerns that are communicated through community workshops) as well as discussions with the 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 MHTO joined the MEWG in 2016.
- e. In 2017 and 2018, several new monitoring tools (i.e., detecting devices) were incorporated into a new narwhal monitoring program that allowed for adequate monitoring of narwhal through changing seasonal and daylight conditions, as well as during periods when narwhal are not readily visible (because they are underwater). The 2018 Narwhal Tagging Program involved deploying remote sensing tags on the backs of narwhal to effectively track the animal’s 3 dimensional movements, vocal behavior and surrounding acoustic environment over an extended time-series as the animals naturally moved through their summer foraging range in the North Baffin Island region. This provided insight into the animal’s behavior over a continuous 24-h period, throughout changing environmental conditions and across a broad geographic range. The deployment of satellite-based location/dive tags on individual narwhal allowed for the tracking of narwhal spatial movement (horizontal and vertical) in relation to shipping events. The deployment of Acousonde (passive acoustic recorder) tags on individual narwhals allows for the evaluation of potential changes in narwhal behavior in relation to received levels of shipping noise, in comparison to their movements and behaviour when no shipping is present. Passive acoustic tags allow for a better understanding of what the whale is hearing (received sound levels) in its natural environment, while simultaneously recording information on 3-dimensional movement and vocal behavior of the tagged animal. In addition, information from these tags helps to refine the inherent errors associated with abundance/population estimates when using visual survey techniques (as it allows to correct for surface availability bias, related to the period when animals are unobservable because they are underwater). The 2017 and 2018 Narwhal Tagging Program was a collaborative study with Fisheries and Oceans Canada. Detailed methodology on data collection and analytical procedures for the 2017 Narwhal Tagging Program is presented in Golder (2019c).
- f. In 2018, five underwater acoustic monitoring stations were deployed near Bruce Head over a 2-month period (Aug-September) to document ambient underwater noise levels along the shipping corridor, monitor marine mammal presence along the shipping corridor near Bruce Head and in Koluktoo Bay, and to compare measured (actual) ship noise levels to estimated ship noise levels determined through underwater noise modelling undertaken in support of the FEIS. This acoustic program allowed for monitoring of narwhal through changing seasonal and daylight conditions, as well as during periods when narwhal were not readily visible. Detailed methodology on data collection and analytical procedures for the 2018 Passive Acoustic Monitoring Program is presented in Frouin-Muoy and Maxner (2019).

- g. No marine mammal aerial surveys took place in 2018. Baffinland is currently in planning stages for undertaking marine mammal aerial surveys along the Northern Shipping Route during summer of 2019.
- h. No activity took place at Steensby Inlet in 2018. This phase of the project is currently inactive.
- i. Baffinland undertook a shore-based narwhal monitoring program at Bruce Head over a continuous 5-year period (2013-2017¹⁰). The objective of the Bruce Head shore-based monitoring study was to investigate narwhal response to shipping activities along the Northern Shipping Route in Milne Inlet, with data collected annually on relative abundance and distribution (RAD), group composition, and behaviour. Additional data were also collected on environmental conditions and anthropogenic activities (e.g., shipping and hunting activities) to distinguish between the potential effects of Project-related shipping activities and confounding factors which may also affect narwhal behaviour.
- j. In 2018, Golder undertook an integrated analysis of the combined 2014–2017 Bruce Head dataset using the RAD model and group composition and behaviour models developed by Golder in 2017. Detailed methodology on data collection and analytical procedures for the 2017 Bruce Head study is presented in Golder (2018k).
- k. Baffinland understands that the intent of this condition (101-h) was to address concerns related to icebreaking of land-fast ice in support of shipping operations along the Southern Shipping Route and in Steensby Port. This phase of the project is currently inactive. Baffinland has not undertaken icebreaking of land-fast ice along the Northern Shipping Route.

RESULTS

- a. Not applicable in 2018.
- b. A total of 11 Inuit participants received program-specific training prior to their participation in the 2018 marine monitoring programs. A total of 9 Inuit participants were employed for the 2018 monitoring programs. Five of the 12 Inuit participants were employed through the MHTO in Pond Inlet and four were Inuarak Outfitting employees. The total amount of work hours for Inuit staff on the 2018 monitoring programs was 1,610 hours. The work positions filled by Inuit participants in 2018 included: marine mammal observers, polar bear monitors, narwhal tagging personnel, marine field sampling technicians, boat operators and boat assistants.
- c. The Bruce Head marine mammal monitoring program, which has been conducted each year since 2013 (noting that this was a vessel-based program in 2018), originated from a proposal by the QIA to develop a community-based monitoring protocol and has been operated with a team of Inuit marine mammal observers and polar bear monitors each year.
- d. Detailed results of the 2017 Narwhal Tagging Program are presented in Golder (2019c) with a brief summary presented below. Narwhal tagging data suggest that most dive behavioural responses by narwhal are elicited at relatively close distances (<2km) to a passing ship, although several specific responses are observed at intermediate distances (up to 5 km from the source), such as increased turning rate and decreased bottom dives, suggesting potential foraging effects are possible within this range. Distances at which behavioural responses were observed in the present study are smaller than the zones of acoustic disturbance predicted through acoustic modelling where disturbance was predicted to occur at ranges extending from 12 to 29 km from a ship (depending on location on ship type). The discrepancy between measured and modelled disturbance distances relevant to vessel noise may be due to a variety of factors including animal habituation to vessel noise, site-specific noise propagation limitations, overly conservative model assumptions, and the lack of any scaling or weighting in the disturbance threshold to account for species-specific hearing abilities. This is particularly relevant for narwhal, given that the majority of ship noise energy is <1kHz, which is well below the main frequency range used by narwhal for communication and echolocation (5 to 100 kHz), and thus assumed to be outside their sensitive hearing range. Observed behavioural responses in narwhal during interactions with ships were shown to be in agreement

¹⁰ 2013 represented a pilot study year

with impact predictions made in the FEIS, which stated that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment' or long-term displacement behavior is anticipated.

Data collected during the 2018 Narwhal Tagging Program are currently being analyzed and will be presented in a technical report scheduled for release in Q4 of 2019.

Detailed results of the 2018 Passive Acoustic Monitoring Program are provided in Frouin-Muoy and Maxner (2019). Acoustic monitoring results demonstrated that ambient sound levels were similar at four of the five recording stations, with lower sound levels recorded at the fifth station where the recorder was located in a more protected embayment (Koluktoo Bay). The primary contributor to the soundscape throughout the recording period was shipping; however, wind and waves also contributed to the ambient noise at each station. Sounds from three species of marine mammals were identified acoustically in the data: narwhal, killer whale and ringed seal. The results of the PAM study suggest that ship noise levels did not exceed established acoustic injury thresholds for marine mammals (NOAA, 2018). Exceedances of the established 120 dB behavioural disturbance threshold for marine mammals (NOAA, 2013) were rare at both AMAR-1 (the station with the highest narwhal vocal detections) and AMAR-3 (the station with the lowest sound levels in Koluktoo Bay). Listening space reduction (LSR) is the fractional decrease in the available listening space for marine mammals. The largest LSR occurrences were associated with ambient noise, such as wind and rain, rather than the vessels for the narwhal whistle and click frequencies, especially at AMAR-3. Acoustic monitoring results demonstrated that shipping activities in 2018 may have disturbed narwhal or seriously impacted their listening space at most 1% of the recording period.

- e. Not applicable in 2018.
- f. Not applicable in 2018.
- g. In 2018, Golder undertook an integrated analysis of the combined 2014–2017 Bruce Head dataset using the RAD model and group composition and behaviour models developed by Golder in 2017. Key findings from the 2014–2017 Bruce Head Monitoring Program include the following:
 - Relative abundance and distribution (RAD):
 - The relative abundance of narwhal in the Bruce Head area has remained relatively constant over the four years of sampling (as shown by a lack of significant year effect on counts and fewer occurrences of zero counts in 2017) despite the relative increase in shipping during this period.
 - Model results indicated that vessel direction within Milne Inlet (south- vs northbound vessels) affected the response of narwhal relative to distance from large vessel. Conversely, the direction of vessel relative to the substrata (heading toward or away from substrata) was not a significant predictor of relative abundance.
 - Group composition and behaviour:
 - Group size - group sizes changed between years, but not in a manner consistent with the increase in vessel traffic between 2014 and 2017. Model results also did not suggest temporary effects of large vessel transits on narwhal group size within the BSA.
 - Group composition - groups with calves/yearlings and groups with tusks were present in the BSA and SSA throughout the four sampling years. Model results indicated no effect of large vessel transits on presence of tusks or calves/yearlings in observed groups in the BSA. For both response variables, group size was the only significant predictor variable identified.
 - Group spread - narwhal were more often observed in tight associations compared to loose associations under both vessel presence and vessel absence scenarios. During passage of a large vessel within 15 km from the BSA,

loosely spread groups were more likely to occur when southbound or northbound vessels heading toward the BSA were 2-4 km away from the BSA, or when northbound vessels heading away from the BSA were near (≤ 2 km). In addition, the probability of observing a group in a loose spread significantly increased with group size.

- Group formation - narwhal were usually observed in parallel formation under both vessel presence and vessel absence scenarios. Models indicated no effect of vessel transits on group formation in the BSA (analyzed as presence/absence of non-parallel groups). The probability of observing a non-parallel formation increased significantly with group size.
- Group direction - narwhal groups were predominantly observed travelling south through the BSA. When northbound large vessels were within 15 km of the BSA, narwhal were most often observed travelling south, regardless of direction of the vessel relative to the BSA. In the presence of southbound vessels, narwhal groups travelled both north and south when the vessel was heading toward the BSA (model predictions were of a predominantly southward traveling direction). When the southbound vessel headed away from the BSA, narwhal groups were observed traveling predominantly north, unless the vessel was within close proximity (≤ 2 km). Narwhal tended to travel south in large groups and north in small groups.
- Travel speed - the majority of narwhal groups travelled at a medium speed, regardless of large vessel presence/absence. The probability of observing slowly-traveling groups increased when large vessels were south of the BSA (regardless of direction of travel and direction relative to the BSA) and in close proximity (≤ 3 km). When vessels were north of the BSA, the probability of observing slowly-traveling groups was low, especially for southbound vessels. The probability of observing slowly-traveling groups decreased with group size.
- Distance from Bruce Head shore - narwhal groups were observed more often at a distance < 300 m of the Bruce Head shore compared to groups > 300 m offshore under both vessel presence and vessel absence scenarios. Offshore groups were detected less frequently with increasing Beaufort scale values, indicating observer impediment with worsening sea state. Model results indicated that narwhal groups tended to be offshore when large vessels were 3–6 km away from the BSA, especially when vessels were heading toward the BSA (compared to vessels heading away from the BSA). When vessels were close, the model estimated that narwhal groups were concentrated inshore.

Observations collected throughout the four-year study period indicate the following:

- The majority of narwhal recorded in the SSA during the four-year study period were engaged in travelling behaviour. Other behaviours observed in the SSA included nursing, rubbing, tusking, foraging, and mating. In all years, narwhal calves were commonly observed in the SSA, with observations of nursing behaviour recorded in 2015 (two occasions), 2016 (four occasions) and 2017 (two occasions). On 11 August 2016, the birth of a narwhal calf off Bruce Head was observed. Collectively, these observations lend support to the hypothesis that this part of Milne Inlet is important for calf rearing.
- Narwhal occur most frequently south of the SSA in the vicinity of Koluktoo Bay and the entrance to Assomption Harbour (Milne Port). A similar distribution of narwhal has been reported during aerial surveys conducted in the Milne Inlet region (Thomas et al. 2015, 2016; Golder, 2018m) affirming the importance of Koluktoo Bay as a refuge for narwhal during the open-water season.
- Responses of narwhal to ore carrier traffic is variable, ranging from 'no obvious response' in which animals remain in close proximity to ore carriers as they transit through the SSA, to temporary and localized displacement and related changes in behaviour. However, no overall decrease in the abundance of narwhal in the area was observed.

- During each survey year, narwhal were observed to respond to shooting (i.e. hunting) events by diving and increasing their swim speed. Despite repeatedly being shot at from the same location (i.e. the hunting camp below the Bruce Head observation platform), narwhal were regularly observed to return to the study area, though the time until they returned was variable.

Overall, results from the 2014-2017 Bruce Head Shore-based Monitoring Program, including observed behavioural responses of narwhal during their interactions with ships, were shown to be in agreement with impact predictions made in the FEIS, which predicted that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment or long-term displacement behavior is anticipated'.

Detailed results of the 2014-2017 Integrated Report for the Bruce Head Shore-based Monitoring Program are presented in Golder (2018k).

- h. Not applicable in 2018.

TRENDS

- a. Not applicable in 2018.
- b. Inuit have been involved in monitoring studies at all levels since the inception of the program. The addition of the MHTO as members of the MEWG in 2016 has increased the participation of Inuit in this process.
- c. Inuit participation in Baffinland's monitoring programs decreased slightly in 2018 compared to 2017 (from 2,265 hours / 12 participants in 2017 to 1,610 hours / 9 participants in 2018). However, engagement with Inuit community members on the design and results of the marine monitoring programs increased in 2018 compared to previous years.
- d. Additional detecting devices (passive acoustic monitoring stations at Bruce Head, satellite-based remote sensing tags deployed on narwhal) were integrated into the 2018 EEM programs.
- e. Not applicable in 2018.
- f. Not applicable in 2018.
- g. Results of the 2014-2017 Bruce Head shore-based monitoring study indicate that the relative abundance of narwhal counted along this part of the shipping route has not significantly changed over the four-year survey period (2014-2017) despite increasing vessel traffic over this period (note that 2013 was a pilot study of shorter duration and was not included in this analysis). Overall, study results including observed behavioural responses of narwhal during their interactions with ships, appear to be in agreement with impact predictions made in the FEIS, which state that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment or long-term displacement behavior is anticipated'.
- h. Not applicable in 2018.

RECOMMENDATIONS / LESSONS LEARNED

- a. Not applicable in 2018.
- b. Marine monitoring programs will be reviewed with the MEWG in 2019 in consideration of increasing Inuit involvement if possible.
- c. Marine monitoring programs will be reviewed with the MEWG in 2019, with the intention of increasing responsiveness to Inuit concerns if possible.

- d. Marine monitoring programs will be reviewed in 2019, and discussed with the MEWG and the MHTO, and will consider the use of additional detecting devices. A passive acoustic monitoring program is proposed in 2019 that would be undertaken in concert with the Bruce Head visual-based behavioural monitoring program conducted at Bruce Head (shore-based monitoring station) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019 to address this identified data gap.
- e. Baffinland is currently in planning stages for undertaking marine mammal aerial surveys along the Northern Shipping Route during summer of 2019.
- f. Not applicable in 2018.
- g. Shore-based monitoring at Bruce Head has been shown to be an effective method for monitoring of narwhal in relation to shipping activities. For 2019, the following recommendations are being considered for the proposed 2019 shore-based monitoring program:
 - Data collection:
 - Supplement visual observation with drone footage. This will provide a means to verify observation counts and will allow to correct for observation bias under conditions of low visibility or increased distance. In addition, drone footage may be helpful for filling in missing information on narwhal behaviour and composition in the BSA, where observers are not able to record certain aspects of group behaviour due to reduced sightability.
 - Analysis:
 - Assess the potential effects of simultaneous transits of multiple large vessels on narwhal RAD and behaviour. At this time, it is unknown whether the effects of consecutive transits of a single large vessel are different than a single transit of multiple large vessels (travelling in SSA simultaneously).
 - Integration of acoustic monitoring results with shore-based observer data to assess if and when narwhal alter their acoustic behaviour in response to vessel transits. A passive acoustic monitoring program is proposed in 2019 that would be undertaken in concert with the Bruce Head visual-based behavioural monitoring program conducted at Bruce Head (shore-based monitoring station) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019 to address this identified data gap.
- h. Not applicable in 2018.

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.
Relevant BIM Commitment	30, 36
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Baffinland Corporate Website – Ship Locations
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

Baffinland has contracted exactEarth®, 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 the vessel 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 do provide regularly updated snap shot of vessel movement in the North Baffin region.

RESULTS

Baffinland has made vessel routing accessible to the public via the Baffinland website. Baffinland also installed an Automated Information System at the MHTO office for live continuous monitoring of vessels active in the Northern Shipping Route.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth® 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> <ul style="list-style-type: none"> a. A record of all ship tracks taken along both shipping routes covering the entire shipping season; b. When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; c. A comparison of recorded ship tracks to the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; d. An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and e. When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.
Relevant BIM Commitment	Not applicable
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	Daily Ice Charts – Approaches to Resolute Bay (Canadian Ice Service 2019) Draft 2018 Ship-Based Observer Program (Golder 2018d)
Ref. Document Link	N/A

METHODS

- a. Project-related ship tracks and ship speeds along the Northern Shipping Route were recorded throughout the 2018 shipping season using an automatic ship tracking system (Automated Identification System or AIS), which tracks the movement of each ship using an onboard AIS transceiver with integrated Global Positioning System (GPS). Vessels fitted with AIS transceivers are tracked in the Project area by an AIS base stations set up at Pond Inlet and Bruce Head; and when out of range of the base stations, through satellites with AIS receiving capability. Information provided by AIS equipment includes the vessel's unique identification number, position, course, and speed. Baffinland has contracted exactEarth®, a global vessel monitoring and tracking service based on AIS data from polar orbiting satellites to track and report on vessel movements.
- b. Vessel ship tracks are publicly accessible through the Baffinland website during the shipping season. Maps have also been prepared showing 2018 ship tracks along the Northern Shipping Route for the full duration of the shipping season.
- c. Baffinland procured an Ice Management Vessel in 2018 to facilitate the safe passage of vessels through prevailing ice conditions (i.e., both the start and end of the shipping season).

For the 2018 shipping season, maps have been prepared showing the Ice Management Vessel - the MSV Botnica - ship tracks (along with vessels under escort) on all days when ice concentrations were 4/10 or greater. These maps include an overlay of sea ice concentration (i.e., coverage) provided by the Canadian Ice Service (2019).

Additionally, marine mammal observers were present on the MSV Botnica during the shoulder shipping seasons (28 July through 07 August 2018; 28 September through 17 October 2018) as part of Baffinland’s Ship-based Observer (SBO) Program. Prevalent ice conditions along with seabird and marine mammal sightings made during this time, are presented in the 2018 Ship-based Observer Report (Baffinland 2019d).

- d. See update to (a) and (b) above.
- e. See update to (a) and (b) above.
- f. See update to (a) and (b) above.

RESULTS

The 2018 ship tracks are plotted in Figure 4.15. There were no significant deviations from the nominal shipping route in 2018 by Project ore carriers. On one occasion, ship-based wildlife observers on the MSV Botnica observed narwhal using a 1-day old track following the MSV Botnica (17 October 2018).

TRENDS

No significant deviations from the nominal shipping route have occurred in the first four years of iron ore shipping (2015--2018).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor ship tracks using the shore-based AIS stations at Pond Inlet and Bruce Head, and satellite-based ship tracking using the exactEarth® AIS archive.

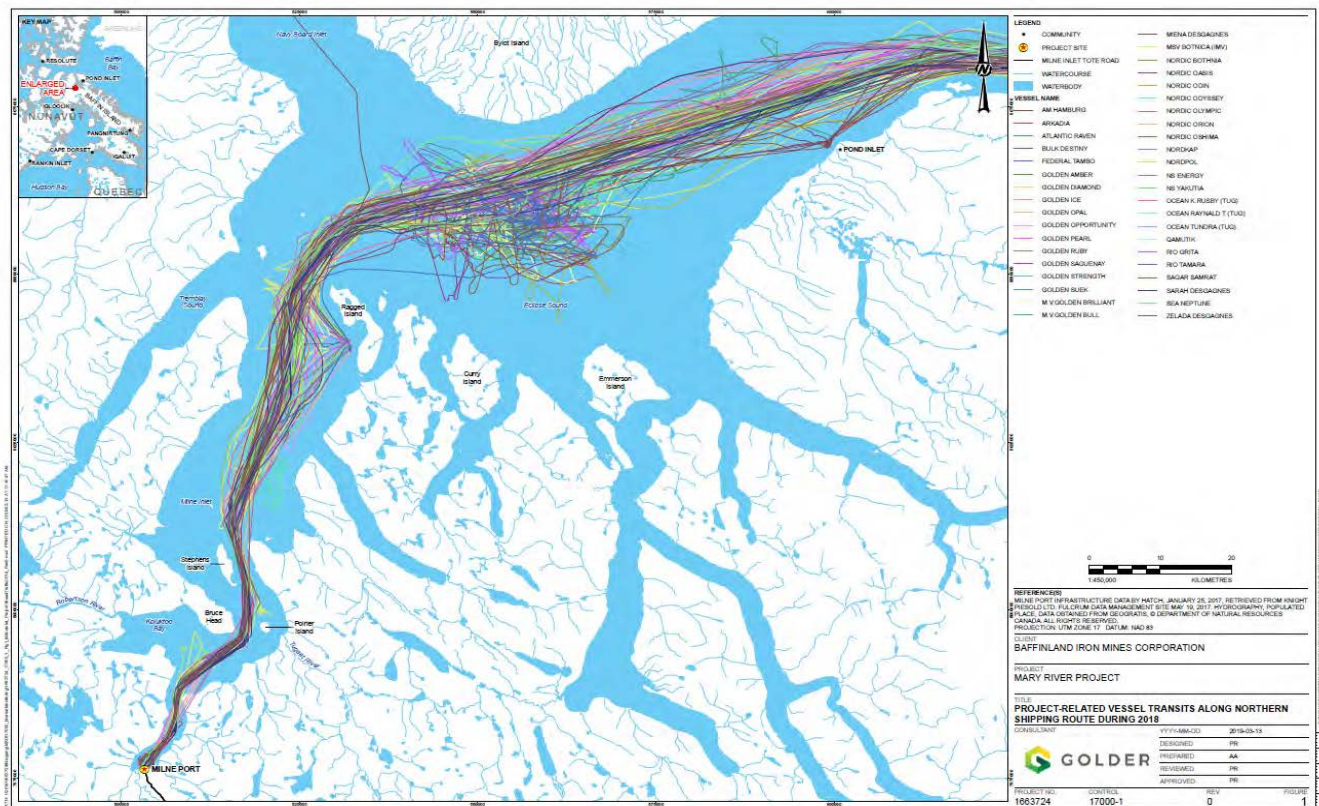


Figure 4.15 Project Related Vessel Transits - 2018

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> <p>a. 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.</p> <p>b. 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.</p>
Relevant BIM Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

- a. Shipping from Steensby Port is not currently an active part of the Project. Not applicable in 2018.
- b. No significant deviations from nominal shipping routes occurred in 2018. See update for Condition No. 103.

RESULTS

- a. Not applicable in 2018.
- b. There were no significant deviations from the nominal shipping route in 2018. The 2018 ship tracks are plotted in Figures 4.15. Also see update for Condition No. 103.

TRENDS

- a. Not applicable in 2018.
- b. No significant deviations from the nominal shipping route occurred during the first four years of shipping (2015-2018).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor ship tracks using the shore-based AIS station at Bruce Head and satellite-based ship tracking using the exactEarth® 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.
Relevant BIM Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliant
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	<p>Standard Instructions and General Information for Masters of Vessels Loading at Milne Inlet Port (Fednav, 2018)</p> <p>Draft 2018 Ship-based Observer Program (Golder, 2019d)</p> <p>Draft 2014-2017 Integrated Report – Bruce Head Shore-based Monitoring Program (Golder, 2018k)</p> <p>Draft 2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner, 2019)</p> <p>Draft 2017 Narwhal Tagging Report – Technical Data Report (Golder, 2019c)</p> <p>2018 MEWG Meeting Records</p>
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en Appendix C1

METHODS

- No activity took place at Steensby Port in 2018. This phase of the project is currently inactive.
- In Milne Inlet, interactions between marine mammals and ships along the Northern Shipping Route are monitored as part of the Bruce Head Narwhal Monitoring Program (Golder, 2018k), the Ship-based Observer Program (Golder, 2019d), the 2018 Passive Acoustic Monitoring (PAM) Program (Frouin-Muoy and Maxner, 2019), and through animal-borne remote sensing tags deployed on narwhal as part of the 2017/2018 Narwhal Tagging Program (Golder, 2019c for 2017; 2018 data analysis in progress). Baffinland’s Standard Instructions to Mariners (SITM; Fednav, 2018) identifies a “vessel maximum speed limit of 9 knots over ground beginning at the entrance to Pond Inlet (at 76 degrees longitude) through Eclipse Sound and throughout Milne Inlet”. Project vessel speeds are tracked in real-time using the AIS tracking system.
- Not applicable in 2018.

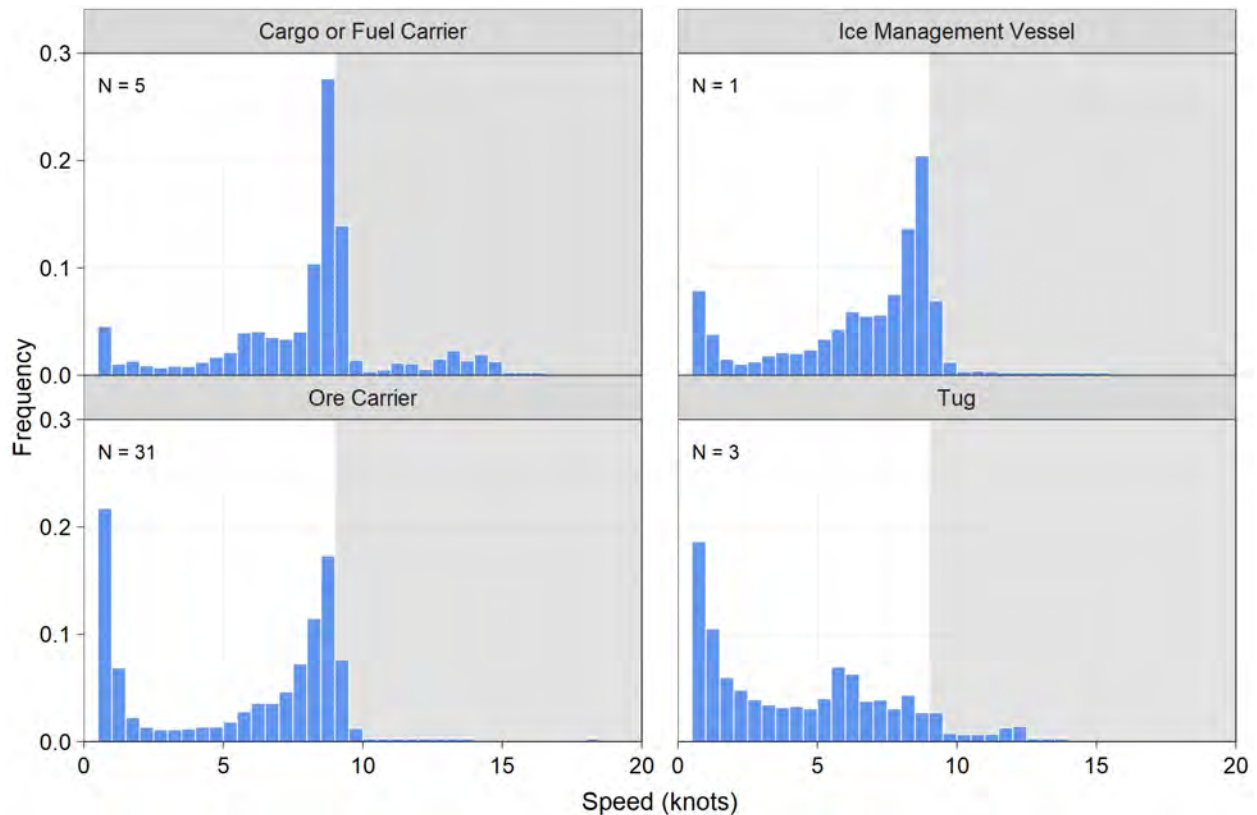
RESULTS

- a. Data collected to date as part of ongoing marine mammal EEM programs do not indicate that changes to shipping frequency or timing (including periodic suspensions) are warranted at this time. Detailed results of the Integrated 2014–2017 Bruce Head Shore-based Monitoring Program are presented in Golder (2018k). Data from the 2018 Ship-based Observer Program are presented in Golder (2019d). Data from the 2018 Passive Acoustic Monitoring (PAM) Program are presented in Frouin-Muoy and Maxner (2019). Data from the 2017 Narwhal Tagging Program are presented in Golder (2019c). Integration of data from the 2018 Narwhal Tagging Program will be presented in a technical report scheduled for distribution to the MEWG in Q4 2019.
- b. Table 4.26 presents vessel speed information for all Project-related vessels calling at Milne Port in 2018. Ore carriers rarely exceeded 10 knots when transiting along the Northern Shipping Route (ranging from 0 to 5.54% of their transit time). The maximum recorded vessel speed for an ore carrier in 2018 was 18.4 knots. A total of four freight / fuel carriers called to Milne Port during the 2018 shipping season. Of these, two (2) vessels were shown to repetitively exceed 10 knots during their respective transits (Table 4.26). The maximum recorded vessel speed for a freight / fuel tanker in 2018 was 16.1 knots. The proportional breakdown of vessel travel speed in the Project area during the 2018 shipping season is presented for all vessels combined (ore carriers and cargo/fuel vessels) in Figure 4.16.

Table 4.26 Recorded Vessel Speeds of Project Vessels on Northern Shipping Route During 2018

Vessel Name	# of Round Trips	Vessel Type	Max Speed	Median Speed	% of travel > 10 knots
AM HAMBURG	1	Ore Carrier	9.2	8.3	0
ARKADIA	3	Ore Carrier	10.5	8.5	0.43
ATLANTIC RAVEN	1	Cargo/Fuel	9.8	8.3	0
BOTNICA	Multiple (escort)	IMV	15.1	7.6	1.65
BULK DESTINY	1	Ore Carrier	10	1	0
FEDERAL TAMBO	1	Ore Carrier	9.5	8.6	0
GOLDEN AMBER	3	Ore Carrier	11.2	7.9	0.09
GOLDEN DIAMOND	2	Ore Carrier	18.4	8.7	5.54
GOLDEN ICE	3	Ore Carrier	10.5	8.3	0.22
GOLDEN OPAL	2	Ore Carrier	11.7	5.6	1.75
GOLDEN OPPORTUNITY	3	Ore Carrier	11.1	7.1	0.88
GOLDEN PEARL	3	Ore Carrier	9.8	7.4	0
GOLDEN RUBY	2	Ore Carrier	13.5	0.8	1.66
GOLDEN SAGUENAY	2	Ore Carrier	13.3	7.9	0.62
GOLDEN STRENGTH	2	Ore Carrier	12.4	1	0.15
GOLDEN SUEK	2	Ore Carrier	10.3	1.2	0.06
M.V. GOLDEN BRILLIANT	2	Ore Carrier	10.6	0.8	0.01
M.V. GOLDEN BULL	2	Ore Carrier	10.3	8.5	0.12
MIENA DESGAGNES	2	Cargo/Fuel	11	8.7	0.3
NORDIC BOTHNIA	1	Ore Carrier	9.2	8.7	0
NORDIC OASIS	3	Ore Carrier	10.1	7	0

Vessel Name	# of Round Trips	Vessel Type	Max Speed	Median Speed	% of travel > 10 knots
NORDIC ODIN	3	Ore Carrier	10.4	6.4	0.03
NORDIC ODYSSEY	3	Ore Carrier	11.3	3	0.11
NORDIC OLYMPIC	3	Ore Carrier	9.6	8.4	0
NORDIC ORION	3	Ore Carrier	10.3	8.3	0.35
NORDIC OSHIMA	4	Ore Carrier	10.1	7.5	0.02
NORDKAP	2	Ore Carrier	9.2	8.2	0
NORDPOL	2	Ore Carrier	12.1	8.6	0.01
NS ENERGY	2	Ore Carrier	10.6	8.6	0.47
NS YAKUTIA	3	Ore Carrier	10.1	8.2	0.01
OCEAN K. RUSBY	Port activities	Tug	12	4	0.57
OCEAN RAYNALD T	Port activities	Tug	12.5	5.6	6.49
OCEAN TUNDRA	Port activities	Tug	13.6	2.7	5.41
QAMUTIK	1	Cargo/Fuel	9.4	6.5	0
RIO GRITA	2	Ore Carrier	11	6.1	0.01
RIO TAMARA	2	Ore Carrier	9.5	4.8	0
SAGAR SAMRAT	3	Ore Carrier	11.1	6.7	0.37
SARAH DESGAGNES	4	Cargo/Fuel	15.3	8.7	11.14
SEA NEPTUNE	1	Ore Carrier	9.7	7.3	0
ZELADA DESGAGNES	3	Cargo Fuel	16.1	8.5	30.55



NOTES:

1. All vessel speeds <0.5 knots were excluded from the analysis as it was assumed vessels were moored/anchored at this time.
2. Northbound = outbound; Southbound = inbound.

Figure 4.16 Proportional Ship Travel Speed for all Project-related Vessels (Ore Carriers, Tugs and Cargo/Fuel Vessels) - 2018 Shipping Season

c. Not applicable in 2018.

TRENDS

- a. Results of the 2014-2017 Bruce Head shore-based monitoring study indicate that the relative abundance of narwhal counted along this part of the shipping route has not significantly changed over the four-year survey period (2014-2017) despite increasing vessel traffic over this period (note that 2013 was a pilot study of shorter duration and was not included in this analysis). Overall, study results including observed behavioural responses of narwhal during their interactions with ships, appear to be in agreement with impact predictions made in the FEIS, which state that ‘narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route’ and that ‘no abandonment or long-term displacement behavior is anticipated’.
- b. Not applicable.
- c. Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

- a. After a trial aimed at running the Shore-based Monitoring Program from a vessel platform in 2018, Baffinland is considering what modifications could be made to the Bruce Head Shore-based Monitoring Program to reinitiate it in 2019. See update to Condition No. 101.
- b. In 2019, cargo and fuel vessels will continue to be provided with standing instructions to travel along the Northern Shipping Route at speeds not exceeding 9 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.
Relevant BIM Commitment	N/A
Reporting Requirement	As needed.
Status	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Draft 2018 Ship-based Observer Program (Golder, 2019d) 2017 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

Baffinland's Ship-based Observer (SBO) Program was first run in 2013-2015 and was subsequently resumed in 2018. The 2013-2015 SBO Program was conducted during the Project construction phase and during Year 1 of shipping operations. As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013-2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018, the SBO Program was conducted from on-board the MSV Botnica, an Ice Management Vessel (IMV) that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The IMV provided a safe climate-controlled viewing platform 20 m above sea level, where port and starboard-stationed Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013-2015) observe marine mammals and birds and record observations. Marine mammal surveys were conducted using conventional distance sampling methods. While the vessel was in transit (averaging approx. 8.3 knots), the MWOs surveyed to 90° on both sides of the ship's bow. Two types of scanning techniques were used to detect marine mammals: S-scans consisting of scanning the water parallel to the horizon (in an S-shaped pattern) and U-scans consisting of scanning the water perpendicular to the horizon.

Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. During the 2018 program, observations of marine mammals and seabirds were detected up to 4 km from the vessel. Boarding of the

MSV Botnica occurred at Milne Port with the observers remaining on the live-aboard for the full multi-week vessel deployment period, eventually disembarking at Milne Port once ice escort services were complete. Marine mammal surveys typically lasted throughout daylight hours with scheduled breaks to avoid observer fatigue. The 2018 SBO Program took place from July 28 to August 7 and again from September 28 to October 17. Detailed methodology on data collection and analytical procedures for the 2018 SBO Program is presented in Golder (2019d).

RESULTS

Very few sightings of marine mammals were recorded over the 2013-2015 period (65 marine mammals in 2013, 12 in 2014 and 16 in 2015). A total of 551 sightings totalling 2,766 individual marine mammals were observed during the 2018 SBO Program, including five (5) different species of marine mammals (narwhal, ringed seal, harp seal, bearded seal, and polar bear). During the spring surveys, 269 sightings of 1,681 individual marine mammals were observed. The most common identified species were ringed seals (194 sightings of 754 individuals), followed by harp seals (41 sightings of 292 individuals), narwhals (seven sightings of 19 individuals), and bearded seals (5 sightings of 5 individuals). During the fall surveys, 282 sightings of 1,084 individual marine mammals were observed. The most common identified species were ringed seal (146 sightings of 315 individuals), followed by harp seal (64 sightings of 462 individuals), narwhal (34 sightings of 156 individuals), and two (2) polar bears. Sightings of four (4) sets of polar bear tracks on the sea ice (not associated with the two recorded polar sightings) were also made, including tracks of an adult with a single cub.

Seabird observations (inclusive of seaducks) declined over the 2013-2015 period (172 sightings in 2013, one (1) in 2014 and one (1) in 2015). In 2018, 631 5-min survey records of seabird monitoring were completed by the wildlife observers, with this data provided to the Canadian Wildlife Service to supplement their seabird sighting database for the region. During the spring survey, a total of 13 species were identified (136 confirmed sightings and 14 unidentified species). The most common species recorded during summer were northern fulmar, king eider, black-legged kittiwake, and thick-billed murre. During the fall survey, a total of five (5) species were identified (704 confirmed sightings and 15 unidentified species). The most common species recorded during fall were glaucous gull, black-legged kittiwake, and northern fulmar. Detailed results for the 2018 SBO Program are presented in Golder (2019d).

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring.

TRENDS

A decline in marine mammal and seabird observations occurred over the 2013-2015 period despite slightly increased survey effort in 2014 and 2015 compared to 2013. A substantial increase in survey effort occurred in 2018 because observers remained on the escort vessel for several weeks, resulting in considerably higher numbers of recorded seabird and marine mammal sightings.

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring. Similarly, no ship strikes on marine mammals or seabirds have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs.

Detailed results for the 2018 SBO Program are presented in Golder (2019d).

RECOMMENDATIONS / LESSONS LEARNED

Safety concerns that were raised regarding the initial SBO program (that led to the postponement of the program in 2016) were mitigated through the use of the MSV Botnica as the survey platform in 2018. This included on-board accommodation for Inuit observers to allow for regular wildlife surveys over consecutive days. In doing so, the need to conduct at-sea boarding of observers on different survey vessels was no longer necessary. A similar program as completed in 2018 is under consideration for 2019.

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 seabirds 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 seabird 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 walrus, in accordance with the requirements of their Special Flight Operations Certificate.
Relevant BIM Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Draft 2018 Ship-based Observer Program (Golder, 2019d) 2017 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

The 2013-2015 SBO Program was conducted during the Project construction phase and during Year 1 of shipping operations. As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013-2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018, the SBO Program was conducted from on-board the MSV Botnica, an Ice Management Vessel (IMV) that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The IMV provided a safe climate-controlled viewing platform 20 m above sea level, where port and starboard-stationed Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013-2015) observe marine mammals and birds and record observations. Marine mammal surveys were conducted using conventional distance sampling methods. While the vessel was in transit (averaging approx. 8.3 knots), the MWOs surveyed to 90° on both sides of the ship’s bow. Two types of scanning techniques were used to detect marine mammals: S-scans consisting of scanning the water parallel to the horizon (in an S-shaped pattern) and U-scans consisting of scanning the water perpendicular to the horizon.

Seabirds were monitored using the Canadian Wildlife Service (CWS)’s Eastern Canada Seabirds at Sea (ECSAS) protocol. During the 2018 program, observations of marine mammals and seabirds were detected up to 4 km from the vessel. Boarding of the MSV Botnica occurred at Milne Port with the observers remaining on the live-aboard for the full multi-week vessel deployment

period, eventually disembarking at Milne Port once ice escort services were complete. Marine mammal surveys typically lasted throughout daylight hours with scheduled breaks to avoid observer fatigue. The 2018 SBO Program took place from July 28 to August 7 and again from September 28 to October 17. Detailed methodology on data collection and analytical procedures for the 2018 SBO Program is presented in Golder (2019d).

Unmanned aerial vehicle (UAV) field tests were conducted in 2014 using DJI Phantom 2 rotary-wing UAVs. Limiting environmental conditions such as cold temperatures and high winds restricted the ability to fly the UAV ahead of the ship during at-sea transits, and battery life restricted the flight time to 13 min. Autonomous flight control failed, possibly due to issues with the magnetic compass, and the onboard GPS data was not logged by the ground station flight controller. No marine mammal or seabird sightings were recorded during the flights. UAV-based surveys are not currently considered a viable monitoring tool given these limitations and based on current UAV technology.

RESULTS

Very few sightings of marine mammals were recorded over the 2013-2015 period (65 marine mammals in 2013, 12 in 2014 and 16 in 2015). A total of 551 sightings totalling 2,766 individual marine mammals were observed during the 2018 SBO Program, including five (5) different species of marine mammals (narwhal, ringed seal, harp seal, bearded seal, and polar bear). During the spring surveys, 269 sightings of 1,681 individual marine mammals were observed. The most common identified species were ringed seals (194 sightings of 754 individuals), followed by harp seals (41 sightings of 292 individuals), narwhals (seven sightings of 19 individuals), and bearded seals (5 sightings of 5 individuals). During the fall surveys, 282 sightings of 1,084 individual marine mammals were observed. The most common identified species were ringed seal (146 sightings of 315 individuals), followed by harp seal (64 sightings of 462 individuals), narwhal (34 sightings of 156 individuals), and two (2) polar bears. Sightings of four (4) sets of polar bear tracks on the sea ice (not associated with the two recorded polar sightings) were also made, including tracks of an adult with a single cub.

Seabird observations (inclusive of seabirds) declined over the 2013-2015 period (172 sightings in 2013, one (1) in 2014 and one (1) in 2015). In 2018, 631 5-min survey records of seabird monitoring were completed by the wildlife observers, with this data provided to the Canadian Wildlife Service to supplement their seabird sighting database for the region. During the spring survey, a total of 13 species were identified (136 confirmed sightings and 14 unidentified species). The most common species recorded during summer were northern fulmar, king eider, black-legged kittiwake, and thick-billed murre. During the fall survey, a total of five (5) species were identified (704 confirmed sightings and 15 unidentified species). The most common species recorded during fall were glaucous gull, black-legged kittiwake, and northern fulmar. Detailed results for the 2018 SBO Program are presented in Golder (2019d).

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring.

TRENDS

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring. Similarly, no ship strikes on marine mammals or seabirds have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs.

RECOMMENDATIONS / LESSONS LEARNED

The SBO Program resumed in 2018 using an MSV Botnica survey platform at the beginning and end of the shipping season. This proved successful at increasing monitoring effort and detection of marine mammals and seabirds, while reducing risks associated with safe onboarding of the observers. A similar program as completed in 2018 is under consideration for 2019.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Draft 2018 Ship-based Observer Program (Golder, 2019d) 2017 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

Ship-based surveillance monitoring was conducted as part of Baffinland's Ship-based Observer (SBO) Program. This program was first run in 2013-2015 and was subsequently resumed in 2018.

The 2013-2015 SBO Program was conducted during the Project construction phase and during Year 1 of shipping operations. As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013-2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018, the SBO Program was conducted from on-board the MSV Botnica, an Ice Management Vessel (IMV) that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The IMV provided a safe climate-controlled viewing platform 20 m above sea level, where port and starboard-stationed Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013-2015) observe marine mammals and birds and record observations. Marine mammal surveys were conducted using conventional distance sampling methods. While the vessel was in transit (averaging approx. 8.3 knots), the MWOs surveyed to 90° on both sides of the ship's bow. Two types of scanning techniques were used to detect marine mammals: S-scans consisting of scanning the water parallel to the horizon (in an S-shaped pattern) and U-scans consisting of scanning the water perpendicular to the horizon.

Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. During the 2018 program, observations of marine mammals and seabirds were detected up to 4 km from the vessel. Boarding of the MSV Botnica occurred at Milne Port with the observers remaining on the live-aboard for the full multi-week vessel deployment

period, eventually disembarking at Milne Port once ice escort services were complete. Marine mammal surveys typically lasted throughout daylight hours with scheduled breaks to avoid observer fatigue. The 2018 SBO Program took place from July 28 to August 7 and again from September 28 to October 17. Detailed methodology on data collection and analytical procedures for the 2018 SBO Program is presented in Golder (2019d).

It is important to note that the Ship-based surveillance monitoring is not designed to identify effects from shipping as there is no relative response control. Other EEM programs are designed for detecting potential effects of the Project, such as the Bruce Head Monitoring Program, the Narwhal Tagging Program, the MEEMP and AIS Monitoring Program and the Physical Oceanographic Program.

RESULTS

Very few sightings of marine mammals were recorded over the 2013-2015 period (65 marine mammals in 2013, 12 in 2014 and 16 in 2015). A total of 551 sightings totalling 2,766 individual marine mammals were observed during the 2018 SBO Program, including five (5) different species of marine mammals (narwhal, ringed seal, harp seal, bearded seal, and polar bear). During the spring surveys, 269 sightings of 1,681 individual marine mammals were observed. The most common identified species were ringed seals (194 sightings of 754 individuals), followed by harp seals (41 sightings of 292 individuals), narwhals (seven sightings of 19 individuals), and bearded seals (5 sightings of 5 individuals). During the fall surveys, 282 sightings of 1,084 individual marine mammals were observed. The most common identified species were ringed seal (146 sightings of 315 individuals), followed by harp seal (64 sightings of 462 individuals), narwhal (34 sightings of 156 individuals), and two (2) polar bears. Sightings of four (4) sets of polar bear tracks on the sea ice (not associated with the two recorded polar sightings) were also made, including tracks of an adult with a single cub.

Seabird observations (inclusive of seaducks) declined over the 2013-2015 period (172 sightings in 2013, one (1) in 2014 and one (1) in 2015). In 2018, 631 5-min survey records of seabird monitoring were completed by the wildlife observers, with this data provided to the Canadian Wildlife Service to supplement their seabird sighting database for the region. During the spring survey, a total of 13 species were identified (136 confirmed sightings and 14 unidentified species). The most common species recorded during summer were northern fulmar, king eider, black-legged kittiwake, and thick-billed murre. During the fall survey, a total of five (5) species were identified (704 confirmed sightings and 15 unidentified species). The most common species recorded during fall were glaucous gull, black-legged kittiwake, and northern fulmar. Detailed results for the 2018 SBO Program are presented in Golder (2019d).

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring.

TRENDS

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring. Similarly, no ship strikes on marine mammals or seabirds have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs.

RECOMMENDATIONS / LESSONS LEARNED

The SBO Program resumed in 2018 using an MSV Botnica as the survey platform at the beginning and end of the shipping season. This proved successful at increasing monitoring effort and improving effectiveness in detecting marine mammals and seabirds, while reducing risks associated with safe onboarding of the observers. A similar program as completed in 2018 is under consideration for 2019.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2014-2016 Shore-based Monitoring Program (Smith et al., 2016) 2017 Bruce Head Shore-based Monitoring Program (Golder, 2018j) Draft 2014-2017 Integrated Report - Bruce Head Shore-based Monitoring Program (Golder, 2018k) Draft 2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner, 2019) Draft 2017 Narwhal Tagging Report - Technical Data Report (Golder, 2019c) 2018 MEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en Appendix C1

METHODS

No studies were conducted in Hudson Strait or Foxe Basin, as this phase of the Project is currently inactive. Monitoring programs used to confirm the predictions in the FEIS with respect to disturbance effects from ships noise on the distribution and occurrence of marine mammals along the Northern Shipping Route include the Bruce Head Shore-based Monitoring Program and the Narwhal Tagging Program.

Bruce Head Shore-based Monitoring Program:

Baffinland undertook a shore-based narwhal monitoring program at Bruce Head over a continuous 5-year period (2013-2017¹¹). The objective of the Bruce Head shore-based monitoring study was to investigate narwhal response to shipping activities along the Northern Shipping Route in Milne Inlet, with data collected annually on relative abundance and distribution (RAD), group composition, and behaviour. Disturbance effects considered included potential changes in direction of narwhal movement (toward or away from the vessel), swim speed, group formation and other behaviours in the presence and absence of vessels. Additional data were also collected on environmental conditions and anthropogenic activities (e.g., shipping and hunting activities) to distinguish between the potential effects of Project-related shipping activities and confounding factors which may also affect narwhal behaviour. This study was focused in Milne Inlet due to higher concentrations of marine mammals in this area during the shipping season, compared to Eclipse Sound and Pond Inlet.

¹¹ 2013 represented a pilot study year

Narwhal Tagging Program:

In 2018, Year 2 of the Narwhal Tagging Program was conducted and involved deploying remote sensing tags on the backs of narwhal to effectively track the animal's 3-dimensional movements, vocal behavior and surrounding acoustic environment over an extended time-series as the animals naturally moved through their summer foraging range in the North Baffin Island region. This provided insight into the animal's behavior over a continuous 24-h period, throughout changing environmental conditions, and across a broad geographic range and longer study period. The deployment of satellite-based location/dive tags on individual narwhal allowed for the tracking of narwhal spatial movement (horizontal and vertical) in relation to shipping events and during periods of no shipping. The deployment of Acousonde (passive acoustic recorder) tags on individual narwhal allows for the evaluation of potential changes in narwhal behavior in relation to received levels of shipping noise, in comparison to their movements and behaviour when no shipping is present. Passive acoustic tags allow for a better understanding of what the whale is hearing (received sound levels) in its natural environment, while simultaneously recording information on 3-dimensional movement and vocal behavior of the tagged animal. In addition, information from these tags helps to refine the inherent errors associated with abundance/population estimates when using visual survey techniques (as it allows to correct for surface availability bias, related to the period when animals are unobservable because they are underwater). The 2017/2018 Narwhal Tagging Program was a collaborative study with Fisheries and Oceans Canada. Detailed methodology on data collection and analytical procedures for the 2017 Narwhal Tagging Program is presented in Golder (2019c).

RESULTS***Bruce Head Shore-based Monitoring Program:***

In 2018, Golder undertook an integrated analysis of the combined 2014–2017 Bruce Head dataset using the RAD model and group composition and behaviour models developed by Golder in 2017. Key findings from the 2014–2017 Bruce Head Monitoring Program include the following:

- Relative abundance and distribution (RAD):
 - The relative abundance of narwhal in the Bruce Head area has remained relatively constant over the four years of sampling (as shown by a lack of significant year effect on counts and fewer occurrences of zero counts in 2017) despite the relative increase in shipping during this period.
 - Model results indicated that vessel direction within Milne Inlet (south- vs northbound vessels) affected the response of narwhal relative to distance from large vessel. Conversely, the direction of vessel relative to the substrata (heading toward or away from substrata) was not a significant predictor of relative abundance.
- Group composition and behaviour:
 - Group size - group sizes changed between years, but not in a manner consistent with the increase in vessel traffic between 2014 and 2017. Model results also did not suggest temporary effects of large vessel transits on narwhal group size within the BSA.
 - Group composition - groups with calves/yearlings and groups with tusks were present in the BSA and SSA throughout the four sampling years. Model results indicated no effect of large vessel transits on presence of tusks or calves/yearlings in observed groups in the BSA. For both response variables, group size was the only significant predictor variable identified.

- Group spread - narwhal were more often observed in tight associations compared to loose associations under both vessel presence and vessel absence scenarios. During passage of a large vessel within 15 km from the BSA, loosely spread groups were more likely to occur when southbound or northbound vessels heading toward the BSA were 2-4 km away from the BSA, or when northbound vessels heading away from the BSA were near (≤ 2 km). In addition, the probability of observing a group in a loose spread significantly increased with group size.
- Group formation - narwhal were usually observed in parallel formation under both vessel presence and vessel absence scenarios. Models indicated no effect of vessel transits on group formation in the BSA (analyzed as presence/absence of non-parallel groups). The probability of observing a non-parallel formation increased significantly with group size.
- Group direction - narwhal groups were predominantly observed travelling south through the BSA. When northbound large vessels were within 15 km of the BSA, narwhal were most often observed travelling south, regardless of direction of the vessel relative to the BSA. In the presence of southbound vessels, narwhal groups travelled both north and south when the vessel was heading toward the BSA (model predictions were of a predominantly southward traveling direction). When the southbound vessel headed away from the BSA, narwhal groups were observed traveling predominantly north, unless the vessel was within close proximity (≤ 2 km). Narwhal tended to travel south in large groups and north in small groups.
- Travel speed - the majority of narwhal groups travelled at a medium speed, regardless of large vessel presence/absence. The probability of observing slowly-traveling groups increased when large vessels were south of the BSA (regardless of direction of travel and direction relative to the BSA) and in close proximity (≤ 3 km). When vessels were north of the BSA, the probability of observing slowly-traveling groups was low, especially for southbound vessels. The probability of observing slowly-traveling groups decreased with group size.
- Distance from Bruce Head shore - narwhal groups were observed more often at a distance < 300 m of the Bruce Head shore compared to groups > 300 m offshore under both vessel presence and vessel absence scenarios. Offshore groups were detected less frequently with increasing Beaufort scale values, indicating observer impediment with worsening sea state. Model results indicated that narwhal groups tended to be offshore when large vessels were 3–6 km away from the BSA, especially when vessels were heading toward the BSA (compared to vessels heading away from the BSA). When vessels were close, the model estimated that narwhal groups were concentrated inshore.

Observations collected throughout the four-year study period indicate the following:

- The majority of narwhal recorded in the SSA during the four-year study period were engaged in travelling behaviour. Other behaviours observed in the SSA included nursing, rubbing, tuskling, foraging, and mating. In all years, narwhal calves were commonly observed in the SSA, with observations of nursing behaviour recorded in 2015 (two occasions), 2016 (four occasions) and 2017 (two occasions). On 11 August 2016, the birth of a narwhal calf off Bruce Head was observed. Collectively, these observations lend support to the hypothesis that this part of Milne Inlet is important for calf rearing.
- Narwhal occur most frequently south of the SSA in the vicinity of Koluktoo Bay and the entrance to Assumption Harbour (Milne Port). A similar distribution of narwhal has been reported during aerial surveys conducted in the Milne Inlet region (Thomas et al. 2015, 2016; Golder, 2018m) affirming the importance of Koluktoo Bay as a refuge for narwhal during the open-water season.
- Responses of narwhal to ore carrier traffic is variable, ranging from ‘no obvious response’ in which animals remain in close proximity to ore carriers as they transit through the SSA, to temporary and localized displacement and related changes in behaviour. However, no overall decrease in the abundance of narwhal in the area was observed.

- During each survey year, narwhal were observed to respond to shooting (i.e. hunting) events by diving and increasing their swim speed. Despite repeatedly being shot at from the same location (i.e. the hunting camp below the Bruce Head observation platform), narwhal were regularly observed to return to the study area, though the time until they returned was variable.

Overall, results from the 2014-2017 Bruce Head Shore-based Monitoring Program, including observed behavioural responses of narwhal during their interactions with ships, were shown to be in agreement with impact predictions made in the FEIS, which predicted that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment or long-term displacement behavior is anticipated'.

Detailed results of the 2014-2017 Integrated Report for the Bruce Head Shore-based Monitoring Program are presented in Golder (2018k).

Narwhal Tagging Program:

Detailed results of the 2017 Narwhal Tagging Program are presented in Golder (2019c) with a brief summary presented below. Narwhal tagging data suggest that most dive behavioural responses by narwhal are elicited at relatively close distances (<2km) to a passing ship, although several specific responses are observed at intermediate distances (up to 5 km from the source), such as increased turning rate and decreased bottom dives, suggesting potential foraging effects are possible within this range. Distances at which behavioural responses were observed in the present study are smaller than the zones of acoustic disturbance predicted through acoustic modelling where disturbance was predicted to occur at ranges extending from 12 to 29 km from a ship (depending on location on ship type). The discrepancy between measured and modelled disturbance distances relevant to vessel noise may be due to a variety of factors including animal habituation to vessel noise, site-specific noise propagation limitations, overly conservative model assumptions, and the lack of any scaling or weighting in the disturbance threshold to account for species-specific hearing abilities. This is particularly relevant for narwhal, given that the majority of ship noise energy is <1kHz, which is well below the main frequency range used by narwhal for communication and echolocation (5 to 100 kHz), and thus assumed to be outside their sensitive hearing range. Observed behavioural responses in narwhal during interactions with ships were shown to be in agreement with impact predictions made in the FEIS, which stated that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment or long-term displacement behavior is anticipated'.

Data collected during the 2018 Narwhal Tagging Program are currently being analyzed and will be presented in a technical report scheduled for release in Q4 of 2019.

TRENDS

Bruce Head Shore-based Monitoring Program:

Results from the 2014-2017 Bruce Head Monitoring Program suggest that the current effect of shipping on narwhal appears to be localized and temporary/short-term in nature. Some evidence of displacement of narwhal has been observed, but the total number (relative abundance) of narwhal observed in the area did not change significantly over the four-year study period. Overall, study results including observed behavioural responses of narwhal during their interactions with ships, appear to be in agreement with impact predictions made in the FEIS, which state that 'narwhal are expected to exhibit temporary and localized avoidance behavior when encountering Project vessels along the shipping route' and that 'no abandonment or long-term displacement behavior is anticipated'.

Narwhal Tagging Program:

Only 2017 tagging data has been analyzed to date, so a description of any multi-year trends in the data is not possible at this time. Data collected during 2018 are currently being analyzed in combination with the 2017 data. The integrated results will be presented in a technical report scheduled for release in Q4 of 2019.

RECOMMENDATIONS / LESSONS LEARNED**Bruce Head Shore-based Monitoring Program:**

Shore-based monitoring at Bruce Head has been shown to be an effective method for monitoring of narwhal in relation to shipping activities. Recommended improvements to the Bruce Head Shore-based Monitoring Program include:

- Data collection:
 - The primary narwhal behaviour in the current SSA consists of travel behaviour, which may make determination of narwhal responses to vessel transits more difficult than vessel transits in relation to more sedentary behaviour types (i.e., milling, foraging, etc.). Alternate locations for the observation platform should be assessed that might better survey the portion of the nominal shipping route closest to Koluktoo Bay, where travel does not appear to be the primary narwhal behaviour.
 - Supplement visual observation with drone footage. This will provide a means to verify observation counts and will allow to correct for observation bias under conditions of low visibility or increased distance. In addition, drone footage may be helpful for filling in missing information on narwhal behaviour and composition in the BSA, where observers are not able to record certain aspects of group behaviour due to reduced sightability.
- Analysis:
 - Assess the potential effects of simultaneous transits of multiple large vessels on narwhal RAD and behaviour. At this time, it is unknown whether the effects of consecutive transits of a single large vessel are different than a single transit of multiple large vessels (travelling in SSA simultaneously).
 - Integration of acoustic monitoring results with shore-based observer data to assess if and when narwhal alter their acoustic behaviour in response to vessel transits. A passive acoustic monitoring program is proposed in 2019 that would be undertaken in concert with the Bruce Head visual-based behavioural monitoring program conducted at Bruce Head (shore-based monitoring station) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019 to address this identified data gap.

Narwhal Tagging Program:

Results from the Narwhal Tagging Program are not directly comparable to narwhal behavioural patterns observed as part of the Bruce Head Monitoring Program given differences in study design and data collection methods. The Bruce Head shore-based study did not measure individual dive responses in narwhal, was limited in spatial scale and applied several different analytical parameters such as vessel travel direction. The 2017 tagging study did not account for vessel direction and was not tied to a specific geographic location. That said, *Ad Lib* observations recorded by observers at Bruce Head were in close agreement with behavioural responses observed in the narwhal tagging study, where the response of narwhal to ore carriers was shown to be variable, ranging from 'no obvious response' (animals remained in close proximity to ore carriers as they transited through the study area), to temporary and localized displacement and related changes in behaviour (Golder, 2018k). This highlights the value of remote sensing (i.e., tagging) technologies in providing insight into animal behavior that would

otherwise be difficult to detect and/or quantify. Although land-based observers can track narwhal activity at the surface, their ability to link subsequent sightings to the same individuals is limited and impedes the ability to interpret dive behaviour.

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.
Relevant BIM Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partial-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Draft 2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner 2019) Draft 2017 Narwhal Tagging Report – Technical Data Report (Golder, 2019c) 2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

In 2018, five (5) underwater passive acoustic monitoring (PAM) stations were deployed near Bruce Head over a 2-month period (Aug-September) to document ambient underwater noise levels along the shipping corridor, monitor marine mammal presence along the shipping corridor, and compare measured (actual) ship noise levels to estimated (modelled) ship noise levels calculated via noise modelling undertaken in support of the FEIS. This acoustic program allowed for monitoring of narwhal through changing seasonal and daylight conditions, as well as during periods when narwhal were not readily visible. Detailed methodology on data collection and analytical procedures for the 2018 Passive Acoustic Monitoring Program is presented in Frouin-Muoy and Maxner (2019).

Acoustic monitoring was also conducted in 2018 as part of the 2018 Narwhal Tagging Program in Tremblay Sound. Four animals were fitted with Acousonde™ PAM tags during the 2018 season to evaluate potential changes in narwhal behavior during ship exposure events (compared to their movements and behavior when no shipping was present). Acoustic tags allow for a better understanding of what a tagged narwhal is hearing (received sound levels) in its natural environment, while simultaneously recording information on the 3-dimensional movements and vocal behavior the tagged animals. This provides an opportunity to evaluate changes in animal behavior related specially to noise events such as a passing ship or vessel and may help refine behavioral disturbance thresholds for narwhal as this relates to ship noise. Detailed methodology on data collection and analytical procedures for the 2017 Narwhal Tagging Program is presented in Golder (2019c).

Early warning indicators (EWIs) of negative impacts of vessel noise are currently in the progress of being developed with the MEWG. A framework was distributed to all MEWG members and observer groups in September 2018, following a September MEWG conference call meeting. This framework provided an opportunity for MEWG members and observer groups to participate in the identification of EWIs. Feedback was received from DFO, Parks Canada and the MHTO (through an in-person

meeting on 28/29 November 2018- Pond Inlet). The proposed EWIs were discussed at the 2018 fall in-person MEWG meeting in Ottawa (10 December 2018). The process for finalizing EWIs and associated thresholds will continue into 2019.

RESULTS

Detailed results of the 2018 PAM Program are provided in Frouin-Muoy and Maxner (2019). Acoustic monitoring results demonstrated that ambient sound levels were similar at four of the five recording stations, with lower sound levels recorded at the fifth station where the recorder was located in a more protected embayment (Koluktoo Bay). The primary contributor to the soundscape throughout the recording period was shipping; however, wind and waves also contributed to the ambient noise at each station. Sounds from three (3) species of marine mammals were identified acoustically in the data; narwhal, killer whale and ringed seal. The results of the PAM study suggest that ship noise levels did not exceed established acoustic injury thresholds for marine mammals (NOAA, 2018). Exceedances of the established 120 dB behavioural disturbance threshold for marine mammals (NOAA, 2013) were rare at both AMAR-1 (the station with the highest narwhal vocal detections) and AMAR-3 (the station with the lowest sound levels in Koluktoo Bay). Listening space reduction (LSR) is the fractional decrease in the available listening space for marine mammals. The largest LSR occurrences were associated with ambient noise, such as wind and rain, rather the vessels for the narwhal whistle and click frequencies, especially at AMAR-3. Acoustic monitoring results demonstrated that shipping activities in 2018 may have disturbed narwhal, or seriously impacted their listening space, at most 1% of the recording period.

Acoustic data from the 2018 Acousonde deployments (2018 Narwhal Tagging Program) are currently being analyzed. Results will be presented in a technical report once analyses are complete in Q4 2019.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

A PAM study is proposed in 2019 that would be undertaken in concert with the 2019 Bruce Head Shore-based Monitoring Program (visual-based behavioural study) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019.

In 2019, Baffinland will, in consultation with the MEWG, finalize the identification of appropriate thresholds for the selected EWIs and link the thresholds to monitoring programs to ensure that EWIs provide rapid detection of adverse impacts on marine mammals.

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	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: <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
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partial-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner, 2019) 2017 Narwhal Tagging Report - Technical Data Report (Golder, 2019c) 2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

In 2018, five (5) underwater passive acoustic monitoring (PAM) stations were deployed near Bruce Head over a 2-month period (Aug-September) to document ambient underwater noise levels along the shipping corridor, monitor marine mammal presence along the shipping corridor, and compare measured (actual) ship noise levels to estimated (modelled) ship noise levels calculated via noise modelling undertaken in support of the FEIS. This acoustic program allowed for monitoring of narwhal through changing seasonal and daylight conditions, as well as during periods when narwhal were not readily visible. Detailed methodology on data collection and analytical procedures for the 2018 Passive Acoustic Monitoring Program is presented in Frouin-Muoy and Maxner (2019).

Acoustic monitoring was also conducted in 2018 as part of the 2018 Narwhal Tagging Program in Tremblay Sound. Four animals were fitted with Acousonde™ PAM tags during the 2018 season to evaluate potential changes in narwhal behavior during ship exposure events (compared to their movements and behavior when no shipping was present). Acoustic tags allow for a better understanding of what a tagged narwhal is hearing (received sound levels) in its natural environment, while simultaneously recording information on the 3-dimensional movements and vocal behavior of the tagged animals. This provides an opportunity to evaluate changes in animal behavior related specifically to noise events such as a passing ship or vessel and may help refine behavioral disturbance thresholds for narwhal as this relates to ship noise. Detailed methodology on data collection and analytical procedures for the 2017 Narwhal Tagging Program is presented in Golder (2019c).

Early warning indicators (EWIs) of negative impacts of vessel noise are currently in the progress of being developed with the MEWG. A framework was distributed to all MEWG members and observer groups in September 2018, following a September MEWG conference call meeting. This framework provided an opportunity for MEWG members and observer groups to participate in the identification of EWIs. Feedback was received from DFO, Parks Canada and the MHTO (through an

in-person meeting on 28/29 November 2018- Pond Inlet). The proposed EWIs were discussed at the 2018 fall in-person MEWG meeting in Ottawa (10 December 2018). The process for finalizing EWIs and associated thresholds will continue into 2019.

RESULTS

Detailed results of the 2018 PAM Program are provided in Frouin-Muoy and Maxner (2019). Acoustic monitoring results demonstrated that ambient sound levels were similar at four of the five recording stations, with lower sound levels recorded at the fifth station where the recorder was located in a more protected embayment (Koluktoo Bay). The primary contributor to the soundscape throughout the recording period was shipping; however, wind and waves also contributed to the ambient noise at each station. Sounds from three (3) species of marine mammals were identified acoustically in the data; narwhal, killer whale and ringed seal. The results of the PAM study suggest that ship noise levels did not exceed established acoustic injury thresholds for marine mammals (NOAA, 2018). Exceedances of the established 120 dB behavioural disturbance threshold for marine mammals (NOAA, 2013) were rare at both AMAR-1 (the station with the highest narwhal vocal detections) and AMAR-3 (the station with the lowest sound levels in Koluktoo Bay). Listening space reduction (LSR) is the fractional decrease in the available listening space for marine mammals. The largest LSR occurrences were associated with ambient noise, such as wind and rain, rather the vessels for the narwhal whistle and click frequencies, especially at AMAR-3. Acoustic monitoring results demonstrated that shipping activities in 2018 may have disturbed narwhal or seriously impacted their listening space at most 1% of the recording period.

Acoustic data from the 2018 Acousonde deployments (2018 Narwhal Tagging Program) are currently being analyzed. Results will be presented in a technical report once analyses are complete in Q4 2019.

TRENDS

Not applicable.

RECOMMENDATIONS/LESSONS LEARNED

A PAM study is proposed in 2019 that would be undertaken in concert with the 2019 Bruce Head Shore-based Monitoring Program at Bruce Head (visual-based behavioural study) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019.

In 2019, Baffinland will, in consultation with the MEWG, finalize the identification of appropriate thresholds for the selected EWIs and link the thresholds to monitoring programs to ensue that EWIs provide rapid detection of adverse impacts on marine mammals.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Partially-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	<p>Draft 2018 Passive Acoustic Monitoring Program (Frouin-Mouy and Maxner, 2019)</p> <p>Draft 2017 Narwhal Tagging Report – Technical Data Report (Golder, 2019c)</p> <p>2018 MEWG Meeting Records</p>
Ref. Document Link	Appendix C1

METHODS

- See update to Condition No. 110.
- See update to Condition No. 110.
- No blasting activities occurred in 2018 and none planned in the marine environment (or near-shore environment) in 2019. Not applicable in 2018/2019.

RESULTS

Detailed results of the 2018 PAM Program are provided in Frouin-Muoy and Maxner (2019). Acoustic monitoring results demonstrated that ambient sound levels were similar at four of the five recording stations, with lower sound levels recorded at the fifth station where the recorder was located in a more protected embayment (Koluktoo Bay). The primary contributor to the soundscape throughout the recording period was shipping; however, wind and waves also contributed to the ambient noise at each station. Sounds from three (3) species of marine mammals were identified acoustically in the data; narwhal, killer whale and ringed seal. The results of the PAM study suggest that ship noise levels did not exceed established acoustic injury thresholds for marine mammals (NOAA, 2018). Exceedances of the established 120 dB behavioural disturbance threshold for marine mammals (NOAA, 2013) were rare at both AMAR-1 (the station with the highest narwhal vocal detections) and AMAR-3 (the station with the lowest sound levels in Koluktoo Bay). Listening space reduction (LSR) is the fractional decrease

in the available listening space for marine mammals. The largest LSR occurrences were associated with ambient noise, such as wind and rain, rather than the vessels for the narwhal whistle and click frequencies, especially at AMAR-3. Acoustic monitoring results demonstrated that shipping activities in 2018 may have disturbed narwhal or seriously impacted their listening space at most 1% of the recording period.

Acoustic data from the 2018 Acousonde deployments (2018 Narwhal Tagging Program) are currently being analyzed. Results will be presented in a technical report once analyses are complete in Q4 2019.

TRENDS

Not applicable.

RECOMMENDATIONS/LESSONS LEARNED

A PAM study is proposed in 2019 that would be undertaken in concert with the 2019 Bruce Head Shore-based Monitoring Program at Bruce Head (visual-based behavioural study) to evaluate whether the frequency, intensity, and duration of different narwhal call types is modified in the presence of large vessel traffic (in relation to visually recorded behavioural changes). A collaborative study between Golder, JASCO, the University of New Brunswick and Baffinland is proposed in 2019.

In 2019, Baffinland will, in consultation with the MEWG, finalize the identification of appropriate thresholds for the selected EWIs and link the thresholds to monitoring programs to ensure that EWIs provide rapid detection of adverse impacts on marine mammals.

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
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2018 MEEMP and AIS Monitoring Program (Golder, 2019b)
Ref. Document Link	

METHODS

The fish community in the Milne Port area was monitored in 2010 and annually from 2013 to 2018. The fish study portion of the MEEMP was conducted to provide a general characterization of the fish community, including Arctic char, and was initially developed based on traditional fishing areas (i.e., IQ) and sites adjacent to the Milne Port facility. Fishing data from the field program were analyzed to include:

Relative abundance and distribution of species

- Catch per unit of effort (CPUE)
- Length/weight distribution of each fish species
- Age distribution, body burden, and diet of incidental fish mortalities

In 2018, field fish studies were conducted in the Milne Port area from 29 July to 27 August using both active (gill netting, angling, beach seine) and passive (Fukui traps) capture methods. Fish sampling locations and methods were, in general, consistent with those in previous years. The effort was spread over four weeks to capture as much of the open-water season as possible. Angling (jigging and trolling) was conducted over six days between 10 and 27 August to sample bottom and demersal fish in the LSA. The duration of sampling was activity-dependent; with the single trolling event occurring for 60 minutes, and jigging events occurring between 20 and 85 minutes (n=12). Jigging occurred from a stationary position with one or two rods and lines deployed from the vessel. Baited hooks or spoon lures (flashers) were allowed to hit the bottom, then flicked upward to attract bottom fish. Trolling occurred along a pre-determined depth contour where lines with flashers were cast over the side of the vessel and spooled in towards the vessel at a known depth to attract pelagic fish. Standardized monofilament gill nets were used to sample shallow (i.e., up to 15 m deep) subtidal areas for characterization of pelagic fish communities present in the Milne Port area. A total of 24 gill net sets occurred from 29 July to 26 August. Each gill net consisted of six panels with each panel measuring 15.2 m in length and 2.4 m in width, with mesh sizes of each panel consisting of 2.5 cm, 3.8 cm, 5.1 cm, 6.4 cm, 7.6 cm and 10.2 cm. The gill nets were deployed in a shore-perpendicular orientation (smallest mesh size closest to shore) and suspended just below the water surface and were checked every two hours for fish presence over the duration of deployment. Sampling locations were recorded using a Garmin GPS and logged in a field notebook. Total soak durations ranged from 1 hour

and 55 minutes to 7 hours and 45 minutes with an average soak duration of 4 hours and 20 minutes. An exception was gill net set GN08, which was left deployed for 25 hours and 40 minutes due to strong winds that prevented timely checking and retrieval of the net. The total duration of the gill net effort was 151 hours and 45 minutes.

Fukui traps were used to sample demersal fish in the Milne Port area from 10 to 27 August 2018. Sampling was conducted with sets consisting of five traps connected with a line, each trap measuring 61 cm x 46 cm x 20 cm, with 1.25 cm stretch mesh and equipped with a bait container. Traps were baited with Arctic char and deployed for several days at each station. Traps were periodically checked (normally every day) and, upon retrieved, bait containers were refilled if necessary, prior to redeployment. There were 11 Fukui trap stations in total.

Seine nets were used to sample fish in near shore habitat in Milne Port on 21 and 26 August in six sampling events. Sampling was conducted using a 1.5 m by 10 m seine net. Sampling effort took an average of 5 minutes to sample total areas ranging from 200 m² to 750 m² at a mean depth of 1 m.

All fish collected were transferred to aerated buckets with seawater prior to processing. Representative photographs were taken for each species and life stage at each station. Fish were identified to species, measured for length and weight and returned to aerated buckets to allow for recovery prior to release to the approximate area of capture.

Incidental fish mortalities were retained for aging, stomach content and body burden analysis. Whole fish were kept frozen until they were packaged and shipped in a cooler to Biologica Environmental Services (Biologica) in Victoria, British Columbia for laboratory assessments. The stomach assessment was conducted prior to dissection. The percent fullness and percent digestion of each stomach was recorded.

Whole fish were examined for lesions or tumors. The internal organs and head were removed prior to tissue collection to prevent contamination of the tissue, should an organ be punctured during tissue removal. The tissue was removed from the dorsal musculature with a knife, rinsed and wrapped in new food-grade aluminum foil and placed in clean labeled bags. Samples were kept frozen in a cooler with ice packs until delivery to Maxxam Analytics (Maxxam) in Victoria, BC for analysis. Maxxam analyzed the wet weight tissue samples for metal concentrations by atomic spectroscopy.

For fish aging, the sagittal otoliths were removed from each fish head, cleaned and placed in labelled vials. Whole otoliths were placed in a glass petri dish with distilled water and examined over a black background using a dissecting scope (10-40x magnification).

Shellfish *H. arctica* was collected from benthic invertebrate samples as an additional effects indicator for the fish sampling program in case insufficient numbers of finfish species (e.g. Arctic char or sculpins) were sampled to support statistical power requirements. Up to 10 specimens of *H. arctica* from each benthic invertebrate station were measured for body weight to length ratio. Samples from each benthic infauna station, where available, were frozen and sent to ALS analytical laboratory for metals in tissue (body burden) analysis.

RESULTS

For the 2018 fish survey, overall effort for the four fishing methods was 1,712 hours and 31 minutes. Angling effort, which included both trolling and jigging, ranged from 20 minutes to 1 hour and 25 minutes, with a mean of 45 minutes over 13 stations. A total of 13 fish, representing three species were caught in angling surveys. Shorthorn sculpin (*Myoxocephalus scorpius*) was the most abundant fish species caught during angling surveys, followed by fourhorn sculpin (*M. quadricornis*) and Arctic sculpin (*M. scorpioides*). These three species were the same species caught in 2017 angling surveys and in previous monitoring surveys in the Milne Port area.

Fukui traps were deployed at 11 stations with each deployment consisting of 5 traps per set, except for FT11, where 3 traps were set. A total of 4 fish were caught in Fukui trap surveys. As in the 2017 surveys (Golder, 2018d), fourhorn sculpin and sandlance (*Ammodytes spp.*) were caught during the Fukui trap survey. Additionally, a single Arctic sculpin was captured. This species was not captured in the 2017 Fukui trap surveys (Golder, 2018d).

Gill net effort was calculated as the soak time at each of the 24 stations. At most stations, the gill nets were checked 1 to 3 times during the set time, and the fish capture results pooled for the station. The total duration of the gill net effort was 151 hours and 45 minutes. As in 2017 (Golder, 2018d), Arctic sculpin, Arctic char (*Salvelinus alpinus*), fourhorn sculpin, and shorthorn sculpin were captured in gill net surveys. Additionally, an Arctic cod (*Arctogadus glacialis*) and an unidentified sculpin were captured. Arctic cod has not been caught in previous gill net surveys in the Milne Port area (SEM, 2016a; SEM, 2017a; Golder, 2018d). Arctic char were the most abundant fish species caught in gill net surveys (n = 169), this species was not captured by any other survey method. Fourhorn sculpin was the next most abundant species caught in gillnet surveys (n = 137), followed by shorthorn sculpin (n = 67). The highest mean CPUE was for Arctic char with 1.57 fish/h (SD of 2.19 fish/h).

Effort for seine net sampling was calculated from the time elapsed to drag the sample areas that ranged from 200 m² to 750 m². A total of ten fish were captured in seine net efforts: shorthorn sculpin, fourhorn sculpin, an unknown sculpin species, and an unidentified fish, tentatively identified as a cod. Shorthorn sculpin were the most abundant (n = 4), followed by fourhorn sculpin (n = 3). The highest mean CPUE was for shorthorn sculpin at 8 fish/h (SD of 9.80 fish/h), followed by fourhorn sculpin at 6 fish/h (SD of 10.04 fish/h).

Six Arctic fish species, in addition to one unidentified species and three unidentified sculpin, were captured during fish surveys in 2018. Arctic char, fourhorn sculpin and shorthorn sculpin were the most abundant fish species caught, comprising almost 98% of the total catch. Arctic char were the most abundant fish species captured, with a relative abundance of 42% of the total catch, followed by fourhorn sculpin (36% of catch) and shorthorn sculpin (19% of catch). Arctic sculpin, Arctic cod, and northern sandlance made up the remainder of identified species with relative abundances of 0.7%, 0.25%, and 0.25%, respectively. Gill netting was the most efficient capture method for fish, accounting for 93% of the total catch, including 100% of the total catch of Arctic char.

TRENDS

Total fish catch in 2018 was significantly greater compared to previous years' sampling, with 403 fish captured, more than double the previous highest total captured in 2016 (197 fish). Throughout the 2010-2018 surveys, thirteen different fish species were identified. Arctic cod was collected for the first time in the Milne Port area in 2018, however, it had been previously observed in large schools in the Milne Port area (SEM, 2017b) and in Arctic char stomach contents in 2016 (SEM, 2017a).

Arctic char was the most abundant fish captured in 2018 surveys, similar to 2015 and 2016, where Arctic char comprised 60% and 80% of the total catch, respectively (SEM, 2016a; SEM, 2017a). As in previous survey years, sculpin species were the most abundant fish caught aside from Arctic char. Relative abundance among the sculpin species varied between survey years, however, shorthorn sculpin and fourhorn sculpin consistently were the two most abundant sculpin species.

RECOMMENDATIONS / LESSONS LEARNED

In 2019, Baffinland will continue monitoring to provide a general characterization of the fish community, including Arctic char, in the Milne Port area. Fish community monitoring results will include:

- Relative abundance and distribution of species
- Catch per unit of effort (CPUE)
- Length/weight distribution of each fish species
- Age distribution, body burden and diet of incidental fish mortalities

Given that the total fish catch in 2018 was significantly higher than in previous years, it will be evaluated with the MEWG whether shellfish sampling as an alternative indicator to fish weight-length and body burden studies needs to be continued in 2019.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

No commercial fishery / Schedule V waterbody operated in the vicinity of Milne Port or Steensby Port during 2018.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will adapt its monitoring programs accordingly in the event a commercial fishery is developed in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Fisheries and Oceans Canada (DFO), Marine Environment Working Group (MEWG)
Reference	2018 Milne Ore Dock Fish Offset Monitoring Report (Golder, 2018c)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=4&archive=1

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 2018 Milne Ore Dock Fish Offset Monitoring Report was submitted to DFO on December 31, 2018. 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, the MEWG and other interested parties, as requested.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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 and DFO 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 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Fisheries and Oceans Canada (DFO), Marine Environment Working Group (MEWG)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019f) Quarry Blasting Operations Management Plan (Baffinland, 2013b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 the requirement that blasting in, and near, marine water shall only occur during periods of open water.

For freshwaters, Baffinland's Surface Water and Aquatic Ecosystem Management Plan SWAEMP and Quarry Blasting Operations Management Plan 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

To date, no blasting has occurred within the required setback distances at the Project

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

A detailed mitigation plan was developed for dredging and vibratory pile driving that was undertaken during construction of the ore dock in the Early Revenue Phase. Monitoring was undertaken during dock construction in 2014 to confirm the effectiveness of the mitigation measures. Since that time, there has been no further construction requiring mitigation measures for construction.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	N/A
Ref. Document Link	N/A

METHODS

Not applicable. Winter shipping 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 was being considered for winter 2017-2018 when the winter sealifts associated with the Phase 2 Expansion Project was still being considered. However, as winter sealifts are no longer currently being proposed, this monitoring study was not implemented. Ringed seal hotspots and pupping grounds will have dissolved by the time shipping begins in late-July. The foraging period extends from July to early December when ringed seals disperse as solitary animals or small groups throughout open-water areas or to coastal areas to forage.

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"> a. Wildlife will be given right of way. b. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior. c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan – Rev 06 – March 2016 2017 MEWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Appendix C1

METHODS

The primary mitigation procedure has been to maintain a straight course and constant speed through Milne Inlet and Eclipse Sound. The Shipping and Marine Wildlife Management Plan (SMWMP) and Standard Instructions to Masters provide guidance on ship speeds and ship tracks that should be followed. The requirements are provided to all vessels procured by Baffinland prior to entry to Eclipse Sound.

Project-related ship tracks and ship speeds along the Northern Shipping Route were recorded throughout the 2018 shipping season using an automatic ship tracking system (Automated Identification System or AIS) which tracks the movement of each ship using an onboard AIS transceiver with integrated Global Positioning System (GPS). Vessels fitted with AIS transceivers are tracked in the Project area AIS base stations set up at Bruce Head and at the MHTO office; and when out of range of the base stations, through a number of satellites fitted with AIS receivers. Information provided by AIS equipment includes the vessel's unique identification number, position, course, and speed. Baffinland has contracted exactEarth® a global vessel monitoring and tracking service based on AIS data from polar orbiting satellites to track and report on vessel movements. The ship tracks are accessible to residents of Pond Inlet in the HTO office and, more generally, publicly accessible through the Baffinland website during the shipping season.

RESULTS

The 2018 ship tracks are plotted in Figure 4.15 (see update to Condition No. 103). There were no significant deviations from the nominal shipping route in 2018 by Project ore carriers.

Table 4.26 presents vessel speed information for all Project-related vessels calling at Milne Port in 2018 (see update to Condition No. 105). Ore carriers rarely exceeded 10 knots when transiting along the Northern Shipping Route (ranging from 0 to 5.54% of their transit time). A total of four freight / fuel carriers called to Milne Port during the 2018 shipping season. Of these, two (2) vessels were shown to repetitively exceed 10 knots during their respective transits (Table 4.26). The proportional breakdown of vessel travel speed in the Project area during the 2018 shipping season is presented for all vessels combined (ore carriers and cargo/fuel vessels) in Figure 4.16.

TRENDS

No significant deviations from the nominal shipping route have occurred in the first four years of iron ore shipping (2015--2018). In general, most Project vessels have adhered to the 9 knot vessel speed restriction along the Northern Shipping Route, with performance improving with every year since the start of Project operations. Baffinland will continue to work with all vessel owner / operators to communicate vessel speeds and nominal shipping route to avoid non-adherence events in the future.

No ship strikes on marine mammals or seabirds were recorded over the three years of SBO monitoring. Similarly, no ship strikes on marine mammals or seabirds have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs.

RECOMMENDATIONS / LESSONS LEARNED

To ensure adherence to the SMWMP, Baffinland will continue to monitor ship tracks and ship speeds using shore-based AIS stations at Pond Inlet and Bruce Head, and satellite-based ship tracking using the exactEarth® archive. In 2019, all Project vessels (ore carriers, fuel tankers, cargo ships, tugs, icebreaker) will be provided with standing instruction to travel through Eclipse Sound and Milne Inlet at speeds of no greater than 9 knots.

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> <ul 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.
Relevant BIM Commitment	80, 83
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC)
Reference	N/A
Ref. Document Link	N/A

METHODS

From July 28 to August 7 and September 28 to October 17, 2018 Golder Associates Ltd. (Golder) on behalf of Baffinland, conducted a Ship-based Observer (SBO) Program designed to collect wildlife data in Milne Inlet and Eclipse Sound. The SBO Program was designed to assess presence, distribution and behavioural response of narwhal and other marine mammals to vessel traffic and associated activity during the 2018 shipping season. In addition to marine mammal observations, information on seabirds was collected using the Canadian Wildlife Service's (CWS) Eastern Canada Seabirds at Sea (ECSAS) protocol. The objective of the SBO Program was to collect localized observational data to describe the distribution, occurrence, relative abundance and behavioural response of marine wildlife to shipping activity. To achieve this objective, MWOs recorded details of wildlife sightings aboard the MSV Botnica.

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 2018 from vessel operators, observers aboard the vessel used for the 2018 Bruce Head monitoring program or by local hunters.

TRENDS

From 2013 through 2018, no notifications of accidental contact were reported.

RECOMMENDATIONS / LESSONS LEARNED

A similar program is under consideration for 2019.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Shipping and Marine Wildlife Management Plan (Baffinland, 2016h)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland's Shipping and Marine Wildlife Management Plan mandates the recording of any contact that occurs between Project vessels and marine mammals or seabird colonies.

RESULTS

No contacts reported.

TRENDS

From 2013 through 2018, no notifications of accidental contact were reported.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Draft 2018 Ship-based Observer Program (Golder, 2019d)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1

METHODS

Ship-based surveillance monitoring was conducted as part of Baffinland's Ship-based Observer (SBO) Program. This program was first run in 2013-2015 and was subsequently resumed in 2018. The 2013-2015 SBO Program was conducted during the initial construction phase and during Year 1 of shipping operations. As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013-2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018, the SBO Program was conducted from on-board the MSV Botnica, an Ice Management Vessel (IMV) that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of shipping season. The IMV provided a safe, climate-controlled viewing platform 20 m above sea level, where port and starboard-stationed Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013-2015) observe marine mammals and birds and record observations. Marine mammal surveys were conducted using conventional distance sampling methods. While the vessel was in transit (averaging approx. 8.3 knots), the MWOs surveyed to 90° on both sides of the ship's bow. Two types of scanning techniques were used to detect marine mammals: S-scans consisting of scanning the water parallel to the horizon (in an S-shaped pattern) and U-scans consisting of scanning the water perpendicular to the horizon.

Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. During the 2018 program, observations of marine mammals and seabirds were detected up to 4 km from the vessel. Boarding of the MSV Botnica occurred at Milne Port with the observers remaining on the live-aboard for the full multi-week vessel deployment period, eventually disembarking at Milne Port once ice escort services were complete. Marine mammal surveys typically lasted

throughout daylight hours with scheduled breaks to avoid observer fatigue. The 2018 SBO Program took place from July 28 to August 7 (spring shoulder season) and again from September 28 to October 17 (fall shoulder season). Detailed methodology on data collection and analytical procedures for the 2018 SBO Program is presented in Golder (2019d).

As part of the Standing Instructions to Masters that is issued to all ship owners/operators prior to the start of the shipping season, all ship strikes on marine wildlife species are to be reported to Baffinland.

RESULTS

Very few sightings of marine mammals were recorded over the 2013-2015 period (65 marine mammals in 2013, 12 in 2014 and 16 in 2015). A total of 551 sightings totalling 2,766 individual marine mammals were observed during the 2018 SBO Program, including five (5) different species of marine mammals (narwhal, ringed seal, harp seal, bearded seal, and polar bear). During the spring surveys, 269 sightings of 1,681 individual marine mammals were observed. The most common identified species were ringed seals (194 sightings of 754 individuals), followed by harp seals (41 sightings of 292 individuals), narwhals (seven sightings of 19 individuals), and bearded seals (5 sightings of 5 individuals). During the fall surveys, 282 sightings of 1,084 individual marine mammals were observed. The most common identified species were ringed seal (146 sightings of 315 individuals), followed by harp seal (64 sightings of 462 individuals), narwhal (34 sightings of 156 individuals), and two (2) polar bears. Sightings of four (4) sets of polar bear tracks on the sea ice (not associated with the two recorded polar sightings) were also made, including tracks of an adult with a single cub.

Seabird observations (inclusive of seaducks) declined over the 2013-2015 period (172 sightings in 2013, one (1) in 2014 and one (1) in 2015). In 2018, 631 5-min survey records of seabird monitoring were completed by the wildlife observers, with this data provided to the Canadian Wildlife Service to supplement their seabird sighting database for the region. During the spring survey, a total of 13 species were identified (136 confirmed sightings and 14 unidentified species). The most common species recorded during summer were northern fulmar, king eider, black-legged kittiwake, and thick-billed murre. During the fall survey, a total of five (5) species were identified (704 confirmed sightings and 15 unidentified species). The most common species recorded during fall were glaucous gull, black-legged kittiwake, and northern fulmar. Detailed results for the 2018 SBO Program are presented in Golder (2019d).

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring.

TRENDS

No ship strikes on marine mammals or seabirds were recorded over the four years of SBO monitoring. Similarly, no ship strikes on marine mammals or seabirds have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs.

RECOMMENDATIONS / LESSONS LEARNED

The SBO Program resumed in 2018 using the MSV Botnica as the survey platform at the beginning and end of the shipping season. This proved successful at increasing monitoring effort and detection of marine mammals and seabirds, while reducing risks associated with safe onboarding of the observers. A similar program as completed in 2018 is under consideration for 2019.

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	In-Compliance
Stakeholder Review	Fisheries and Oceans Canada (DFO), Crown Indigenous Relations and Northern Affairs Canada (CIRNAC), Qikiqtani Inuit Association (QIA), Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a) Hunting and Harvesting Policy (Baffinland, 2013d) Environmental Protection Plan (Baffinland, 2016f)
Ref. Document Link	Management Plans available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en Monitoring Reports available at: http://www.baffinland.com/document-portal-new/?cat=4&archive=1&lang=en

METHODS

As part of the Site orientation and training on the Environmental Protection Plan (EPP) individuals coming onto site participate in cultural awareness training and are provided with an overview of the policies outlined in the Hunting and Fishing (Harvesting) Policy. The policy states that 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 visitor's log.

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 for aquatic effects assessment. Required Scientific permits are applied for and received before sampling or fish population health programs occur. Results are published under various annual reports. Scientific collection permits are intended non-lethal programs

RESULTS

No incidences of Project personnel hunting or fishing within lands leased to Baffinland occurred in 2018.

Consulting groups Minnow Environmental Inc., North South Consultants and Golder Associates Inc. completed various fish surveys over the course of 2018 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 effects as required under Fishery Authorisations, licences and applicable management plans.

354 hunters visited the Project site in 2018 to hunt near the Project area. Baffinland accommodated all individuals, providing support when required for breakdowns and maintenance issues.

TRENDS

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.

Baffinland continues to accommodate all hunting parties that travel to the Project.

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 and accommodating all hunting parties.

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.
Relevant BIM Commitment	41
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	35
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mittimatalik Hunters and Trappers Organization (MHTO)
Reference	N/A
Ref. Document Link	N/A

METHODS

Throughout the 2018, Baffinland conducted extensive consultation with the Mittimatalik Hunters and Trappers Organization (MHTO) regarding vessel drifting locations and vessel management practices. Relevant engagement events are as follows:

- June 7 & 8, 2018 - Pre-Shipping Season meeting in Pond Inlet with MTHO and Hamlet of Pond Inlet representatives;
- July 12, 2018 - Meeting in Pond Inlet regarding Baffinland's Production Increase Proposal application;
- August 30 & 31, 2018 - MHTO Site Visit; and
- November 28 & 29, 2018 - End of Season Shipping meeting in Pond Inlet with MTHO.

RESULTS

There were two (2) key outcomes as a result of these engagement activities. Due to community concerns expressed about the number of vessels waiting at Ragged Island during the 2018 season, Baffinland committed to limiting the number of ships waiting at Ragged Island to a maximum of three (3) Project-related vessels. All other vessels will be instructed to wait in Baffin Bay near the Western coast of Greenland. Baffinland also received comments from community members regarding the location of where vessels should be drifting near Ragged Island, and what areas should be avoided. An established drifting zone will be finalized in consultation with the MTHO during 2019.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to consult with the MHTO and other key stakeholders throughout the life of the Project to minimize Project effects on local communities and other resources users to the fullest extent practicable.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

METHODS

Inuit were actively involved in the planning and execution of the 2018 monitoring programs (2018 MEEMP and AIS Monitoring Program, 2018 Habitat Offset Monitoring Program at Milne Port, 2018 Bruce Head Vessel-based Monitoring Program, 2018 Ship-Based Observer (SBO) Program and the 2018 Tremblay Sound Narwhal Tagging Program). An overview of the marine monitoring programs was provided to the MHTO during a June 7/8 2018 meeting in Pond Inlet. A training workshop was provided in Pond Inlet in late July 2018 for all Inuit participants in the 2018 Monitoring Programs. Practical technical training was also provided on-site for those participants successfully employed on the 2018 Monitoring Programs

As a follow-up to the 2018 field programs, Baffinland conducted face-to-face meetings in Pond Inlet with the MHTO (28-29 Nov 2018) as well as the 2018 Inuit program participants (29 Nov 2018) to provide a recap of the 2018 monitoring programs, to review and discuss preliminary monitoring results, and to solicit input on program design and program planning for the 2019 Monitoring Programs. Baffinland's monitoring programs strive to actively involve local participation and 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 members, and Inuit are employed by Baffinland to assist with the programs.

RESULTS

A total of 11 Inuit from Pond Inlet received program-specific training prior to their participation in the 2018 marine monitoring programs. Of the 11 individuals trained, a total of Five (5) were employed through the MHTO in Pond Inlet and four (4) were employed by Inuarak Outfitting to work on the marine monitoring programs. The total amount of work hours for Inuit staff on the 2018 monitoring programs was 1,610 hours. The work positions filled by Inuit participants in 2018 included: marine mammal observers, polar bear monitors, narwhal tagging personnel, marine field sampling technicians, boat operators and boat assistants.

The inclusion of local Inuit land users in the marine monitoring programs (Tremblay Sound, MEEMP and Bruce Head) have proven to be a successful example of community based environmental monitoring providing tangible results that contribute to Baffinland's overall marine environment monitoring efforts. The MHTO has also provided invaluable advice regarding marine mammal behaviour through the MEWG.

TRENDS

Inuit have been involved in monitoring studies at all levels since the inception of Baffinland's monitoring programs. The addition of the MHTO as members of the MEWG in 2016 has greatly increased participation of Inuit in this process.

RECOMMENDATIONS / LESSONS LEARNED

Based on the success of the 2018 marine monitoring programs, Baffinland will continue to explore ways to further enhance Inuit participation in marine monitoring programs in 2019. Marine monitoring programs will be reviewed with the MEWG in 2019 in consideration of increasing Inuit involvement if possible.

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.
Relevant BIM Commitment	27, 28
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mittimatilik Hunter and Trappers Organization, Marine Environment Working Group (MEWG)
Reference	N/A
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

To ensure that the public is made aware of shipping related activities, Baffinland has enlisted exactEarth®, 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 provide 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.

RESULTS

Baffinland has made vessel routing accessible to the public via the Baffinland website. Baffinland also installed an Automated Information System at the Mittimatilik Hunter and Trappers Organization (MHTO) office for live continuous monitoring of vessels active in the Northern Shipping Route.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth®, to be beneficial in providing information related to ship routing to the public. Baffinland will continue its use of this service. Information on project shipping activities will be continue to be shared with the MEWG and MHTO.

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).
Relevant BIM Commitment	27, 28
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Fisheries and Oceans Canada, Mittimatalik Hunter and Trapper Organization, Pisiksik Working Group
Reference	TSD 23: Conceptual-level Marine Offsetting Plan (Golder, 2018n) Mary River Project - Addendum to the FEIS Baffinland. September 2018 (Baffinland, 2018a)
Ref. Document Link	N/A

METHODS

Baffinland (with DFO participation) consulted with the community of Pond Inlet regarding habitat offset design for the ore dock and freight dock at Milne Port for the Early Revenue Phase (ERP) of the Project. Early engagement was initiated during the consultation process on the ERP when Baffinland met with members of the Mittimatalik Hunters and Trappers Organization (MHTO) and other community members to discuss the design, offsetting measures and proposed monitoring with respect to construction of the ore dock and freight dock.

On June 7, 2018 Baffinland provided MHTO members with a presentation on the specific design of the floating freight dock and also discussed this during the June MEWG meetings with MHTO representatives.

RESULTS

From the extent of consultation Baffinland has conducted with community members on the habitat offset design during the pre-construction phase of the ERP, and that ongoing engagement with these stakeholders throughout the ERP on monitoring programs related to the habitat offset for the ore dock, Baffinland is confident that it has a strong understanding of community member's concerns relative to the design, mitigations and offset plans and monitoring that is proposed for the freight dock.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland approach community consultation as an ongoing and iterative process. We have established a program for continuous engagement opportunities on an annual basis with community members. Subsequently, Baffinland is committed to discussing concerns related to construction and monitoring of offset for the freight dock should they arise during future consultation opportunities.

4.7 PERFORMANCE ON SOCIO-ECONOMIC CONDITIONS

4.7.1 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 Project-specific working group. 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 that provide input related to the socio-economic monitoring program for the Project include the communities, the QIA, various departments of the GN, and CIRNAC. These agencies are active members of the Mary River Socio-economic Monitoring Working Group (SEMWG). While the potential for in-migration of non-Inuit into the North Baffin communities and out-migration of Inuit from the North Baffin were raised as concerns by the GN and by communities during the environmental assessment, it hasn't been raised as a concern in recent consultation (Appendix B).

Monitoring

Baffinland conducts monitoring of population demographics in the Local Study Area - the five (5) North Baffin communities (LSA) by reviewing government population statistics, tracking employee origin information, and tracking worker changes in address. Table 4.27 provides an evaluation of the Project's impacts on population demographics, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.27 Population Demographics Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Mine Employment	Migration of non-Inuit Project employees into the North Baffin LSA	Baffinland's 2018 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. 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 one known non-Inuit employees/contractors have in-migrated to the North Baffin LSA, and a net of thirteen known Inuit employees/contractors have out-migrated from the North Baffin LSA since 2015. Results from the 2019 Employee Information Survey (71 surveys received) indicated 2 respondents had moved to a different community in the past 12 months, both of which moved within the North Baffin LSA, from outside of North Baffin LSA.	Effects may be occurring
	Out-migration from North Baffin		

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the SEMWG 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.
Relevant BIM Commitment	41, 43, 45, 46
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019; Appendix F) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland continues to engage with the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and the Mary River Socio-Economic Monitoring Working Group (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 developed and is provided in the Socio-Economic Monitoring Plan (Baffinland 2018). However, the SEMWG is currently revising its Terms of Reference to better reflect its current activities. Baffinland has also incorporated feedback from SEMWG members while developing the Project's socio-economic monitoring program and continues to welcome feedback on the program from the SEMWG and QSEMC.

RESULTS

Baffinland's Socio-Economic Monitoring Report assesses the socio-economic performance of the Project on an annual basis. Socio-economic performance of the Project is assessed using socio-economic indicators for Valued Socio-Economic Components (VSECs) considered in the FEIS (Baffinland, 2012). The report has identified various positive effects of the Project and presents information that is consistent with several EIS predictions. In other cases, monitoring data have revealed unclear, inconsistent, or otherwise negative trends (but not necessarily due to the Project). Long-term monitoring will be necessary to track Project outcomes more fully over time and may contribute to an improved understanding of observed trends and causality. Baffinland's compliance with various Project Certificate Terms and Conditions pertaining to socio-economic monitoring are also discussed throughout the report.

TRENDS

Where appropriate, trends have been described for the indicators assessed in the 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. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used. A 'pre-development' trend refers to the five-year period preceding Project construction (i.e. 2008 to 2012). In some cases, averaged data from this period have been compared against averaged data from previous years (i.e. 2003-2007, where available) to determine a trend. Likewise, a 'post-development' trend refers to the period after Project construction commenced (i.e. 2013 onwards). Averaged data from this period may have also been compared against averaged data from the pre-development period to determine a trend. A trend 'since previous year' refers to the two most recent years in which indicator data are available. Trend analyses can be useful for assessing potential Project influences on an indicator.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has a Socio-Economic Monitoring Plan in place and continues to engage with the QSEMC and SEMWG on the Project's monitoring program, which confirms compliance with this Term and Condition. No need has been identified to update any EIS predictions or to substantially modify Baffinland's existing management/mitigation approach at this time. However, Inuit employment and Inuit employee turnover are areas Baffinland will continue to address. This will occur in part through implementation of Baffinland's Inuit Human Resources Strategy (IHRS) and Inuit Procurement and Contracting Strategy (IPCS). Baffinland's Apprenticeship Program, Morrisburg Heavy Equipment Operator Training Program, Work Ready Program, Q-STEP program (in conjunction with QIA), and other actions to meet the IIBA's Minimum Inuit Employment Goal (MIEG) may also assist with increasing Inuit employment over time. Continued monitoring of Inuit employment hours, the causes of employee turnover, and other aspects of the initiatives described above will be necessary to track outcomes over time. Opportunities for potential performance improvements in these areas may also be investigated.

More generally, successful socio-economic monitoring for the Project will require appropriate long-term data, the regular input of Project stakeholders, and a focus on continual improvement. Baffinland has also committed to using adaptive management as a tool to identify and make necessary improvements to the Project's 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.
Relevant BIM Commitment	41, 43, 46
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland continues to engage with the QSEMC and the SEMWG on the Project's socio-economic monitoring program. In addition, Baffinland regularly engages North Baffin community members through its community engagement program, and other committees that operate under provisions of the Inuit Impact and Benefit Agreement (IIBA), on various socio-economic topics.

RESULTS

Baffinland continues to engage with the QSEMC and 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 developed and is provided in the Socio-Economic Monitoring Plan (Baffinland 2018). However, the SEMWG is currently revising its Terms of Reference to better reflect its current activities. Baffinland has also incorporated feedback from SEMWG members while developing the Project's socio-economic monitoring program, and continues to welcome feedback on the program from the SEMWG and QSEMC.

Baffinland's recent meetings with the SEMWG and QSEMC have been recorded in meeting notes presented in Appendix A of the Socio-Economic Monitoring Report and include:

- February 14, 2018 teleconference meeting with the SEMWG
- June 19, 2018 in-person meeting with the SEMWG in Pangnirtung, Nunavut
- June 20, 2018 in-person meeting with the QSEMC in Pangnirtung, Nunavut

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to engage with the QSEMC and SEMWG on the Project's monitoring program and will consider establishing smaller, focused socio-economic working groups to address specific community issues or Project challenges if deemed appropriate.

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.
Relevant BIM Commitment	45
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland has provided demographic change information in the 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 regularly administers an Inuit Employee Survey, which collects information related to employee changes of address, housing status, and migration intentions.

RESULTS

Demographic change indicator trends are provided in Table 4.28. Detailed results are presented in the Socio-Economic Monitoring Report.

TRENDS
Table 4.28 2018 Monitoring of Indicators of Demographic Change

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Known in-migrations of non-Inuit Project employees and contractors	Not applicable	↑	↑	N. Baffin LSA	Since 2015, a net of one known non-Inuit employee/contractor has in-migrated to the North Baffin LSA.
In-migration of non-Inuit to the North Baffin LSA	Not available	Not available	Not available	N. Baffin LSA	Limited government data are 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	Not applicable	↑	↑	N. Baffin LSA	Since 2015, a net of 13 known Inuit employees/contractors have out-migrated from the North Baffin LSA.
Out-migration of Inuit from the North Baffin LSA	Not available	Not available	Not available	N. Baffin LSA	Limited government data are currently 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 net migration	↑	↓	↑	Territory	A decreasing post-development trend in Nunavut annual net migration is currently occurring.
Employee and contractor changes of address, housing status, and migration intentions	Not applicable	Not applicable	Not applicable	Project	5.4% of respondents to the 2019 Inuit Employee Survey changed residences in the past 12 months. 3.6% moved to a different community and 1.8% moved within their existing community. 13.8% planned to move to a different community in the next 12 months. 6.9% planned to move away from the North Baffin LSA. Data on the housing status of respondents were not collected in 2019 due to a survey administration error.

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide demographic change information in its Socio-Economic Monitoring Report. 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'. For this reason, Baffinland continues to present data from various non-government sources (e.g. Inuit Employee Survey, BCLO survey) to help better understand this topic.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

Baffinland is committed to exploring ways to partner with local and regional governmental agencies and educational institutions to support local communities and develop training programs for residents while limiting the potential for out-migration. Measures implemented during 2018 to achieve these goals include the following initiatives:

Q-STEP

Baffinland and the Qikiqtani Inuit Association (QIA) have partnered in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program, which has as its objective the provision of Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Q-STEP is a four-year initiative consisting of work readiness measures as well as targeted training programs directed at apprenticeships, skills development, supervisor training, and formal certification in heavy equipment operation.

Work Readiness

A key component of Baffinland's efforts to provide opportunities to local communities to enhance labour skills is the development and delivery of pre-employment training programs. Baffinland successfully carried out a 'Work Ready' pre-employment training program with North Baffin residents in 2012 and 2013. There were 277 graduates of the program and 150 of those graduates went on to be employed at the Project in 2013. From 2014 to 2017, Baffinland focused on revising and improving its Work Ready program. In 2017, Baffinland worked with Hamlet Governments from the five (5) North Baffin communities (Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet), the QIA, and Arctic College to develop a revised Work Ready Program that commenced in the first quarter of 2018. Curriculum for this program was developed by the Mining Industry

Human Resource Council (MIHR) and is delivered in the five (5) North Baffin Communities as well as Iqaluit. The curriculum has been expanded from what was included in 2012 and 2013, and the length of classroom time was also extended to offer Inuit participants a more robust work preparedness program.

Upon rollout, it was determined that the program was too lengthy, the content was too broad, and the participation started to dwindle. The program demanded a review. The improved Work Ready Program was run for 5 days offsite in each point of hire community (Clyde River, Hall Beach, Igloodik, and Pond Inlet), with the exception of Arctic Bay which was re-scheduled for February 2019 due to weather conditions. For 2018 there were a total of 72 graduates. In 2019 there will be a total of 15 courses run offsite; 3 sessions per point of hire community, targeting a minimum of 5 participants per course. In addition, 2019 will see the introduction of an on site Work Ready Program where a minimum of 5 graduates from each Work Ready course will be selected to participate in job shadowing on the Mary River Mine Site for 60 hours (five 12-hour work rotations). The addition of the on site program will provide graduates with a chance to experience work life and choose an entry-level position that they seek to be developed in. After the job shadowing process these graduates will become Baffinland employees, either occupying a role in the organization or commencing further training to enhance their skills.

A further refinement of the Work Ready Program will be the introduction of an Inuit trainer who will run the course in Inuktitut and English. The 2019 revisions are aligned with commitments made in the IIBA signed in October 2018 by Baffinland and QIA.

Apprenticeships and Other Opportunities

The apprenticeship program was initiated in late 2017 and the number of apprentices employed by Baffinland during that year was limited. In 2017 Baffinland employed one Inuk apprentice. In 2018 Baffinland placed 8 Inuit apprentices in the following skilled trades: housing maintainer (3), electrician (2), heavy equipment technician (2), welder (1).

In 2018, Baffinland further identified 25 vacancies in the following 8 skilled trades: carpenter, electrician, heavy duty mechanic, heavy equipment technician, housing maintainer, millwright, plumber, and welder. The recruitment process started in Q4 2018 and 14 placements have commenced. The remaining 11 vacancies will be filled in fall 2019. The apprenticeship program is designed as follows: recruits join Baffinland as trades assistants for six months, job shadowing and learning about their prospective trade. Upon successful completion of the six-month term, candidates will write their Trades Entrance exam. Pending successful enrollment in that program, candidates will become full-time, permanent apprentices at Baffinland.

Heavy Equipment Training

In partnership with the Operating Engineers Training Institute of Ontario (OETIO), Baffinland offers North Baffin Inuit opportunities to participate in the Heavy Equipment Operating Training delivered by the OETIO in Morrisburg, Ontario. This training began in early 2018. Five (5) classes of 12 trainees were enrolled in the HEO program and 54 successfully graduated. Baffinland also offered advanced heavy equipment operator training to four existing Baffinland Inuit employees to upgrade their heavy equipment skills. In 2019 there will be a further intake of 36 HEO trainees at Baffinland. Enhancements made for the 2019 HEO training course include:

- Smaller classes which allows for increased seat time, and one-on-one coaching;
- Introduction of Work Ready Program to the participants for familiarity with fly-in, fly-out work schedules, and site expectations;
- Introduction of job shadowing which allows for on-the-job experience and understanding of a day in the role; and
- Extended the duration of the program from 6 weeks to 12 weeks to allow for extended training time to ensure a better transition from the training to the work environment.

Support for Local Businesses

In addition to provisions respecting the participation of Inuit Firms in Project contracting opportunities as detailed in Article 6 of the Inuit Impact and Benefit Agreement (IIBA) and the Inuit Procurement and Contracting Strategy, Baffinland supports the development of local businesses through its annual contribution of \$250,000 through the IIBA's Business Capacity and Start Up Fund. The fund, which is administered by the QIA, is designed to assist existing Inuit Firms to develop capacity to participate in the bidding process and to encourage business start-ups in the communities.

In addition, Baffinland has worked and will continue to work with local businesses on an ongoing basis to create contracting opportunities in the communities.

Support for Local Communities

Baffinland also supports a number of community investment programs. Pursuant to Article 12 of the IIBA, Baffinland and QIA each contribute \$375,000 annually to the Ilagiiktunut Nunalinnullu Pivalliajutsait Kiinaujat fund. The fund, which is administered by QIA is designed to meet the following objectives:

- 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; and
- 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.

In addition, through its community sponsorship program, Baffinland supports a wide range of social, recreational and cultural activities in the communities.

RESULTS

The types of training currently provided or proposed by Baffinland reveal the full scope of learning opportunities available at the Project. Most training opportunities continue to be offered on-site. In 2018, Inuit training hours totalled 32,629.2 hours which is 45% of the total training provided by Baffinland. Baffinland is also working to develop new training programs that would be offered both in the community and at the Mine site. Baffinland is also working with contractors to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as operations advance, employment increases, and feedback from Inuit employees is implemented.

In 2018 the Q-STEP partnership achieved the following:

- 54 Certified Heavy Equipment Trainees
- 8 apprenticeships
- 72 Work Ready graduates

The value of Project-related procurement with Inuit-owned businesses and joint ventures demonstrates the business opportunities created by the Project. Approximately \$140.9 million in contracts were awarded to Inuit-owned businesses and joint ventures in 2018. Of a total of 10 contracts awarded to Inuit-owned businesses and joint ventures, 9 were awarded to businesses based out of the five (5) North Baffin communities. Total procurement (with Inuit *and* non-Inuit firms) in 2018 totalled \$415.1 million. Since Project development, a total of \$960 million worth of contracts has been awarded to Inuit-owned businesses and joint ventures.

TRENDS

On an annual basis, Baffinland has and continues to seek multiple avenues for offering training and education and employment opportunities to local Inuit, and to further explore new partnerships with local Hamlets and training institutes and strengthen existing programs or partnerships, where these already exist.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with its partners, such as Arctic College, to encourage Inuit to continue living in their home communities while seeking ongoing and progressive training and development.

Baffinland will also continue to identify new opportunities to encourage the development of local businesses and is committed to ongoing support for local community programs, initiatives and events.

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.
Relevant BIM Commitment	43, 45
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland regularly administers a voluntary Inuit Employee Survey, which collects information on employee changes of address, housing status, and migration intentions. Baffinland has discussed its surveys with the SEMWG (which includes GN, QIA, and CIRNAC representatives) and QSEMC and will continue to engage both groups on the Project's socio-economic monitoring program. The most recent survey was administered by Baffinland in January/February 2019. Results from the Inuit Employee Survey are summarized, where relevant, in the Project's Socio-Economic Monitoring Reports.

Baffinland also added two new questions to its Inuit Employee Survey in 2019 on home ownership and financial literacy training, at the request of Nunavut Housing Corporation (NHC) staff. These questions ask survey participants if they have ever considered purchasing a home in their community, and if they would be interested in attending an informational course about managing their personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through their employer or local housing association.

RESULTS

A total of 71 surveys were completed by Inuit employees and contractors. Table 4.29 summarizes results pertaining to changes in employee and contractor residence and community ($n=71$). 4.2% of respondents indicated their housing situation had changed in the past 12 months, 74.6% indicated their housing situation had not changed in the past 12 months, and results were unknown for 21.1% of respondents. When ‘unknown’ results are removed, 5.4% of respondents indicated their housing situation had changed in the past 12 months and 94.6% indicated it had not. Respondents who had changed residences and moved to a different community ($n=2$) were then asked which community they had moved from; this result was compared against information provided on their current community of residence. Of these respondents, 100.0% had moved into the North Baffin LSA (or 2.8% of all survey responses).

Table 4.29 Changes in Inuit Employee and Contractor Residence and Community (2019 Inuit Employee Survey Results)

Type of Change	Number of Respondents	Percentage of Respondents
All survey respondents ($n=71$)		
Residence changed in the past 12 months, within existing community	1	1.4%
Residence changed in the past 12 months, moved to new community	2	2.8%
Residence did not change in the past 12 months	53	74.6%
Unknown	15	21.1%
Total	71	99.9%
Residence changed in the past 12 months, moved to a new community ($n=2$)		
Moved from North Baffin LSA to outside of North Baffin LSA	N/A	N/A
Moved from outside of North Baffin LSA to North Baffin LSA	2	100.0%
Moved within the North Baffin LSA	0	0.0%
Other	N/A	N/A
Unknown	0	0.0%
Total	2	100.0%

NOTES:

1. Source: 2019 Inuit Employee Survey
2. Total percentages may not equal 100.0% due to rounding. Because the 2019 survey was administered only in North Baffin LSA communities, Inuit residing outside of these communities (e.g. in Iqaluit or non-Nunavut communities) were not included. North Baffin LSA out-migrants were thus not captured in the results, nor were residence changes that occurred outside the North Baffin LSA.

Table 4.30 pertains to current Inuit employee and contractor housing status. Due to a survey administration error in 2019, data on the type of housing respondents lived in were unable to be collected and are not included in the table below.¹² The most recent data on this topic are presented in JPCSL (2018). This section of the table has been retained as a placeholder for future reports. Regarding homeownership ($n=71$), 31.0% of respondents said they have considered purchasing a home in their community, 47.9% had not considered purchasing a home in their community, 4.2% already owned their own home, and results

¹² A programming issue associated with a new survey administration technique in 2019 (i.e. tablet administration) resulted in responses to this survey question inadvertently defaulting to the first response option provided. This issue was not identified until after the data collection phase was complete. The issue will be rectified for future surveys conducted by this method.

were unknown for 16.9% of respondents. When 'unknown' results are removed, 37.3% of respondents had considered purchasing a home in their community and 5.1% already owned their own home.

Table 4.30 Current Inuit Employee and Contractor Housing Status (2019 Inuit Employee Survey Results)

Current Housing Status	Number of Respondents	Percentage of Respondents
What type of housing do you currently live in? (n=N/A)		
Privately owned – Owned by you	–	–
Privately owned – Owned by another individual	–	–
Renting from a private company	–	–
Public housing	–	–
Government of Nunavut staff housing	–	–
Other staff housing	–	–
Other	–	–
Unknown	–	–
Total	–	–
Have you ever considered purchasing a home in your community? (n=71)		
Yes	22	31.0%
No	34	47.9%
I already own my own home	3	4.2%
Unknown	12	16.9%
Total	71	100.0%

NOTES:

1. Source: 2019 Inuit Employee Survey.

Table 4.31 summarizes results pertaining to Inuit employee and contractor migration intentions ($n=71$). 16.9% of respondents planned to move residences in the next 12 months while 64.8% did not. Migration intentions were unknown for 18.3% of respondents. When 'unknown' results are removed, 20.7% of respondents planned to move residences in the next 12 months and 79.3% did not. Respondents who planned to both change residences and move to a different community in the next 12 months ($n=8$) were then asked which community they planned to move to; this result was compared against information provided on their current community of residence. Of these respondents, 50.0% (or 6.9% of known survey responses) planned to move out of the North Baffin LSA and 25.0% (or 3.4% of known responses) planned to move within the North Baffin LSA. The planned type of move was unknown for 25.0% (or 3.4% of known responses).

Table 4.31 Inuit Employee and Contractor Migration Intentions (2019 Inuit Employee Survey Results)

Migration Intentions	Number of Respondents	Percentage of Respondents
All survey respondents (n=71)		
Plan to move residences in the next 12 months, within existing community	4	5.6%
Plan to move residences in the next 12 months, to a new community	8	11.3%
Do not plan to move residences in the next 12 months	46	64.8%
Unknown	13	18.3%
Total	71	100.0%
Plan to move residences in the next 12 months, to a new community (n=8)		
Plan to move from North Baffin LSA to outside of North Baffin LSA	4	50.0%
Plan to move from outside of North Baffin LSA to North Baffin LSA	N/A	N/A
Plan to move within North Baffin LSA	2	25.0%
Other	N/A	N/A
Unknown	2	25.0%
Total	8	100.0%

NOTES:

1. Source: 2019 Inuit Employee Survey.
2. Total percentages may not equal 100.0% due to rounding. Because the 2019 survey was administered only in North Baffin LSA communities, Inuit residing outside of these communities (e.g. in Iqaluit or non-Nunavut communities) were not included. Those who were planning to in-migrate to the North Baffin LSA were thus not captured in the results, nor were those who planned to move between residences outside the North Baffin LSA.

TRENDS

Like previous surveys, some respondents to the 2019 Inuit Employee Survey indicated they had moved to a different community in the past 12 months (3.6% in 2019, 9.9% in 2018, and 7.0% in 2017) or planned to move to a different community in the next 12 months (13.8% in 2019, 17.6% in 2018, and 16.3% in 2017). Due to a survey administration error in 2019, data on the type of housing respondents lived in were unable to be collected and compared to previous survey results (60.7% lived in public housing in 2018 and 66.7% lived in public housing in 2017). Baffinland will continue to track employee changes of address, housing status, and migration intentions through an Inuit Employee Survey to see if future trends emerge.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to administer this survey on a regular basis. Baffinland will also continue to welcome feedback on the survey from SEMWG and QSEMC members.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Data on the origin, number, and ethnicity of employees and contractors who worked on the Project are presented in the Socio-Economic Monitoring Report. This information was obtained from internal Baffinland records.

RESULTS

An average of 2,054 individuals worked on the Project in 2018, of which 315 (15.3%) were Inuit. In 2018, most of the Project's known origin Inuit employees and contractors were based in LSA communities with smaller numbers residing outside of Nunavut. Most of the Project's known origin non-Inuit employees and contractors were based in Canadian locations outside of Nunavut, with Ontario having the greatest number. Small numbers of non-Inuit employees and contractors were based in Nunavut (all in Iqaluit). There were also a small number of non-Inuit international contractors, and various Inuit/non-Inuit employees and contractors whose origin was unknown. Within the North Baffin LSA, Hall Beach had the highest average number of employees and contractors (50), while Igloolik had the lowest (29). Several employees and contractors also resided in Iqaluit (59). One employee/contractor came from the Kivalliq Region, while none came from the Kitikmeot Region.

TRENDS

Similar to previous years, the Project employed many Inuit from the LSA communities in 2018. This likely reflects the Inuit hiring commitments Baffinland has made in those locations and the access to Project work locations provided by regular flights from LSA communities directly to site. Nearly all known origin non-Inuit employees and contractors were based in Canadian provinces and territories other than Nunavut. A mine like Mary River requires many employees with various skill sets. Individuals with advanced mining and/or technical skill sets are in limited supply in Nunavut. The large number of Project employees from outside of Nunavut is considered to at least partly reflect this skills gap. The Project's labour demand is also expected to continue to exceed the LSA Inuit labour supply (i.e. those who are 'ready, able, and willing' to work at the Project), as noted in a recent Labour Market Analysis prepared for Baffinland (Impact Economics 2018).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information regarding employee origin in future Socio-Economic Monitoring Reports.

4.7.2 Education and Training (PC Conditions 135 through 141)

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.

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 CIRNAC. There is an inherent relationship between the education and training initiatives and objectives implemented by Baffinland and the Government of Nunavut, which is responsible for delivering most education and training programs in Nunavut. Commitments for Baffinland to provide education and training opportunities are contained in the IIBA. The SEMWG and QSEMC also regularly discuss 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 benefit of the Project (Appendix B).

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 4.32 provides an evaluation of the Project’s impacts on education and training, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.32 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 2018 is described in PC Condition No 137. 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 In 2018, a total of 72,041 hours of training were completed at the Project site, of which 32,629 hours (or 45%) were provided to Inuit.	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		Positive effects consistent with FEIS predictions

Positive effects with respect to life skills and to education and work skills have occurred as a result of the Project.

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).
Relevant BIM Commitment	93
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

The Baffinland Inuit Employment and Training Specialist works closely with various levels of Government, Inuit Organizations, and other resource development companies to continue the identification of programs and activities that would provide new opportunities for work/study programs.

The Baffinland Inuit Apprenticeship program, partially funded by the Qikiqtani Skills and Training for Employment Partnership (Q-STEP) program, will offer employment and apprenticeship training to Inuit. The training components of this program will be administered by Nunavut Arctic College both in Nunavut and through their partner educational institutions outside of Nunavut. Baffinland is currently recruiting 25 candidates, spread across eight positions: carpenter, electrician, heavy duty mechanic, heavy equipment technician, housing maintainer, millwright, plumber, and welder. Recruits will join Baffinland as trades assistants for six months, job shadowing and learning about their prospective trade. Upon successful completion of the six-month term, candidates will write their Trades Entrance exam. Pending successful enrollment in that program, candidates will become full-time, permanent apprentices at Baffinland.

The apprenticeship program was initiated in late 2017 and the number of apprentices employed by Baffinland during that year was limited. In 2017 Baffinland employed one Inuk apprentice. In 2018 Baffinland placed 8 Inuit apprentices in the following skilled trades: housing maintainer (3), electrician (2), heavy equipment technician (2), welder.

In partnership with the Operating Engineers Training Institute of Ontario (OETIO), Baffinland offers local Inuit opportunities to participate in the Heavy Equipment Operating Training delivered by the OETIO in Morrisburg, Ontario. This training began in early 2018. Five classes of 12 trainees were enrolled in the HEO program and 54 successfully graduated. Baffinland also offered advanced heavy equipment operator training to four existing Baffinland Inuit employees to upgrade their heavy equipment skills.

Additional programs, including financial literacy, General Education Development (GED) upgrading and other initiatives are currently under consideration by Baffinland for implementation in 2019.

RESULTS

The Baffinland Inuit Employment and Training Specialist has been working with the Mary River Inuit Impact and Benefit Agreement (IIBA) Joint Management Committee to discuss training opportunities at both the mine site and in communities. These discussions are of an ongoing and iterative nature and will continue to occur in 2019.

QIA and Baffinland are also engaged in implementation of the Q-STEP program and associated training initiatives.

TRENDS

Given the remote location of Baffinland's Point of Hire Communities as well as the lack of comprehensive post secondary educational infrastructure in these communities, offering work/ study programs continues to be a challenge.

RECOMMENDATIONS/ LESSONS LEARNED

Baffinland will continue to examine programs offered in other jurisdictions, including those offered by other mining companies operating in similar conditions, to determine their potential suitability for offer at the Mary River Project.

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.
Relevant BIM Commitment	92, 94
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

As described in Project Certificate No 135, Baffinland is providing the opportunities for Inuit to become certified in the Skilled Trades. These certifications are recognized Canada-wide. These skills and associated certifications can be used for employment opportunities outside of the Mary River Project.

The apprenticeship program was initiated in late 2017 and the number of apprentices employed by Baffinland during that year was limited. In 2017 Baffinland employed one Inuk apprentice. In 2018 Baffinland placed 8 Inuit apprentices in the following skilled trades: housing maintainer (3), electrician (2), heavy equipment technician (2), welder.

Baffinland recently began recruiting candidates for the apprenticeship program for individuals interested in pursuing a career in the skilled trades. Baffinland is currently recruiting 25 candidates, spread across eight positions: carpenter, electrician, heavy duty mechanic, heavy equipment technician, housing maintainer, millwright, plumber, and welder. Recruits will join Baffinland as trades assistants for six months, job shadowing and learning about their prospective trade. Upon successful completion of the six-month term, candidates will write their Trades Entrance exam. Pending successful enrollment in that program, candidates will become full-time, permanent apprentices at Baffinland.

Baffinland is also partnering with the Operating Engineer Training Institute of Ontario (OETIO) in to train Inuit candidates from Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet and Iqaluit. the Heavy Equipment Operating Training delivered by the OETIO in Morrisburg, Ontario. The trainees will learn the foundations of heavy equipment operation and build skills to be able to operate various pieces of heavy equipment confidently and safely.

This training began in early 2018. Five classes of 12 trainees were enrolled in the HEO program and 54 successfully graduated. Baffinland also offered advanced heavy equipment operator training to four existing Baffinland Inuit employees to upgrade their heavy equipment skills.

RESULTS

In 2018 the Q-STEP partnership achieved the following:

- 54 Certified Heavy Equipment Trainees
- 8 apprenticeships

These Inuit participants can use the training obtained for employment with Baffinland or other industries requiring heavy equipment operators.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland views offering training programs as a fundamental component of expanding the Inuit workforce for the Project.

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, particularly those from the North Baffin, continue to develop new skillsets for advancement at the Project.

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.
Relevant BIM Commitment	92
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	In-Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

On-site and on-the-job training is delivered in all departments and employment-types at the Project site. Many of the resultant certificates or licenses are transferable to other jobs within Nunavut. A summary of the transferable skills/certificates delivered includes:

- 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)
- 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

Baffinland delivers training that is job specific. The above listing, although not exhaustive, is subject to operational need. It is noteworthy that due to poor internet connections in some communities, employees who reside in the North Baffin Communities upon hire complete the full suite of training once they arrive on site for their first employment rotation.

In 2017, Baffinland also provided training to both the Baffinland Community Liaison Officers (BCLO) and QIA Community Liaison Officers. This training provided participants with insight into presentation preparation and delivery as well as issues resolution. In 2018, Baffinland continued to develop the BCLO's skills in human resource activities such as recruitment and resume writing, as well as becoming effective coordinators of training in the communities. They provided logistical support and language interpretation for the Work Ready Program delivered in each community. For 2018 we had a total of 72 graduates of the Work Ready Program. In 2019 there will be a total of 15 courses run offsite, 3 per point of hire community, targeting a minimum of 5 participants per course.

RESULTS

A total of 72,040.7 hours of training were delivered in 2018. This represents a 66% increase from 2017. 32,629.2 was training hours to Inuit employees, which represent 45% of the total training hours provided by Baffinland.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor and evaluate training programs to ensure that training is effective and offers employees the opportunities to advance in their chosen careers and to develop transferable skills. New initiatives and programs are being considered to enhance the subject matter of training (i.e. Mental Health and First Aid Programs, Inuktitut as a Second Language) as well as enhance the support that is offered by Baffinland Management to Project employees.

Baffinland will also continue to work with contractors to ensure Inuit content in the form of training opportunities and to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as operations advance, employment increases, and feedback from Inuit employees is considered.

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.
Relevant BIM Commitment	92
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

Throughout 2018 Baffinland and the QIA continued to work closely to identify candidates for training opportunities, and to secure additional government funding to support the provision of the skills necessary to gain meaningful and long term employment at Baffinland.

Baffinland together with the QIA, as a project partner, is currently engaged in the implementation of the Qikiqtani Skills and Training Partnership (QSTEP) program. This program is designed to prepare Inuit for employment both at the Project and elsewhere in the region through a number of training-to-employment initiatives. This program will boost skills development across the Qikiqtani Region, with a focus on training in the mining sector, for a four-year period ending on March 2021.

RESULTS

The Q-STEP program has been announced and is being implemented. This program is partially supporting Baffinland's Work Ready, Apprenticeship, and Heavy Equipment Operator training programs.

The approved Inuit Human Resource Strategy will guide the work of the Baffinland Human Resources Department. Baffinland and the QIA are developing procedures to operationalize the Inuit Human Resources Strategy. These procedures were finalized in 2018.

TRENDS

Not Applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to work closely with the QIA to implement the employment and education and training provisions of Mary River Project IIBA. Through the Joint Management Committee, Baffinland and the QIA work to monitor training initiatives, develop and plan for new potential opportunities, and jointly review proposed activities that may lead to improved retention among Inuit employees.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-Economic Monitoring Working Group
Reference	N/A
Ref. Document Link	N/A

METHODS

A revised labour market analysis was presented in the 2014 Annual Report to the NIRB (Baffinland, 2015c).

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

In 2018, Baffinland engaged Mining Industry Human Resources Council (MiHR) to conduct an LMA with a larger scope in 2019. The LMA will include:

1. **Labour Market Analysis (LMA)** will examine the labour market conditions in the Qikiqtani region of Nunavut, from both a labour demand and labour supply perspective;
2. **Skills and Capacities Assessment (SCA)** will profile the skills and capacities of the labour force, including a look at how people distribute by skill level among Qikiqtani's labour supply;
3. **Inuit Labour Force Barriers Analysis (ILBA)** will explore barriers to full employment for Inuit people and identify potential strategies to support/improve the ability of Inuit people to attain and maintain employment at Baffinland operations.

LMA Study Objectives

The intent of the LMA study is to estimate and assess the availability of Inuit labour for Baffinland operations in the Qikiqtani region of Nunavut and to help identify the factors that may influence that

availability. The LMA offers an objective and independent analysis of the challenges facing the region's labour market.

At its core, the LMA aims to understand and inform expectations of labour supply in the Qikiqtani region, such that project partners can develop strategies to maximize the potential of their community members. As well, the LMA covers labour demand factors that may tighten the labour market for different occupations and categories of skill level.

The LMA will provide reliable labour market data and analysis that will support the establishment of annual Inuit Employment Goals (IEGs) for Baffinland operations in the Qikiqtani region and identify areas where additional training/recruitment efforts could support the ultimate objective of clarifying expectations around Inuit employment targets as set out in the Inuit Impact Benefit Agreement (IIBA). The LMA project will aim to ensure that data collection, analysis and reporting can be updated on a regular basis.

The LMA will further provide a specific focus on Post-Secondary Education (PSE) data in the Qikiqtani region, and examine the extent that incoming students may influence the region's labour market. This will include a sensitivity analysis that expands on the baseline analysis (based on historical observation) and investigate how the expected outcomes might differ under different educational scenarios.

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.
Relevant BIM Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland regularly administers a voluntary Inuit Employee Survey, which collects information on 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. Baffinland has discussed its surveys with the SEMWG (which includes GN, QIA, and CIRNAC representatives) and QSEMC and will continue to engage both groups on the Project's socio-economic monitoring program. The most recent survey was administered by Baffinland in January/February 2019. Results from the Inuit Employee Survey are summarized, where relevant, in the Project's Socio-Economic Monitoring Reports.

RESULTS

A total of 71 surveys were completed by Inuit employees and contractors. Table 4.33 summarizes results on the highest level of education obtained by survey respondents ($n=71$). 49.3% of respondents had less than a high school education. 16.9% had a high school diploma or equivalent, 4.2% had an apprenticeship or trades certificate or diploma, and 15.5% had a college or other non-university certificate or diploma. 0.0% had any type of university certificate or diploma and 14.1% of respondents had unknown educational levels. When 'unknown' results are removed, 57.4% had less than a high school education, 19.7% had a high school diploma or equivalent, and 23.0% had higher than a high school diploma or equivalent.

Furthermore, 64.8% of respondents said they would attend an informational course about managing personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through their employer or local housing association; 25.4% would not; and results were unknown for 9.9% of respondents. When 'unknown' results are removed, 71.9% of respondents said they would attend such a course.

Table 4.33 Education Status (2019 Inuit Employee Survey Results)

Highest Level of Education	Number of Respondents	Percentage of Respondents
What is the highest education level you have obtained? (n=71)		
Less than high school	35	49.3%
High school diploma or equivalent	12	16.9%
Apprenticeship or trades certificate or diploma	3	4.2%
College or other non-university certificate or diploma	11	15.5%
University certificate or diploma	0	0.0%
Unknown	10	14.1%
Total	71	100.0%
Would you attend an informational course about managing your personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through your employer or local housing association? (n=71)		
Yes	46	64.8%
No	18	25.4%
Unknown	7	9.9%
Total	71	100.1%

NOTES:

1. Source: 2019 Inuit Employee Survey.
2. Total percentage may not equal 100.0% due to rounding.

Table 4.34 summarizes results on the employment status of survey respondents prior to Project employment ($n=71$). 23.9% of respondents resigned from a previous job in order to take up employment with the Project, while 66.2% did not. Results were unknown for 9.9% of respondents. When 'unknown' results are removed, 26.6% resigned from a previous job in order to take up employment with the Project while 73.4% did not. Of those respondents that resigned from a previous job in order to take up employment with the Project ($n=17$), 35.3% (or 9.4% of known survey responses) had casual employment status, 17.6% (or 4.7% of known responses) had part-time employment status, and 41.2% (or 10.9% of known responses) had full-time employment status.

Table 4.34 Employment Status Prior to Project Employment (2019 Inuit Employee Survey Results)

Pre-Employment Status	Number of Respondents	Percentage of Respondents
Did you resign from a previous job in order to take up employment with the Mary River Project? (n=71)		
Yes	17	23.9%
No	47	66.2%
Unknown	7	9.9%
Total	71	100.0%
If yes, what was your previous employment status? (n=17)		
Casual	6	35.3%
Part-time	3	17.6%
Full-time	7	41.2%
Unknown	1	5.9%
Total	17	100.0%

NOTES:

1. Source: 2019 Inuit Employee Survey.
2. Total percentage may not equal 100.0% due to rounding.

Table 4.35 summarizes results on the education status of survey respondents prior to Project employment (n=71). 7.0% of respondents were enrolled in an academic or vocational program at the time of their hire at the Project, while 77.5% were not. Results were unknown for 15.5% of respondents. When 'unknown' results are removed, 8.3% of respondents were enrolled in an academic or vocational program at the time of their hire at the Project while 91.7% were not. Of those respondents that were enrolled in an academic or vocational program at the time of their hire at the Project (n=5), 0.0% (or 0.0% of known survey responses) suspended or discontinued their education because they were hired to work at the Project.

Table 4.35 Education Status Prior to Project Employment (2019 Inuit Employee Survey Results)

Pre-Employment Status	Number of Respondents	Percentage of Respondents
Were you enrolled in an academic or vocational program at the time of your hire at the Mary River Project? (n=71)		
Yes	5	7.0%
No	55	77.5%
Unknown	11	15.5%
Total	71	100.0%
If yes, did you suspend or discontinue your education because you were hired to work at the Mary River Project? (n=5)		
Yes	0	0.0%
No	5	100.0%
Unknown	0	0.0%
Total	5	100.0%

NOTES:

1. Source: 2019 Inuit Employee Survey.
2. Total percentage may not equal 100.0% due to rounding.

TRENDS

Like previous surveys, the individuals who completed Baffinland's Inuit Employee Survey in 2019 had varied educational and pre-employment backgrounds. 57.4% had less than a high school education, 19.7% had a high school diploma or equivalent, and 23.0% had higher than a high school diploma or equivalent. By comparison, data from the 2016 Census indicate the proportion of the North Baffin LSA's population (aged 25 to 64 years) with no certificate, diploma or degree was 50.8%; with a secondary school diploma or equivalency certificate was 14.4%; and with a postsecondary certificate, diploma, or degree was 36.0%. Likewise, the proportion of Nunavut's population (aged 25 to 64 years) with no certificate, diploma or degree was 40.9%; with a secondary school diploma or equivalency certificate was 14.6%; and with a postsecondary certificate, diploma, or degree was 44.4% (Statistics Canada 2017a, b, c, d, e, f, g).

Like previous surveys, some respondents to the 2019 Inuit Employee Survey also indicated they resigned from a previous job in order to take up employment with the Project (26.6% in 2019, 31.4% in 2018, and 20.9% in 2017). For greater reference, Nunavut's Inuit population participation rate, employment rate, and unemployment rate in December 2018 were 58.1%, 46.0%, and 20.8% respectively (Nunavut Bureau of Statistics 2019). Likewise, few or no respondents continue to indicate they suspended or discontinued their education because they were hired to work at the Project (0.0% in 2019, 3.1% in 2018, and 0.0% in 2017). Baffinland will continue to track employee education and pre-employment status through an Inuit Employee Survey to see if additional trends emerge.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to administer this survey on a regular basis. Baffinland will also continue to welcome feedback on the survey from SEMWG and QSEMC members.

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.
Relevant BIM Commitment	92
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA)
Reference	N/A
Ref. Document Link	N/A

METHODS

This Term and 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 Proposal.

Baffinland continues to work collaboratively with the QIA to promote Inuit training, education, and employment initiatives, consistent with provisions of the Inuit Impact and Benefit Agreement (IIBA), which was successfully re-negotiated in 2018. This work occurs through IIBA committees such as:

- Joint Executive Committee
- Employment Committee

Inuit training and employment initiatives addressed through the IIBA include:

- Inuit Human Resources Strategy
- Apprenticeship Program (not mentioned specifically in the IIBA, but apprenticeship training is identified as a potential program)
- Morrisburg Heavy Equipment Operator training program (not mentioned specifically in the IIBA, but HEO training is identified as a potential program)
- Work Ready Program
- Summer Student Employment
- Inuit Internship Program
- Achievement Awards and Scholarships
- Baffinland Inuit Training Centre

Furthermore, Baffinland and the QIA are partners in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) program, which has been designed 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. Q-STEP is a four-year initiative consisting 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.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland recognizes the need to institute training programs at early stages to ensure potential Inuit employees are equipped with the necessary skills to take advantage of employment opportunities at the Mary River Project. Baffinland's IIBA with the QIA and its Inuit Human Resources Strategy outline several initiatives Baffinland is undertaking to advance Inuit training and employment. The success of Inuit training and employment initiatives will continue to be tracked through Baffinland's Socio-Economic Monitoring Reports and IIBA Implementation Reports provided to QIA.

4.7.3 Livelihood & Employment (PC Conditions 142 through 147)

The Project provides direct and indirect employment opportunities to residents of the five (5) North Baffin communities and other Nunavummiut.

Six (6) PC conditions relate to potential impacts of the Project on livelihood and employment. The conditions identify actions that Baffinland 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 unilingual candidates.

The IIBA outlines the commitments Baffinland has made to ensuring the North Baffin communities benefit from employment opportunities of the Project. Baffinland and QIA also establish an annual Minimum Inuit Employment Goal (MIEG) to set a target for Inuit employment and to outline the actions that need to be taken to meet it.

Baffinland and QIA initiated the development of an Inuit Human Resources Strategy (IHRS) in 2016. The IHRS was finalized with QIA in 2017.

Stakeholder Feedback

Discussions around livelihood and Project-related employment opportunities continue to be a key focus of the comments provided by community members and other stakeholders during public meetings. Comments when Baffinland hosts public meetings in the communities (Appendix B). The SEMWG and QSEMC also regularly discuss this element of the Project (Appendices C3 and C4).

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 2018 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 4.36 provides an evaluation of the Project's impacts on employment, relative to predictions presented in the FEIS and to the 2018 MIEG.

Although the level of Inuit participation in the Project's workforce (14.1% of the total hours worked in 2018) was largely consistent with FEIS predictions (e.g. consistent with North Baffin LSA predictions, but slightly lower than LSA predictions), it was below the 2018 MIEG.

Path Forward

Baffinland continues to refine its Inuit human resources programs and remains committed to meeting Inuit employment targets. The new Baffinland Apprenticeship Program, the development of a labour pool of multi-skilled Inuit Heavy Equipment Operators, implementation of the Q-STEP training program (in conjunction with QIA) and other actions to meet the MIEG should also assist with increasing employment in the North Baffin communities. The establishment of an annual MIEG with the QIA and finalization of Baffinland's IHRS and Inuit Contracting and Procurement Strategy (ICPS) should also support increased Project-related employment levels in the North Baffin communities. Baffinland will continue to monitor Inuit employment levels at the Project for future trends. Reporting on each PC condition follows.

Table 4.36 Livelihood and Employment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Wage Employment	Employment of LSA residents	<p>Direct employment in 2018 included 379,956 hours worked by LSA residents (Inuit and non-Inuit), representing 12.3% of total worked in Nunavut (3,081,740 hours). This is slightly higher than FEIS predictions for the total labour supply potential of 342,000 h/a, and higher than in 2017.</p> <p>Of this, 287,040 hours were worked by North Baffin LSA residents (representing 9.3% of the total). This is higher than FEIS predictions of 230,000 h/a for the North Baffin LSA labour supply potential.</p> <p>Project hours worked by North Baffin LSA residents increased (by 57,382 hours) from 2017, as did Project hours worked by Iqaluit residents (by 9,506 hours) from 2017. Inuit individuals worked 435,908 Project hours in 2018 (representing 14.1% of the total. Approximately, 1,529 full time equivalent (FTE) positions were held in 2018 of which 216 FTEs (14.1%) were held by Inuit individuals at the Project in 2018, which is 114,882 hours more than 2017. This is below the 2018 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 2018, eighteen contracts worth approximately \$140.9 million were awarded to Inuit-owned businesses and joint ventures, which is \$246.3 million lower than in 2017. Of the \$140.9 million, \$123.1 million in contracts were awarded to Inuit-owned businesses and joint ventures in the LSA. Prior to 2018, reporting was focused on 'value of procurement with Inuit-owned businesses and joint ventures'. This reporting focus was changed in 2018 to 'value of contracting with Inuit Firms' to better align with IIBA reporting methods. Overall Inuit Firm contracting values in 2018 were lower than in 2017 by \$246.3 million. Total contracting (with Inuit and non-Inuit firms) in 2018 totaled \$415.1 million. Since Project development, a total of \$960 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 6 Inuit workers received promotions in 2018.	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.
Relevant BIM Commitment	105
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA)
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland's Inuktitut in the Workplace Policy outlines the Company's position respecting support for the use of Inuktitut at all Project sites in Nunavut and ensures that 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 the Executive Committee level and was last updated in 2017. Article 11.4 of the IIBA also specifically addresses the topic of Inuktitut in the workplace.

Although the working language at the Project 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 symbols where possible. While on-site training is delivered in English, site-based Cultural Advisors 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 the IIBA, Baffinland provides Inuit employees with access to professional career counselling and professional counselling for personal issues on an as-needed basis. Services are available from Inuktitut speaking counsellors. Through the amended IIBA, Baffinland will be rolling out an in-community counselling program in 2019 to further support the residents of the North Baffin communities. These services will also be available in Inuktitut. Baffinland also updates the company website with news articles and other information related to the Project. It is intended that the website will eventually 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.
Relevant BIM Commitment	N/A
Reporting Requirement	As needed
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

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.

From September 10-14, 2018, Baffinland hosted an Employment and Training Information Tour in the five (5) North Baffin communities. An important component of the information presented during this tour related to sharing description of the various pre-employment and work-readiness requirements to interested community members.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is continuously seeking ways to increase Inuit employment in the Project and to provide relevant and meaningful training opportunities for local community members.

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.
Relevant BIM Commitment	43, 45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland has provided information on potential barriers to employment for women in the Socio-Economic Monitoring Report. This includes indicator data on hours worked by female employees and contractors, and some information on childcare availability and costs. Furthermore, specific reference is made in the Mary River Project IIBA to Inuit women's access to employment (Article 7.17) and affirmative steps for attracting female employees (Article 11.5; which acknowledges Inuit women entering non-traditional occupations can face barriers related to skill levels and discrimination). Actions identified in Article 11.5 include:

- The Company shall develop an affirmative action plan that sets out measurable goals and procedures to monitor compliance with government employment equity legislation and any harassment policies.
- The Company and a designated Inuit organization shall develop and locate training programs developed specifically to attract women who may want to work at the Project.
- The Company and a designated Inuit organization shall develop and implement gender sensitivity training programs.
- The Company shall provide for appropriate accommodations and facilities for female Inuit employees.

RESULTS

Table 4.37 presents the hours (and percentage of hours) worked by women and men on the Project in 2018. 226,080 hours (or 7.3% of total hours worked on the Project) were worked by women, which is 63,530 hours more than documented for 2017. The percentage of hours worked by Inuit and non-Inuit women in 2018 were similar (3.9% and 3.4%, respectively). However, the percentage of hours worked by Inuit women compared to Inuit men on the Project (approximately 27.8% of this total) was much higher than non-Inuit women compared to non-Inuit men (approximately 3.9% of this total) in 2018. A similar trend was noted from 2013 to 2017.

Table 4.37 Hours Worked by Project Employees and Contractors by Ethnicity and Gender (2018)

Hours Worked by Project Employees and Contractors, by Ethnicity and Gender (2018)		
Employee Ethnicity and Gender	Hours Worked	% of Total (3,081,740)
Inuit	Male	314,530
	Female	121,378
Non-Inuit	Male	2,541,130
	Female	104,702
Total	3,081,740	100.0%

Source: Baffinland

Appropriate community-level indicator data are currently unavailable for the topic of childcare availability and costs. As such, this topic continues to be tracked through the QSEMC process and community engagement conducted for the Project (results are reported on in the Socio-Economic Monitoring Report). Employment levels can be influenced by many factors, including the existence of barriers faced by certain demographic groups. Inadequate access to childcare in the LSA may be creating some barriers to increased employment of women at the Project. However, the new employment opportunities being created for women in the LSA because of the Project should be acknowledged. Baffinland has also developed, or has committed to developing, several measures that encourage Inuit female employment and retention at the Project. Goals and priorities in this area were finalized with the QIA in the IHRS and through renegotiation of the IIBA in 2018. The success of IIBA and IHRS initiatives will continue to be tracked by Baffinland.

TRENDS

While Baffinland has continued to encourage the employment of women at the Project, women have worked 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 related to potential barriers to employment for women through its Socio-Economic Monitoring Reports. However, appropriate community-level indicator data are currently unavailable for the topic of childcare availability and costs. As such, this topic continues to be tracked through the QSEMC process and community engagement conducted for the Project.

Baffinland engages with the GN on employment topics through the SEMWG and QSEMC. Baffinland remains open to discussing these issues with the GN further as part of its engagement with these groups. Baffinland also remains open to discussing how improved monitoring data may be obtained.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	N/A
Ref. Document Link	N/A

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.
Relevant BIM Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Government of Nunavut (Nunavut Housing Corporation; Community and Government Services; Economic Development and Transportation); Mary River Socio-Economic Monitoring Working Group (SEMWG); Qikiqtani Socio-economic Monitoring Committee (QSEMC)
Reference	2017 SEMWG Meeting Records 2017 QSEMC Meeting Records
Ref. Document Link	Appendices C3 and C4

METHODS

Baffinland discusses housing related issues with the SEMWG, of which the Government of Nunavut (including Nunavut Housing Corporation) are active participants.

At the June 20, 2018 QSEMC meeting, concerns related to public housing were discussed by the 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.

4.7.4 Economic Development, Self Reliance, and, Contracting and Business Opportunities (PC Conditions 148 through 152)

Five (5) PC conditions relate to the potential impacts of the Project on economic development and self-reliance, and contracting and business opportunities. The objectives of the conditions are to: encourage Baffinland to investigate what measures the Proponent could take to encourage home ownership; promote the contracting of Inuit firms by contracting with smaller work packages; undertake collaborative monitoring with regional agencies to evaluate the Project's interactions with harvesting and food security; outline measures 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 potential negative effects or challenges associated with temporary or early closure of the Project. Commitments and contracting guidelines are contained in the IIBA to encourage contracting of Inuit firms, and an Inuit Contracting and Procurement Strategy (ICPS) has recently been finalized. Procurement and contracting workshops were held in all five of North Baffin communities in 2018 (Appendix B).

Monitoring

Baffinland tracks and reports on the amount spent on 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 2018 socio-economic monitoring report. Table 4.38 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 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Positive effects with respect to aspects of the economy in the North Baffin communities have accrued as a result of Project employment.

Path Forward

Baffinland recently finalized an ICPS jointly with the QIA, to further enhance business opportunities to Inuit companies in the Qikiqtani Region and within Nunavut. Baffinland will continue to monitor and report on Project-related economic-development effects in future years. Reporting on each PC condition follows.

Table 4.38 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, 539 land use visitor person-days were recorded at Project sites in 2018, which is 385 person-days greater than in 2017. The majority (185) of the visitors stopped at Milne Port and were associated with the Nunavut Quest, which in 2018 ran between Igloolik and Pond Inlet through Milne Inlet.	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 2018 Socio-economic Monitoring Report presents 2018 employment and contracting statistics. GN (2015) also reported positive feedback from Igloolik and Pond Inlet regarding 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 2018, Baffinland awarded contracts worth approximately \$140.9 million to Inuit-owned businesses and joint ventures. Of this, \$123.1 million in contracts were awarded to Inuit-owned businesses and joint ventures in the LSA. Procurement values in 2018 were higher than in 2016 (i.e. by \$322.8 million). Prior to 2018, reporting was focused on 'value of procurement with Inuit-owned businesses and joint ventures'. This reporting focus was changed in 2018 to 'value of contracting with Inuit Firms' to better align with IIBA reporting methods. Overall Inuit Firm contracting values in 2018 were lower than in 2017 by \$246.3 million. Total contracting (with Inuit and non-Inuit firms) in 2018 totaled \$415.1 million. Furthermore, Baffinland's LSA employee payroll expenditures (in Canadian dollars, not including contractors, but including both Inuit and non-Inuit employees) totaled \$10,124,687.67 in 2018.	Positive effects consistent with FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
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.
Relevant BIM Commitment	45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland has provided some information on Project harvesting interactions and food security in the Socio-Economic Monitoring Report.

RESULTS

Appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information (results are reported on in the Socio-Economic Monitoring Report). Some territorial (but not community-scale) government data are available on harvesting and food security in Nunavut and are presented in the Socio-Economic Monitoring Report. Data related to this topic are also presented in the report and include: Proportion of taxfilers with employment income, median employment income, percentage of population receiving social assistance, number of recorded land use visitor person-days at Project sites, and number of Wildlife Compensation Fund claims.

Harvesting and consumption of country food remains a valued and important part of the Inuit culture and diet. Monitoring data presented in the Socio-Economic Monitoring Report suggest Inuit land use activities coexist to some degree with the Project, as local land users have continued to access Project sites since construction. Inuit employee harvesting is also permitted at the Project (subject to certain restrictions) although Baffinland's January 2018 Inuit Employee Survey indicates only minimal harvesting is currently being conducted.

Stakeholder concerns expressed about Project effects on harvesting and wildlife are acknowledged. Concerns have also been expressed elsewhere about declining rates of country food consumption and the lack of food security in Nunavut, generally. Various mitigation measures have been established by Baffinland to address effects on Inuit travel, camps, and harvesting. For example, Baffinland has contributed \$750,000 to a Wildlife Compensation Fund (administered by the QIA under the terms of

the IIBA) to address the potential for wildlife-related impacts from the Project. Monitoring data indicate this Fund has been accessed by local Inuit. Baffinland has also established a Harvesters Enabling Program in Pond Inlet through the IIBA, whereby Baffinland will contribute \$400,000 per year for 10 years for a gas program to allow for more accessible travel to Inuit in the area.

There are positive indications the Project makes contributions to improved household income and food security in the Local Study Area (LSA). This has occurred by providing LSA residents with meaningful employment opportunities and through related contributions and initiatives. Employment income facilitates the purchase of food and other family goods, while also providing a means to participate in harvesting if desired. Baffinland also contributes to various community wellbeing initiatives directly (e.g. through the IIBA's INPK Fund, school meal program, seasonal country food exchange program, community food bank donations) and indirectly (e.g. through the QIA Legacy Fund and QIA Benefits Fund), which may assist individuals not directly benefiting from Project employment.

The Nunavut Food Security Coalition (2014) has outlined four components of food security (i.e. availability, accessibility, quality, and use) and factors affecting each component. Baffinland has acknowledged it can play a role in each of these food security components. However, the Nunavut Food Security Coalition (2014: 2) also highlights food security components "are influenced by many complex factors" and notes "this critical and complex issue is larger than the mandate of any one organization. A collaborative approach is essential." Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer; Baffinland's role in each of the four food security components identified by the Nunavut Food Security Coalition (2014) is described in the Socio-Economic Monitoring Report.

TRENDS

Baffinland acknowledges stakeholder concerns have been raised on this topic. However, relevant mitigation is in place (e.g. Wildlife Compensation Fund, Harvesters Enabling Program) and Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer. In addition, potential effects on wildlife resources continue to be tracked through Baffinland's environmental monitoring programs and the TEWG/MEWG processes. Relevant sections of Baffinland's Annual Report to the NIRB should be consulted for monitoring results and information specific to these topics.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor the topic of Project harvesting interactions and food security in its Socio-Economic Monitoring Report. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information. Baffinland is open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Potential Effects of a Mine Closure (FHW Consulting 2014)
Ref. Document Link	N/A

METHODS

The report '*Potential Effects of a Mine Closure*' (FHW Consulting 2014) was completed in 2014 and submitted to the NIRB.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

When the Project is approaching closure, Baffinland will work with government and community stakeholders to implement programs to support employee transition. Many Baffinland employees will be able to demonstrate a meaningful work record and a variety of on-the-job and formal training experiences, which may assist them in their transition to new endeavours.

Baffinland is working with the QIA to develop a Mine Closure Working Group that will include members from local communities and will address biophysical 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.
Relevant BIM Commitment	34
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not applicable
Stakeholder Review	Parks Canada, Environment Climate Change Canada, Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board, Parks Canada
Reference	<p>Environmental Protection Plan (Baffinland, 2016f)</p> <p>2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)</p> <p>MEWG Meeting Records (Appendix C1)</p>
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Pilots are made aware of the minimum flying altitude over the park and this condition is written into aviation contracts. Flight Height compliance was monitored in 2018 and is reported on in the 2018 Annual Terrestrial Report No flights over Sirmilik Park occurred in 2018 and therefore no noise implications are relevant.

Parks Canada is made aware of the shipping schedules for each upcoming shipping season through their participation in the Marine Environment Working Group and any planned 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 published in French, English and Inuktitut and installed in the Pond Inlet Parks office.

RESULTS

No flights over Sirmilik Park occurred in 2018.

Parks Canada continues to be appraised of shipping seasons through public accessible information.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

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, some Nunavut-based employees may 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 also regularly administers an Inuit Employee Survey, which collects data on employee housing status and other topics. Survey results are presented in the Socio-Economic Monitoring Report.

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) may be a goal for some individuals. Incomes generated by the Project may help individuals accomplish this goal should they wish.

Baffinland provided financial literacy training at both Project locations (i.e. mine site and port site) in March 2018. There were 18 individuals who attended, the majority of which were Inuit (some non-Inuit individuals also participated as all employees were welcome to attend). The individual providing the training also had several informal discussions related to financial planning with Baffinland employees while at site. Baffinland will continue to offer financial literacy training to its employees, on an as-needed basis, in the future.

Per IIBA Article 11.9, Baffinland has committed to provide Inuit employees with advice on personal financial management, when requested by an employee. The Baffinland Inuit Employment and Training Specialist and QIA Inuit Engagement Specialist shall be the points of contact for access to these services. Likewise, the IIBA's Ilagiiktunut Nunalinnullu Pivalliajutsait Kiinaujat (INPK) Fund (Article 12.2) supports projects that demonstrate positive impacts for Inuit in the North Baffin communities, aiming

towards resilient communities, strong families, and job readiness. Activities supported by the Fund may include individual and family financial planning. For additional reference, the Inuit Human Resources Strategy (IHRS) also commits Baffinland to establishing literacy and numeracy upgrade programs on-site.

Baffinland also added two new questions to its Inuit Employee Survey in 2019 on home ownership and financial literacy training, at the request of Nunavut Housing Corporation (NHC) staff. These questions ask survey participants if they have ever considered purchasing a home in their community, and if they would be interested in attending an informational course about managing their personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through their employer or local housing association. Results from the Inuit Employee Survey are summarized where relevant in the Project's Socio-Economic Monitoring Reports.

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 at least partly by the Project, in the same way that the branch in Baker Lake was likely induced at least partly by the Meadowbank Mine.

Furthermore, the Nunavut Housing Corporation (NHC) continues to make investments in new housing units across the territory and has several 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.
Relevant Commitment	BIM N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not applicable
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2017 SEMWG Meeting Records
Ref. Document Link	Appendix C3

METHODS

Responsibility for implementation of this PC Condition is primarily directed towards the QIA.

Pursuant to Article 6 of the IIBA, Baffinland has committed to implement best efforts to maximize Inuit participation in contracting and procurement. Measures to enhance Inuit participation in Project contracting opportunities include advance notice of contracting opportunities, unbundling of large contracts into smaller, separate packages to provide smaller Inuit Firms with access to contracting opportunities, the mandatory requirement of Inuit content in each bid, and the weighting of Inuit content proposals in bid evaluation.

In 2018 the Company and QIA renegotiated specific provisions of the Mary River IIBA including provisions related to procurement and contracting activities. This resulted in enhanced benefits for Inuit firms including removal of bonding requirements for contracts valued under CAD \$500,000, and the commitment to work with the QIA through annual planning processes to identify special conditions to maximize Inuit and/or Inuit firm participation in project contracts.

In 2018, as part of IIBA implementation Baffinland continued implementation of the Inuit Procurement and Contracting Strategy (IPCS). This strategy aims to increase Inuit business participation in contracting opportunities for the Mary River Project. The IPCS was operationalized and implemented through a series of procedures that were developed with the QIA. The operation of the IIBA's contracting and procurement provisions as well as the IPCS are regularly monitored by a newly established Contracting Committee and Baffinland provides quarterly reports to QIA on the number and value of contracts awarded to Inuit Firms.

The Company also conducted a Procurement and Contracting Information tour in 2018 which included the participation of the Kakivak Association. By working together Baffinland and the Kakivak association held multiple open house sessions in the five (5) North Baffin Communities to provide information about contracting policies and procedures, opportunities, and information about business start-up and development funding available through the Kakivak Association. Baffinland has committed to conduct a session similar to this one annually in Iqaluit and the five (5) North Baffin Communities.

Baffinland also annually contributed \$250,000 to a Business Capacity and Start Up Fund in 2018. The contribution amount to this fund will increase in 2019 to \$275,000 as per the renegotiated Mary River IIBA. The fund, which is administered by QIA, is intended to develop business capacity and enhance the ability of Inuit Firms to participate in the Project bidding process through the provision of advice and assistance related to start-up capital and financing, management development, ongoing business management, financial management, contracts and procurement or human resources management. Baffinland is currently in the process of implementing a Contracting Database which will track Inuit firm pre-qualification status and reasons for unsuccessful pre-qualification and/or unsuccessful bids. This information will then be utilized to identify how the Business Capacity and Start Up Fund can be best utilized to maximize benefit to Inuit Firms.

Baffinland also participates in both the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and the Mary River Socio-Economic Monitoring Working Group (SEMWG). These Working Groups provide a discussion forum and information sharing hub that supports impacted communities and interested stakeholders to take part in monitoring efforts to Project-specific economic monitoring.

RESULTS

The value of Project-related procurement with Inuit-owned businesses and joint ventures is a useful indicator of the business opportunities created by the Project. Approximately \$140.9 million in contracts were awarded to Inuit-owned businesses and joint ventures in 2018. Total procurement (with Inuit *and* non-Inuit firms) in 2018 totaled \$415.1 million. Since Project development, a total of \$960 million worth of contracts has been awarded to Inuit-owned businesses and joint ventures.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to work with the QIA through the newly established Contracting Committee and the Joint Executive Committees to maximize Project-related benefits to Inuit Firms.

4.7.5 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 measures to support Inuit employed by the Project, including: 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. Commitments to the provision of employee assistance and counselling are contained in the IIBA.

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 the federal government. There is an inherent relationship between the Project and the Government of Nunavut for managing socio-economic effects from the Project as the GN is responsible for delivering most health and social services programs in Nunavut. Key concerns expressed by stakeholders relate to the effects of fly-in/fly-out employment on workers and their families. These concerns were raised during the environmental assessment, and also in recent consultation (Appendix B). The SEMWG and QSEMC also regularly discuss this element of the Project (Appendices C3 and C4).

Monitoring

Baffinland tracks and reports on several 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 tax filers with employment income and median employment income, percentage of population receiving social assistance, and other topics (e.g. crime rates) in the 2017 socio-economic monitoring report. Table 4.39 provides an evaluation of the Project's impacts on human health and well-being, based on monitoring activities completed in 2017, relative to predictions presented in the FEIS and FEIS Addendum.

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, including those which are external to the Project. 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 2017.

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 SEMWG, the QSEMC, and the Project's workforce. Reporting on each PC condition follows.

Table 4.39 Human Health and Well-being Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
<p>Substance Abuse</p>	<p>Increased substance abuse due to the transportation of substances through Project sites</p>	<p>Security searches of employees arriving and departing site and site searches with drug dog and trained staff.</p> <p>In 2018, 28 drug and alcohol related contraband infractions occurred at Project sites amongst employees and contractors. This was 13 infractions higher than in 2017. While all contraband infractions are of concern and taken seriously by Baffinland, the 28 infractions that occurred in 2018 represent only a small number of individuals from the Project workforce. Reasons for the increase in 2018 are unknown but may be linked to the increased average number of employees and contractors working on site compared to 2017 (2,054 vs. 1,572; see Section 3.1.5 of Appendix F). 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.</p> <p>There has been an increasing trend in the number of impaired driving violation and in the number of drug violations in the North Baffin LSA in the post-development period, which was also evident prior to Project development. Conversely. There have been decreasing trends in Iqaluit and Nunavut in the post development period, which was not evident prior to Project development. Reason for lack of a similar trend reversals in the North Baffin LSA are currently unknown. As Project construction only began in 2013, there is minimal post-development data currently available. However, the area positive indications the Project continues to improve attitudes toward substances and additions in the LSA, by proving LSA residents with meaningful employment opportunities within a drug and alcohol-free environment.</p>	<p>Relevant monitoring activities for human health and well-being are longer term and conclusions will be drawn in future years</p>
	<p>Increased substance abuse because Project employment makes substances more affordable</p>		
	<p>The Company’s focus on health and safety, and employee assistance and counselling programs will increase awareness of employees, reducing substance abuse</p>		

Component	Effects	Monitoring Program	Impact Evaluation
<p>Increased Well-being and Community Social Stability</p>	<p>Project employment resulting in increased well-being of children, and increased community social stability</p>	<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>	<p>Relevant monitoring activities for human health and well-being are longer term and conclusions will be drawn in future years</p>

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.
Relevant BIM Commitment	96
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

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, on-site Inuit Cultural Advisors are available for the Project's Inuit employees to meet with and Baffinland provides all employees with regular access to an on-site Project medic. Furthermore, Section 11.7 of the IIBA commits Baffinland to the development and operation of a Community Counsellors Program in the communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet.

RESULTS

In 2018 there were a total of 41 EFAP cases. This is 3 cases more than in 2017. Employees and their families who reside in Nunavut accounted for 36.6% of annual EFAP use. Furthermore, there were 6,301 recorded visits to the on-site Project medic in 2018, a decrease of 36 visits from 2017.

TRENDS

A summary of monitoring results and trends is provided in Table 4.40. Detailed results are presented in the Socio-Economic Monitoring Report.

Table 4.40 Employee Health and Counselling Indicators and Trends in 2018

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Number of times the Project EFAP is accessed	Not applicable	↑	↑	Project	The EFAP was accessed 41 times in 2018; 15 of these were by Nunavummiut
Number of visits to Project site medic	Not applicable	↑	↓	Project	There were 6,301 visits to the Project site medic in 2018; 1,315 of these were by Inuit

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has received informal positive feedback about the presence of Inuit Cultural Advisors (previously called on-site Elders) on site to work with and mentor Baffinland employees. Baffinland will maintain the employment of Inuit Cultural Advisors on site, per IIBA Article 11.8. Baffinland will also continue to explore other options and opportunities to provide support to its 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.
Relevant BIM Commitment	43, 45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland has provided information on potential indirect effects of the Project in the Socio-Economic Monitoring Report. This includes information (where available) 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 Socio-Economic Monitoring Report.

TRENDS

A summary of monitoring results and trends is provided in Table 4.41. Detailed results are presented in the Socio-Economic Monitoring Report.

Table 4.41 Socio-Economic Indicators and Trends for Potential Indirect Effects in 2018

Indicator / Topic	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	Not applicable	↑	↑	Project	There were 28 drug and alcohol related contraband infractions at Project sites in 2018.
Number of impaired driving violations	↑ ↑	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	An increasing post-development trend in the number of impaired driving violations is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is apparent in Iqaluit, which was not evident prior to the Project.
Number of drug violations	↑ ↑	↓ ↓	↓ ↓	N. Baffin LSA Iqaluit	A decreasing post-development trend in the number of drug violations is apparent in the LSA, which was not evident prior to the Project.
Prevalence of gambling issues	Not available	Not available	Not available	Project	These topics continue to be tracked through the QSEMC process and community engagement conducted for the Project.
Prevalence of family violence					
Prevalence of marital problems					
Rates of teenage pregnancy					
Percent of health centre visits related to infectious diseases	↓ ↓	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	An increasing post-development trend in the percent of health centre visits related to infectious diseases is apparent in the North Baffin LSA, which was not evident prior to the Project. A decreasing post-development trend is apparent in Iqaluit and was evident prior to the Project.
Number of secondary school graduates	↑ ↑	↓ ↓	↑ ↓	N. Baffin LSA Iqaluit	A decreasing post-development trend in graduation numbers is apparent in the LSA, which was not evident prior to the Project.
Secondary school graduation rate	↑	↓	↑	Region	A decreasing post-development trend in graduation rates is apparent in the region, which was not evident prior to the Project.

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Crime rate	↑ ↑	↑ ↓	↑ ↓	N. Baffin LSA Iqaluit	An increasing post-development trend in crime rates is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is apparent in Iqaluit, which was not evident prior to the Project.

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not applicable' or 'Not available' are used.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on potential indirect effects of the Project through its Socio-Economic Monitoring Reports and complies with this Term and Condition. In instances where appropriate community-level indicator data are currently unavailable (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 community engagement conducted for the Project. Baffinland is open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be provided at least 60 days prior to the commencement of any construction activities.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland is committed to promoting employee cohesion through cultural awareness and social programs. In 2018, Baffinland continued to provide cultural recognition programs such as cultural awareness, promotion of Inuktitut in the workplace and Inuit Cultural Advisors (formerly referred to as on-site Elder's) support for Inuit employees.

Baffinland Inuit Cultural Advisors attended select Management Team meetings to discuss Inuit culture and history as well as ways to approach Inuit employees to discuss work related matters in a culturally appropriate manner. Elders also gave informal Inuktitut as second language lessons during non-working hours.

Consistent with the provisions of the IIBA, Baffinland has also instituted measures to reduce and address potential cultural conflicts at site, including:

- 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;
- Hiring four (4) on-site Inuit Cultural Advisors to provide counselling services;
- Hiring four (4) on-site Human Resources Advisor - Inuit Relations;
- Development of an Inuktitut in the Workplace Policy which is currently under review;
- Country food kitchen provided for the consumption and sharing of traditional country food; and
- Ongoing translation of signage and policies on site to ensure effective communications to and for the safety of all employees.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is committed to supporting Inuit employees at site. A number of initiatives are planned for 2019 to increase cultural awareness and reduce conflict including:

- Measures to promote the use of Inuktitut (ongoing efforts to translate signs / manuals – will continue in 2019);
- Investigate providing English lesson on site for interested employees;
- Continued review and enhancement of cross-cultural training programs and on-boarding orientation programs;
- Delivery of presentations (on-site and at corporate head office) relating to Inuit culture and the IIBA; and
- Hiring of Inuit Summer Student to work in Human Resource Department.

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
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

METHODS

An Ilagiktunut Nunalinnullu Pivalliajutsait Kiinaujat Fund (the 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; and
- 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. Baffinland and QIA each contributed \$375,000 annually to the fund which is administered by QIA from 2013-2018. Through successful IIBA renegotiations in 2018, the Company and QIA further agreed that commencing in 2019 maximum annual matching contributions to the Fund by the Company will be increased but shall not exceed \$550,000 annually. Baffinland also supported numerous community centered events and activities in 2018. This includes, but is not limited to, community snowmobile races, fishing derbies, square dances, community feasts, as well as various sports team travel and sponsorship. These activities directly supported participation in recreation programming, specifically the participation of Inuit youth.

In 2018, Baffinland also partnered with the Recreation and Parks Association of Nunavut (RPAN) to support summer camp programming in Pond Inlet. Baffinland contributed \$25,000 in support of RPAN programming designed to support youth participants.

Throughout 2019 the Company plans to work directly with community based organizations and various levels of government to look at ways its sponsorship activities can further enhance community wellbeing.

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.
Relevant BIM Commitment	96
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

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, on-site Inuit Cultural Advisors are available for the Project's Inuit employees to meet with and Baffinland provides all employees with regular access to an on-site Project medic. Furthermore, Section 11.7 of the IIBA commits Baffinland to the development and operation of a Community Counsellors Program in the communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet.

RESULTS

In 2018 there were a total of 41 EFAP cases. This is 3 cases more than in 2017. Employees and their families who reside in Nunavut accounted for 36.6% of annual EFAP use. Furthermore, there were 6,301 recorded visits to the on-site Project medic in 2018, a decrease of 36 visits from 2017.

TRENDS

A summary of monitoring results and trends is provided in Table 4.42. Detailed results are presented in the Socio-Economic Monitoring Report.

Table 4.42 Employee Health and Counselling Indicators and Trends in 2018

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Number of times the Project EFAP is accessed	Not applicable	↑	↑	Project	The EFAP was accessed 41 times in 2018; 15 of these were by Nunavummiut
Number of visits to Project site medic	Not applicable	↑	↓	Project	There were 6,301 visits to the Project site medic in 2018; 1,315 of these were by Inuit

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide employee access to an EFAP, on-site Cultural Advisors, and a Project-site medic, and is committed to the development and operation of a Community Counsellors Program. Baffinland also encourages its employees and stakeholders to provide feedback on how its various programs and initiatives can be improved in the future. For example, Baffinland's Workplace Conditions Review process (required under the IIBA) has previously reviewed aspects of the counselling and support services available to Project employees.

4.7.6 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 as the responsible party for implementation of these conditions. 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, Hamlet administrations, the QIA, the GN, and CIRNAC. The GN is the primary stakeholder, since it is responsible for the delivery of many public services. Hamlets expressed concern that skilled workers may leave their workforce to work for the Project, resulting in a skills gap, at least temporarily. Some Project employees and contractors have left positions in their communities to pursue employment at the Project. However, the recent Mary River Experience – The First Three Years report (BDSI, 2016) describes a lack of full-time hamlet work in many communities and the important role the Project plays in filling this gap. Potential opportunities for the community to realize new community infrastructure as a result of the Project continue to be expressed. This has included receiving retired heavy equipment from the Project, or in 2018 about Baffinland purchasing, renovating, and renting buildings in the community (Appendix B).

Monitoring

Baffinland has conducted Employee Information Surveys in early 2017, early 2018 and early 2019. Results are provided in the 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 4.43 provides an evaluation of the Project's impacts on community infrastructure and public services, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.43 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 2019 Employee Information Survey (71 surveys received), 17 Project employees (or 26.6%) indicated they had left positions in their communities to pursue employment at the Project. Of these, 9 were casual/part-time positions, while 7 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 194,991 hours of training for Project employees, 34,629 hours (or 48.1%) of which were completed by Inuit employees (this does not include the additional training and experience gained by Project contractors). Likewise, 11,919,376 hours of labour have been cumulatively performed in Nunavut as a result of the Project since 2013, 1,919,267 hours (or 16.1%) of which were performed by Inuit employees and contractors.	Long-term effect to be realized over time

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 SEMWG. 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.
Relevant BIM Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland continues to engage the QSEMC and SEMWG on its socio-economic monitoring program; the Government of Nunavut (GN) actively participates in both these groups. Baffinland also signed an updated Memorandum of Understanding (MOU) with the GN Department of Health in 2017 regarding site health services and medevac procedures. More specifically, this MOU describes the health care staff and services Baffinland will provide on-site, including procedures Baffinland will follow during medevac situations, for pre-employment medical examinations, and for the reporting and management of communicable diseases, amongst other topics. The MOU also describes how Baffinland will pay for and/or reimburse the GN Department of Health for costs associated with the medical transportation of employees and for conducting pre-employment medical exams.

Baffinland has provided information on potential socio-economic effects of the Project in its 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 (e.g. percentage of the population receiving social assistance, percent of health centre visits related to infectious diseases, total and per capita number of health centre visits, number of visits to Project site medic).

RESULTS

Summary results and trends in socio-economic monitoring data are presented in Table 4.44. Detailed results are presented in the Socio-Economic Monitoring Report.

In-migration of workers is one way the Project could negatively affect health and social service provision in the LSA. Company monitoring data suggest North Baffin LSA in-migration is not occurring in any significant manner (see Sections 3.1.2 and 3.1.3 of the Socio-Economic Monitoring Report). Company monitoring data for Iqaluit are more limited, but a net of +1 individuals are known to have moved from the North Baffin LSA into Iqaluit since 2015 (data obtained from annual BCLO survey discussed in Section 3.1.2 of the Socio-Economic Monitoring Report). More generally, Section 3.1.5 of the Socio-Economic Monitoring Report indicates an average of 53 Inuit and 7 non-Inuit employees / contractors with known origins lived in Iqaluit in 2018. Appropriate government-sourced migration data for the LSA are otherwise unavailable. However, the Project may also be contributing positively to LSA health service provision, by providing employees with regular access to an on-site Project medic and by providing various counselling and support services (e.g. EFAP, on-site Cultural Advisors, commitment to establish a Community Counsellor Program).

Table 4.44 Selected Human Health and Well-Being Indicators and Trends in 2018

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Percentage of population receiving social assistance	↓ ↓	↓ ↓	↑ ↑	N. Baffin LSA Iqaluit	A decreasing post-development trend in the percentage of the population receiving social assistance is apparent in the LSA and was evident prior to the Project.
Percent of health centre visits related to infectious diseases	↓ ↓	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	An increasing post-development trend in the percent of health centre visits related to infectious diseases is apparent in the North Baffin LSA, which was not evident prior to the Project. A decreasing post-development trend is apparent in Iqaluit and was evident prior to the Project.
Number of health centre visits (total)	↑ ↑	↑ ↑	↓ ↓	N. Baffin LSA Iqaluit	An increasing post-development trend in the total number of health centre visits is apparent in the LSA and was evident prior to the Project.

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Number of health centre visits (per capita)	↑ ↑	↑ ↑	↓ ↓	N. Baffin LSA Iqaluit	An increasing post-development trend 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	Not applicable	↑	↓	Project	There were 6,301 visits to the Project site medic in 2018; 1,315 of these were by Inuit.

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

TRENDS

Trends are presented in Table 4.44.

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 SEMWG and QSEMC on its socio-economic monitoring program.

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.
Relevant BIM Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 SEMWG and QSEMC Meeting Records Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland continues to engage the QSEMC and the SEMWG on its socio-economic monitoring program and the Government of Nunavut (GN) actively participates in both these groups. Baffinland also provides information on potential socio-economic effects of the Project in the Socio-Economic Monitoring Report. This includes indicator data related to increased Project-related pressures to community and airport infrastructure in the Local Study Area (LSA) communities (i.e. Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet, and Iqaluit).

RESULTS

Like previous years, Baffinland has continued to use some LSA community infrastructure to support ongoing Project development. This use is small in comparison to other ongoing community uses but does add some incremental pressure on LSA facilities. However, 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 and short-term in nature (e.g. community meetings only occur a limited number of times per year). Furthermore, the use of these spaces is 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 some incremental pressure on these facilities. For example, in 2017 (the most recent year data were available) there were a total of 24,859 aircraft movements within the LSA. This includes 6,572 aircraft movements at North Baffin LSA airports (Statistics Canada 2018a) and 18,287 aircraft movements at the Iqaluit airport (Statistics Canada 2018b). Project-related aircraft movements at LSA community airports in 2017 represent a small portion (6.5%) of this total. 2018 monitoring results are summarized in 4.45.

Table 4.45 2018 Monitoring Results for Selected Community Infrastructure and Public Services Indicators

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Baffinland use of LSA community infrastructure	Not applicable	↑	No change	Project	Baffinland continued to use some LSA community infrastructure to support ongoing Project development in 2018
Number of Project aircraft movements at LSA community airports	Not applicable	↑	↑	Project	There were 1,802 Project aircraft movements at LSA airports in 2018

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

TRENDS

Trends are presented in Table 4.45.

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, in the Socio-Economic Monitoring Report. Baffinland will also continue to engage the SEMWG and QSEMC on the Project's socio-economic monitoring program.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA) and Government of Nunavut (GN)
Reference	The Mary River Project Inuit Impact and Benefit Agreement Between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation (QIA and Baffinland 2018) 2018 Socio-Economic Monitoring Report (JPCSL, 2019)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

While Baffinland cannot influence how the QIA and GN cooperate with one another, the Proponent regularly engages 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 QSEMC and SEMWG to discuss socio-economic impacts and benefits of the Project. GN and QIA representatives are members of both the QSEMC and SEMWG. Furthermore, Baffinland regularly communicates with the QIA on various matters related to the Mary River Project Inuit Impact and Benefit Agreement (IIBA; QIA and Baffinland 2018). Baffinland and the QIA also worked to renegotiate the IIBA in 2018 and an amended version was finalized on October 22, 2018.

RESULTS

The Socio-Economic Monitoring Report identifies positive effects the Project has had. 3.1 million hours of Project labour were performed by Baffinland employees and contractors in 2018, equal to approximately 1,529 FTEs. Of this total, 435,908 hours were worked by Inuit, representing approximately 216 FTEs. A total of 11.9 million hours of Project labour have been performed since Project development, of which 1.9 million hours have been performed by Inuit. In addition, \$12.0 million in payroll was provided to Baffinland Inuit employees in 2018 and, since 2014, Baffinland has provided \$45.2 million in payroll to its Inuit employees. Likewise, \$140.9 million was spent on contracting with Inuit Firms in 2018. A total of \$960.0 million has been awarded to Inuit Firms since Project development.

Various programs under the IIBA also continue to operate, such as the Ilagiiktunut Nunalinnullu Pivalliajutsait Kiinaujat (INPK) Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin) and the Business Capacity and Start-Up Fund (which provides up to \$275,000/year to Inuit Firms to assist with locating start-up capital and financing, management development, ongoing business management, financial management, contracts and procurement, and human resources management). Several other Project-related initiatives are also addressed directly in the IIBA.

TRENDS

Not Applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to engage the QIA and GN, where appropriate, to help ensure that Project benefits are distributed across impacted communities and across various demographic groups within these communities, and to help offset any Project-related impacts to infrastructure or services in the communities. Baffinland and the GN are also in the process of negotiating a Memorandum of Understanding (MOU) to deal with items of mutual concern and interest between the parties. The parties hope to finalize this MOU in the near future and can provide further details on its content in future annual reports.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Government of Nunavut (GN)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland regularly engages the Government of Nunavut (GN) on the Project's socio-economic monitoring program. For example, Baffinland produces an annual Socio-Economic Monitoring Report (which includes demographic and crime-related information) and regularly engages the QSEMC and SEMWG to discuss socio-economic impacts and benefits of the Project. GN representatives are active members of both the QSEMC and the 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.

The Company has also directly engaged local RCMP detachments in the North Baffin communities to discuss socio-economic impacts and benefits of the Project. Specifically, in 2018, Baffinland representatives met in-person or over the phone with RCMP officers in Pond Inlet and Arctic Bay.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to cooperate with the GN regarding Project-related socio-economic monitoring (including monitoring of demographic and crime-related information). Baffinland will continue to engage the GN through the QSEMC and SEMWG, moving forward. Baffinland will also continue to engage directly with the RCMP on an as-needed basis.

4.7.7 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. Concerns regarding potential impacts to resources and land use continue to be a theme of community engagement (Appendix B).

Monitoring

Baffinland conducts annual monitoring and when required 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 4.46 provides an evaluation of the Project's impacts on culture, resources and land use, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.46 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 sites most years. 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		
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. At the time of reporting, the QIA had not yet informed Baffinland if any claims against the Wildlife Compensation Fund were made in 2018.	Effect within FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
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 2018, a total of 539 land use visitor person-days were recorded at Project sites, which is 385 person-days greater than in 2017. The majority of the visitors (185) stopped at Milne Port and were associated with the Nunavut Quest, which in 2018 ran between Igloolik and Pond Inlet through Milne Inlet.	Effect within FEIS predictions
	Sensory disturbance and safety along Milne Inlet Tote Road	Fewer hunters using cabins due to the limited Total Allowable Harvest (TAH) of 250 set for caribou on Baffin Island.	Effect within FEIS predictions
	Detour around Mine Site		
	HTO cabin closure	HTO cabin at the Mine Site were relocated several years ago.	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 2018, and the number of land use visitor person-days have increased every year since record-keeping was commenced, except for 2017, which saw a decrease in land use visitor person-days. 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.

Baffinland held discussions with the MHTO and hosted MHTO representatives on-site in 2018 regarding a minor relocation of the HTO cabin on the north end of Camp Lake to better ground nearby, and about replacing the cabin at Milne Inlet due to its poor conditions, with the new cabin likely to be positioned several hundred metres further from Milne Port facilities. Baffinland expects to implement these changes in 2019.

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.
Relevant BIM Commitment	97
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA), North Baffin Communities
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland meets with various community groups on a regular basis to discuss aspects of the Project and ongoing issues, concerns or recommendations these Community representatives may have. The Mittimatalik Hunter and Trappers Organization (MHTO) is also a participating member of the Terrestrial and Marine Environment Working Group (TEWG and MEWG) meetings, where annual monitoring program design and results are discussed.

Baffinland also hosted a site tour with the MHTO on August 30 and 31, 2018 where concerns related to the potential effects of the Project on traditional activities and cultural resources were discussed. Subsequent to this, mitigations to minimize potential effects based on the MTHO input and knowledge of the area was also discussed.

Baffinland has also maintained ongoing participation of community members from Pond Inlet in the marine monitoring programs. In 2018, Golder on behalf of Baffinland conducted four (4) monitoring programs that included various levels of Inuit participation. Eleven (11) individuals from Pond Inlet received training to assist in conducting these programs, representing a total of 160 hours of training. A total of eleven (11) positions were available for Inuit employees in the 2018 marine programs, resulting in 1,610 hours of employment for these programs. A total of nine (9) Inuit participants were employed for the 2018 monitoring programs. An Inuit archaeological assistant from Clyde River was also hired for archaeology work conducted in supported the Phase 2 proposal during the summer of 2018.

RESULTS

Community members and other stakeholders continue to provide valuable input that guide the development of monitoring programs and mitigation measures as, needed.

A list of meetings held with the public and with community groups in 2018 are listed in Table 4.47.

Table 4.47 Public Meetings

Community	Date(s) of Public Meeting	Information Shared
All Communities	September 10-14	Career and Training Information Tour
All Communities	October 15-19	Contracting and Procurement Information Tour
Hall Beach, Igloolik and Arctic Bay	December 13-17	Holiday Country Foods Feast Tour

Table 4.48 Community Group Meetings

Date	Community Group	Location	Topic
March 21 2018	Hamlet and HTO	Pond Inlet, NU	Overview of Project shipping and production plans for 2018
April 5, 2018	Hamlet and HTO	Hall Beach, NU	Exploration program consultation
April 6, 2018	Hamlet and HTO	Igloolik, NU	Exploration program consultation
June 6, 2018	HTO	Pond Inlet, NU	6 MTPA Application - Shipping Management
June 7, 2018	HTO	Pond Inlet, NU	Freight Dock Construction and Offset - Marine Monitoring Programs
June 11, 2018	Hamlet Council and HTO	Clyde River, NU	Phase 2 Impacts and Mitigation
June 12, 2018	Hamlet Council and HTO	Pond Inlet, NU	Phase 2 Impacts and Mitigation
June 13, 2018	Hamlet and Mayor	Arctic Bay, NU	Phase 2 Impacts and Mitigation
June 14, 2018	HTO	Igloolik, NU	Phase 2 Impacts and Mitigation
June 15, 2018	Hamlet Council and HTO	Hall Beach, NU	Phase 2 Impacts and Mitigation
August 30, 2018	MHTO	Mary River	MHTO Site Visit (August 30-31)
October 11, 2018	QIA, NAC, and MHTO	Pond Inlet, NU	Pond Inlet Training Center
November 19-22, 2018	Hamlet and HTO	Pond Inlet and Arctic Bay	Phase 2 Info Sessions (Nov 19-22)
November 27-28, 2018	HTO	Pond Inlet	End of Shipping and Marine Monitoring Season Meeting

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 Mittimatalik Hunters and Trappers Organization (MHTO) during the Marine Environment and Terrestrial Working Group will also continue to occur.

Baffinland intends to continue training and employing Inuit participants in marine monitoring programs. Additional Inuit participation in the terrestrial environment monitoring programs is also planned for 2019.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	North Baffin Communities
Reference	2018 Community Meeting Records
Ref. Document Link	Appendix B

METHODS

Baffinland is committed to meaningful engagement with individuals and organizations potentially affected by the Project, including the five (5) North Baffin Communities (Arctic Bay, Clyde River, Hall Beach, Igloodik and Pond Inlet).

In support of the Company's focus on continuous improvement and the engagement objectives defined for the Project (Section 2.2), Baffinland implements a variety of engagement mechanisms that are intended to ensure that a broad and comprehensive approach to the identification of interested parties and that the creation of enhanced opportunities for dialogue and input are executed. During 2018, Baffinland completed a number of engagement activities, which included:

- Providing 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 five (5) North Baffin communities;
- Hosting public meetings and open houses;
- Conducting employee surveys;
- Participating in multi-stakeholder forums (e.g. Working Groups);
- Holding focus groups, workshops and meetings with individual community groups and Hamlet Councils;
- Hosting site based meetings for MHTO members and representatives from the Hamlet of Pond Inlet; and
- Distributing Project-related information through websites, newsletters, advertisements and other means.

Throughout 2018 Baffinland held public meetings within the five (5) North Baffin communities at the Mine Site. These meetings provided an important opportunity for Baffinland to share information with the Communities related to current operations, the results of ongoing environmental monitoring programs and future planning to support the phased development of the Project.

Table 4.49 Public Meetings

Community	Date(s) of Public Meeting	Information Shared
All Communities	September 10-14	Career and Training Information Tour
All Communities	October 15-19	Contracting and Procurement Information Tour
Hall Beach, Igloolik and Artic Bay	December 13-17	Holiday Country Foods Feast Tour

As North Baffin Community representatives, the Company also actively engages Hamlet Mayors and Councillors, as well as Hunter and Trapper Organization (HTO) Board Members. These organizations have a direct interest in Project activities and have provided valuable feedback to the company which has aided in more successful Project planning.

Table 4.50 Community Group Meetings

Date	Community Group	Location	Topic
March 21 2018	Hamlet and HTO	Pond Inlet, NU	Overview of Project shipping and production plans for 2018
April 5, 2018	Hamlet and HTO	Hall Beach, NU	Exploration program consultation
April 6, 2018	Hamlet and HTO	Igloolik, NU	Exploration program consultation
June 6, 2018	HTO	Pond Inlet, NU	6 MTPA Application - Shipping Management
June 7, 2018	HTO	Pond Inlet, NU	Freight Dock Construction and Offset - Marine Monitoring Programs
June 11, 2018	Hamlet Council and HTO	Clyde River, NU	Phase 2 Impacts and Mitigation
June 12, 2018	Hamlet Council and HTO	Pond Inlet, NU	Phase 2 Impacts and Mitigation
June 13, 2018	Hamlet and Mayor	Arctic Bay, NU	Phase 2 Impacts and Mitigation
June 14, 2018	HTO	Igloolik, NU	Phase 2 Impacts and Mitigation
June 15, 2018	Hamlet Council and HTO	Hall Beach, NU	Phase 2 Impacts and Mitigation
August 30, 2018	MHTO	Mary River	MHTO Site Visit (August 30-31)
October 11, 2018	QIA, NAC, and MHTO	Pond Inlet, NU	Pond Inlet Training Center
November 19-22, 2018	Hamlet and HTO	Pond Inlet and Arctic Bay	Phase 2 Info Sessions (Nov 19-22)
November 27-28, 2018	HTO	Pond Inlet	End of Shipping and Marine Monitoring Season Meeting

In addition to the above, through the establishment and operation of offices within each of the five (5) North Baffin Communities the Company ensures that Nunavummiut are kept informed about Project activities by having a full time presence available to answer questions, and provides update to the public on a consistent basis.

RESULTS

During the public, Hamlet, and HTO meetings a number of comments were raised by participants. The feedback received was a mix of comments that were both supportive of the Project and comments related to concerns or issues the community members perceived or were experiencing. Most of the comments raised at the public meetings were similar to those raised in 2018 and were related to:

- Employment and Income;
- Education and Training Opportunities;
- Marine Environment;
- Terrestrial Environment;
- Potential effects on Land Use and Harvesting Practices;
- Potential effects of the Project on Climate Change; and
- Dust and Air Quality.

Comments received are considered by Baffinland and incorporated into management and monitoring plans, as relevant.

Comments specific to employment, training, and other matters related to the Mary River Inuit Impact and Benefit Agreement (IIBA) and were incorporated into discussions between the Qikiqtani Inuit Association and Baffinland through established IIBA Committees.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement a proactive approach to engagement with various stakeholders, through meetings, workshops, surveys and dissemination of information and reports. This will ensure that the communities, QIA, regulators and the public are informed in a timely and culturally sensitive manner of the Project's progress and the potential environmental and social impacts of ongoing operations.

In addition, through the amended IIBA, Baffinland will be increasing its direct community engagement as it relates to employment, training, and business opportunities provided by the Project. This can be seen in the commitments and obligations in IIBA Articles 7.8, 8.6, 14.3, 14.15, among others.

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.
Relevant BIM Commitment	30, 34
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	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG) and Mittimatalik Hunter and Trappers Organization
Reference	Baffinland Website
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

Baffinland has contracted exactEarth®, 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 the vessel 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 do provide regularly updated snap shot of vessel movement in the North Baffin region.

Throughout the 2018, Baffinland also conducted extensive consultation with the Mittimatalik Hunters and Trappers Organization (MHTO) regarding the Proponent’s plans for the 2018 shipping season. Relevant engagement events are as follows:

- June 7 & 8, 2018 - Pre-shipping Season meeting in Pond Inlet with MHTO and Hamlet of Pond Inlet representatives;
- July 12, 2018 - Meeting in Pond Inlet regarding Baffinland’s Production Increase Proposal application;
- August 30 & 31, 2018 - MHTO Site Visit; and
- November 28 & 29, 2018 - End of Season Shipping meeting in Pond Inlet with MHTO.

Throughout these meetings Baffinland noted that there were also ongoing challenges associated with the management of vessel ship speeds and minor deviations from the shipping route.

RESULTS

Baffinland has made vessel routing accessible to the public via the Baffinland website. Baffinland also installed an Automated Information System at the MHTO office for live continuous monitoring of vessels active in the Northern Shipping Route.

Ongoing consultation the MHTO in 2018 resulted in Baffinland committing to several new optimized vessel traffic management practices:

1. Reduce Ship Speeds to 9 knots along the Shipping Corridor.
2. Ensure vessels follow the shipping route, avoiding key areas such as Koluktoo Bay and the western shoreline near Bruce Head to minimize effects on marine mammals and interference with hunting activities.
3. Confirm with MHTO that floe edge ice is no longer being used by local hunters at the beginning of the shipping season.
4. Established drifting zone near Ragged Island to avoid drifting near Pond Inlet and other parts of the corridor.
5. Installation of Automated Information System at the MHTO office for live continuous monitoring of vessels active in the Northern Shipping Route.
6. Established communications protocol and designated contact information to respond to community concerns.
7. Improved QA/QC for ballast water sampling protocol.
8. Hired Ship-Board Inuit Observers from Pond Inlet.
9. Limiting the number of ships waiting at Ragged Island to a maximum of 3 Project-related vessels. All other vessels will be instructed to wait in Baffin Bay near Western coast of Greenland.
10. Hire two (2) shipping monitoring personnel to work in Pond Inlet who will be responsible for conducting live monitoring throughout the shipping season.
11. Increase response time to correct vessel movement or speed in the event of non-adherence to vessel management protocols.

TRENDS

Not applicable

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth® 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.
Relevant Baffinland Commitment	14
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Emergency Response Plan (Baffinland, 2018e) Roads Management Plan (Baffinland, 2016e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland has constructed four refuge stations at Km 33, 40, 60 and 69 along the Tote Road. Each station is heated and outfitted with beds and bedding, water, an automatic external defibrillator (AED), food and a digital radio that provides direct contact with Baffinland security or dispatch. In addition to the four refuge stations, there are 11 heated seacans located at communication towers along the Tote Road, equipped with a fire extinguisher and first aid kits. The communication tower seacans are intended for emergency and temporary use only and do not house radios, food or water.

Baffinland has a trained emergency response team at both ends of the Tote Road with emergency vehicles to rapidly respond to any concerns. The emergency response team also has access to snowmobiles, and a side by side that is capable of moving through snowdrifts and effecting a rescue as required. Baffinland plans to continue to expand rescue capabilities in 2019 with the purchase of a snow cat for long distance remote rescue requirements. The Tote Road Travel Procedure is publicly available and outlines the emergency response procedure.

Ensuring the health and safety of local hunters on-site is of utmost important to Baffinland. In the summer months, local hunters have been advised to report to security and request a transport for their equipment and personnel. In the winter, they are to check in with security and are given instructions on where to safely travel around both sites. In 2018 Baffinland hosted a site visit with Pond Inlet hamlet and HTO representatives and worked with the MHTO to improve hunter and visitor access on site, further defining Project site visitor communication protocols and improved snowmobile crossings on the tote road incorporating them into snow management practices. Snowmobile crossing signs were erected for the safety of all. Baffinland is presently working with the MHTO and QIA to continue to improve the traditional hunter and visitor passage on the Project

site with several improvements including trail maintenance and new cabin construction and maintenance. All vehicles carry emergency survival packs 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

354 hunters visited the Project site in 2018 to hunt near the Project area. Baffinland accommodated all individuals, providing support when required for breakdowns and maintenance issues.

This was a significant increase from 2017, which only saw 154 hunters visit the Project. No project related safety related incidents occurred in 2018 for visiting hunters and all emergency shelters were available for use.

TRENDS

Emergency shelters continue to be available for use and no project related health and safety incidents with Hunters and Visitors occurred in 2018

RECOMMENDATIONS / LESSONS LEARNED

PC Condition No. 165 was originally developed for the development of the southern railway to Steensby Inlet. For the ERP, use of the Tote Road means that there are multiple types of vehicles readily available to access a person in need of assistance. Therefore, Baffinland does not feel that construction of emergency shelters along every 1 km of the Tote Road is warranted at this time. Construction of emergency shelters along the railway to Steensby Port will be considered when this phase of the Project becomes active. Baffinland commits that buildings placed along the rail line for signal and switch requirements will also be intended for use as emergency shelters for Railway personnel and visitors.

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.
Relevant BIM Commitment	30
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	N/A
Reference	Hunter and Visitor Site Access Procedure - Attachment F of the Roads Management Plan (Baffinland, 2016e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland has developed a Hunter and Visitor Site Access Procedure (Baffinland, 2015d) for visitors wanting to access the Project area, made available to local communities and accessible on the Baffinland web portal. All policies related to visitor's access to the Project Area are developed with rights of NLCA beneficiaries and conditions of the IIBA in mind. The Procedure was being updated by Baffinland in 2017, and a revised version will be made available on the Baffinland document portal in early 2019.

Baffinland also implemented a new communications protocol with the community of Pond Inlet. Information regarding the communications protocol was shared during meetings with the MHTO on June 7 and 8, and community information sessions on July 12, 2018. Baffinland also made available a Shipping and Marine Monitoring Program Fact Sheet, which contained relevant Baffinland staff contact information should community members have any concerns throughout the season.

RESULTS

The public have access to shipping operations personnel via telephone and internet contact.

Two concerns were raised using the communications protocol. A summary of these events are provided below.

Table 4.51 Pond Inlet Shipping Communications

Date of Concern	Individual Name and Contact	Concern	Vessel	Location of Concern	Response	Date of Response
9-Aug-18	Mona Pond Inlet HTO - pond@baffinhto.ca	Phone Call-She said she got a phone call yesterday from a community member that works at Site stating that there was an oil spill from one of the tug boats and that there was oil everywhere in the water and no narwhal around. She also mentioned that HTO members were going out to investigate. She wants to know what is being done for the cleanup.	Tug Boat	Milne Inle/Eclipse Sound	<p>Hi Mona,</p> <p>I can confirm that no fuel spill has occurred in Milne Inlet or Eclipse Sound since July 22, 2018.</p> <p>On July 22nd a Tug contracted by Baffinland, the Ocean K Rusby, suffered a gear box failure in Milne Inlet. As a result of this failure slightly more than 30 liters of gear box oil was released into Mline Inlet. Attached for your review, is an information bulletin from Fisheries and Oceans Canada. This bulletin describes the incident and the measures taken to contain the fuel spill. Per the memo, a helicopter was sent out and reported a narrow band of oil 20 km long in Milne Inlet. Pictures showed a narrow, silvery sheen in a streak. A flight by helicopter on July 23 showed the sheen had greatly dissolved. The Canadian Coast Guard determined that this product was unrecoverable and expected the sheen to dissolve naturally.</p>	10-Aug-18

Date of Concern	Individual Name and Contact	Concern	Vessel	Location of Concern	Response	Date of Response
9-Aug-18	Mona Pond Inlet HTO - pond@baffinhto.ca				<p>Baffinland communicated information about the fuel spill to the Mayor of Pond Inlet, the QIA, and Members of the Mittimatilik Hunters and Trappers Organization via teleconference and in a follow-up email on July 24th.</p> <p>Should you have any further questions about this information please do not hesitate to contact Baffinland.</p>	
10-Aug-18	Mona Pond Inlet HTO - pond@baffinhto.ca	Email- It may be Rio Grata that is continually parked at Upirngivik Sam Omik's Camp, received a complaint of a ship. That's the only name of ship on my monitor.	Rio Grata	<p>Rio Grita was specifically told to drift in vicinity 079-30W in the middle of the West-end of Eclipse Sound.</p> <p>It is evident the vessel has proceeded on own without authorization to a position west of 080W.</p> <p>I shall send them East back to 079-30w.</p>	<p>Hi Mona,</p> <p>I can confirm that the ship has been moved away from Sam Omik's Camp.</p> <p>After receiving your email on Friday, Baffinland called both the owner of the ship as well as the captain of the ship and told them to move the ship back east away from Sam Omik's Camp. The ship was moved on Friday evening.</p> <p>Additionally the Baffinland head of shipping tried to leave a message on Friday at your office to let you know.</p>	13-Aug-18

Date of Concern	Individual Name and Contact	Concern	Vessel	Location of Concern	Response	Date of Response
10-Aug-18	Mona Pond Inlet HTO - pond@baffinhto.ca				Should you have any further questions about this information please do not hesitate to contact Baffinland.	

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.

The communications protocol proved to be an effective method for addressing ongoing community concerns related to shipping throughout the season. Baffinland will continue to make community members aware of the protocol and implement this in 2018.

4.7.8 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; and
- Other Nunavummiut - Beneficiaries of mineral royalties' payable to NTI.

Communities continue to express a desire to maximize benefits of the Project (Appendix B).

Monitoring

Baffinland tracks payments made as benefits, royalties and taxes, and this information is presented in annual monitoring reports. Table 4.52 provides an evaluation of the Project's impacts on benefits, royalties and taxes, based on monitoring activities completed in 2018, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.52 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 2018.

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.
Relevant BIM Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	Not applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

Baffinland issued an invitation letter to the Government of Nunavut (GN) 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 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 website (i.e. Government of Nunavut 2019) 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.

4.7.9 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 SEMWG include Baffinland, the QIA, the GN, and CIRNAC. Each organization has an interest and a role in improving socio-economic conditions within the Qikiqtani Region and 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 monitoring results for aspects of the socio-economic environment that interacts with the Project. The socio-economic monitoring program has been developed in consultation with the SEMWG, 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 SEMWG 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.
Relevant BIM Commitment	45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) Socio-Economic Monitoring Plan (Baffinland 2018)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Socio-economic data collection and analysis methods are described in the Socio-Economic Monitoring Plan (Baffinland 2018) and annual Socio-Economic Monitoring Report. Government data are collected from the Nunavut Bureau of Statistics and Statistics Canada. Change of address information is collected by Baffinland's Community Liaison Officers and through voluntary employee surveys. Other Project-specific information is also presented by Baffinland, as appropriate.

RESULTS

Summary results and trends for relevant socio-economic monitoring data are presented in Table 4.53. Detailed results are presented in the annual Socio-Economic Monitoring Report, including additional information where appropriate community-level indicator data are currently unavailable (e.g. for the topics of childcare availability and costs, Project harvesting interactions and food security, prevalence of gambling issues, prevalence of family violence).

Table 4.53 2018 Monitoring Results and Trends for Selected Socio-Economic Indicators

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
Known in-migrations of non-Inuit Project employees and contractors	Not applicable	↑	↑	N. Baffin LSA	Since 2015, a net of one known non-Inuit employee/contractor has in-migrated to the North Baffin LSA.
In-migration of non-Inuit to the North Baffin LSA	Not available	Not available	Not available	N. Baffin LSA	Limited government data are 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	Not applicable	↑	↑	N. Baffin LSA	Since 2015, a net of 13 known Inuit employees/contractors have out-migrated from the North Baffin LSA.
Out-migration of Inuit from the North Baffin LSA	Not available	Not available	Not available	N. Baffin LSA	Limited government data are 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 decreasing post-development trend in Nunavut annual net migration is currently occurring.
Employee and contractor changes of address, housing status, and migration intentions	Not applicable	Not applicable	Not applicable	Project	5.4% of respondents to the 2019 Inuit Employee Survey changed residences in the past 12 months. 3.6% moved to a different community and 1.8% moved within their existing community. 13.8% planned to move to a different community in the next 12 months. 6.9% planned to move away from the North Baffin LSA. Data on the housing status of respondents were not collected in 2019 due to a survey administration error.
Hours worked by female employees and contractors	Not applicable	↑	↑	Project	226,080 hours were worked by female employees and contractors in 2018 (7.3% of total), 121,378 hours of which were worked by Inuit females (3.9% of total).
Childcare availability and costs	Not available	Not available	Not available	Project	This topic continues to be tracked through the QSEMC process and community engagement conducted for the Project.
Project harvesting interactions and food security	Not available	Not available	Not available	Project	This topic continues to be tracked through the QSEMC process,

Indicator / Topic	Pre Dev't Trend	Post Dev't Trend	Trend Since Prev. Year	Scale	Summary
					community engagement conducted for the Project, and related information.
Number of drug and alcohol related contraband infractions at Project sites	Not applicable	↑	↑	Project	There were 28 drug and alcohol-related contraband infractions at Project sites in 2018.
Number of impaired driving violations	↑ ↑	↑ ↓	↑ ↑	N. Baffin LSA Iqaluit	An increasing post-development trend in the number of impaired driving violations is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is apparent in Iqaluit, which was not evident prior to the Project.
Number of drug violations	↑ ↑	↓ ↓	↑ ↑	N. Baffin LSA Iqaluit	A decreasing post-development trend in the number of drug violations is apparent in the LSA, which was not evident prior to the Project.
Prevalence of gambling issues	Not available	Not available	Not available	Project	These topics continue to be tracked through the QSEMC process and community engagement conducted for the Project.
Prevalence of family violence					
Number of secondary school graduates	↑ ↑	↓ ↓	↑ ↓	N. Baffin LSA Iqaluit	A decreasing post-development trend in graduation numbers is apparent in the LSA, which was not evident prior to the Project.
Secondary school graduation rate	↑	↓	↑	Region	A decreasing post-development trend in graduation rates is apparent in the region, which was not evident prior to the Project.

NOTE:

1. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used.

TRENDS

Trends in the monitoring data relative to the previous year and pre-development period (and during the pre-development period itself in some instances) are presented in Table 4.53.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on socio-economic effects of the Project through its Socio-Economic Monitoring Report. In instances where appropriate community-level indicator data are currently unavailable (e.g. for the topics of childcare availability and costs, Project harvesting interactions and food security, prevalence of gambling issues, prevalence of family violence), these topics continue to be tracked through the QSEMC process and community engagement conducted for the Project. Baffinland is open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2018 Socio-Economic Monitoring Report (JPCSL, 2019) 2018 QSEMC and SEMWG Meeting Records
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Baffinland has provided a summary of monitoring data related to regional and cumulative economic effects associated with the Project in its annual Socio-Economic Monitoring Report.

RESULTS

The Project continues to make positive contributions to the Nunavut economy. 3.1 million hours of Project labour were performed by Baffinland employees and contractors in 2018, equal to approximately 1,529 FTEs. Of this total, 435,908 hours were worked by Inuit, representing approximately 216 FTEs. A total of 11.9 million hours of Project labour have been performed since Project development, of which 1.9 million hours have been performed by Inuit. In addition, \$12.0 million in payroll was provided to Baffinland Inuit employees in 2018 and, since 2014, Baffinland has provided \$45.2 million in payroll to its Inuit employees. Likewise, \$140.9 million was spent on contracting with Inuit Firms in 2018. A total of \$960.0 million has been awarded to Inuit Firms since Project development.

When compared to annual economic outputs for Nunavut as a whole, these values are notable. In 2017 (the most recent year estimates were available), for example, there were a total of 18,345 jobs held in Nunavut and 32,677,000 total hours worked (Nunavut Bureau of Statistics 2018a), with average weekly earnings of \$1,329.54 per employee (Nunavut Bureau of Statistics 2018b). By comparison, hours worked by Baffinland's employees and contractors in 2017 (i.e. 2,380,990) represent 7.3% of the Nunavut total.¹³ Average weekly earnings of Baffinland's Inuit employees in 2017 were also higher than the Nunavut average, at \$1,719.17.¹⁴

¹³ This is a general estimate only, as not all Project hours were necessarily worked in Nunavut.

¹⁴ Baffinland Inuit employee numbers (93) and payroll amounts (\$8,313,897.59) for 2017 were presented in Baffinland's 2017 Socio-Economic Monitoring Report (JPCSL 2018). Inuit employee numbers in 2017 were calculated based on the average of quarterly totals. Weekly employee earnings are thus an estimate and may not fully reflect average amounts for the year.

Mining remains an important contributor to the Nunavut economy. Nunavut's real gross domestic product (GDP) for all industries in 2017 was \$2,228.1 million.¹⁵ Of this amount, '*mining, quarrying, and oil and gas extraction*' was responsible for contributing \$391.4 million (or 17.6%). Mining may also make economic contributions to supporting industries such as '*construction*' (\$310.8 million contribution to the Nunavut economy in 2017), '*transportation and warehousing*' (\$53.8 million contribution to the Nunavut economy in 2017), and '*accommodation and food services*' (\$25.8 million contribution to the Nunavut economy in 2017), amongst others (data sourced from Nunavut Bureau of Statistics 2018c). The Mary River Project has likely been an important contributor to these amounts, as has Agnico Eagle Mines Limited's Meadowbank Mine and TMAC Resources Hope Bay Project (Nunavut's only other operating mines in 2017), and several other Nunavut-based mining projects that were in various stages of development in 2017. Mining in Canada, generally, contributed \$57.6 billion to the country's GDP, or 3.4% of total Canadian GDP (in 2016). The industry also directly employs more than 403,000 individuals and remains the largest proportional private sector employer of Indigenous peoples in the country (Mining Association of Canada 2018).

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 Report. No negative regional or cumulative economic effects associated with the Project were identified in 2018. As such, no mitigation measures have been proposed to manage negative effects.

¹⁵ The Bank of Canada (2016) notes real GDP is "the most common way to measure the economy... GDP is the total value of everything - goods and services - produced in our economy. The word "real" means that the total has been adjusted to remove the effects of inflation." The real GDP amounts by industry presented by the Nunavut Bureau of Statistics (2018c) are in chained 2007 dollars.

4.8 PERFORMANCE ON OTHER CONDITIONS

4.8.1 Accidents & Malfunctions (PC Conditions 170 through 177)

Eight (8) PC conditions relate to accidents and malfunctions. Two (2) of these conditions relate to the TEMMP, four (4) relate to spill response planning, one relates to implementing adaptive management measures around hunter safety around ice tracks, and one (1) 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Nunavut Impact Review Board
Reference	N/A
Ref. Document Link	N/A

METHODS

Not applicable.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Project Certificate Condition No. 170 refers to better understanding and minimizing caribou interactions with the Railway. The Railway has not been built, and therefore 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.
Relevant Baffinland Commitments	N/A
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2018 Terrestrial Environment Annual Monitoring Report (EDI, 2019a)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=5&archive=1&lang=en

METHODS

Areas along the Tote Road that caribou may use for movement were identified in the FEIS Terrestrial Wildlife Baseline Report (EDI Environmental Dynamics Inc. 2012). 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

During 2018, several groups of caribou were observed by local Inuit hunters in various locations outside the PDA. In September, five caribou were observed on the west side of Sheardown lake; six caribou were harvested by hunters in late November on their way back to Pond Inlet (exact location of harvest was not reported); and a group of 20 caribou were observed north of Angajurjualak Lake in early December, with reports of 15 caribou harvested during the month of December. No caribou were seen within the PDA or identified during the Height-of-Land surveys. Generally, caribou observations near the Tote Road have diminished since 2013. The lack of observations near site is likely due to region-wide low caribou numbers.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

To date, the implementation of deterrents along the Tote Road have not been required.

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.
Relevant BIM Commitment	8
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
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

Not applicable.

RESULTS

None.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland did not require the overwintering of fuel in 2018. 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.
Relevant Baffinland Commitment	9
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Environment and Climate Change Canada, Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	Oil Pollution Emergency Plan – Milne Inlet (Baffinland, 2017f) Shipping and Marine Wildlife Management Plan (Baffinland, 2016h) Spill at Sea Response Plan (Baffinland, 2015b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

Baffinland maintains a Transport Canada approved Oil Pollution Emergency Plan (OPEP) for ship to shore fuel transfers at Milne Port, which is currently a Class 1 Oil Handling Facility. Updates to the OPEP were made on May 25, 2018. Training of Baffinland staff on the Milne Inlet OPEP was conducted by a qualified marine spill response contractor (Navenco Marine) between July 20-22, 2018. Baffinland is committed to undertaking fuel transfer from vessels under good weather conditions.

Baffinland also maintains the Spill at Sea Response Plan that outlines procedures for dealing with the unlikely event of a spill during ship to ship fuel transfers. Each vessel under contract to Baffinland also maintains its own Shipboard Oil Pollution Emergency Plan (SOPEP), which outlines the vessels protocol for dealing with a spill event, and includes an inventory of spill response equipment onboard the vessel.

RESULTS

OPEP training occurred in 2018. A mock spill exercise was performed to ensure spill readiness. Required equipment for a Class 1 Oil Handling Facility was met. No spills occurred during fuel transfers.

TRENDS

As in previous years, Transportation Canada's Guidelines for Baffinland's Class 1 Oil Handling Facility were adhered to.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically place resources and equipment on site for spill response during ship-to-shore fuel transfer events.

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.
Relevant BIM Commitment	108,110
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Environment Climate Change Canada, Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	Oil Pollution Emergency Plan – Milne Inlet (Baffinland, 2017f) Shipping and Marine Wildlife Management Plan (Baffinland, 2016h) Spill at Sea Response Plan (Baffinland, 2015b)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

METHODS

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.

Training of Baffinland staff on the Milne Inlet Oil Pollution Emergency Plan (OPEP) was conducted by a qualified marine spill response contractor between July 20-22 2018. This ensured that Baffinland is ready to respond to potential spills along the shipping route within the Inlet. Oil Spill Response Inc. has continued to be retained to respond to significant spills that occur. Baffinland continued to improve marine spill response ability at the Port in 2018, beyond standard requirements for a Level 1 Oil handling Facility, procuring additional spill response booms, skimmers and other materials. Baffinland is committed to ensuring that adequate resources are allocated to the development and deployment of emergency and spill response capabilities within the Project.

RESULTS

OPEP training occurred in 2018. A mock spill exercise was performed to ensure spill readiness. Baffinland has invited communities of the North Baffin Region to participate and observe training. Required equipment for a Class 1 Oil Handling Facility was met. No spills occurred during fuel transfers.

A minor release of gear oil from a contracted marine work tug occurred on July 22 2018 in Milne Inlet. Notification was provided to the Canadian Coast Guard and the Hamlet of Pond Inlet and Hunter and Trappers Organization. Once the tug returned to Milne Port Baffinland deployed oil containment booms and sorbents to contain release. An investigation revealed that 30 L of gear oil had been released in Milne Inlet as a result of a gear box failure. It appeared that the oil quickly dissipated due to weather and wave conditions. Baffinland confirmed with CCG that additional spill recovery methods were not recommended and tug was cleared by CCG for operation. A follow-up spill report issued to ECCC, CIRNAC and QIA on August 22.

TRENDS

Baffinland is committed, during operations, to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically place resources and equipment on site for spill response during ship-to-shore fuel transfer events.

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.
Relevant BIM Commitment	34, 57
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

There is no winter shipping associated with the current phase of the Project. 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.
Relevant BIM Commitment	N/A
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	Not applicable
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 Foster Wheeler, 2015) Oil Pollution Emergency Plan - Milne Inlet (Baffinland, 2017f) Shipping and Marine Wildlife Management Plan (Baffinland, 2016h) Spill at Sea Response Plan (Baffinland, 2015b) Spill Contingency Plan (Baffinland, 2017g) Exploration Spill Contingency Plan (Baffinland, 2014e)
Ref. Document Link	http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en

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 from the 2015 report 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.

The spill modelling results highlight the importance of spill prevention and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Management plans, including the Spill at Sea Response Plan (Baffinland, 2015b) and the Emergency Response Plan (Baffinland, 2018e) are being updated as part of the Phase 2 EIS regulatory process to incorporate the updated fuel spill dispersion modelling that was completed in support of Phase 2. Versions of the aforementioned management plans that are currently operational will remain in effect until anticipated approval of the Phase 2 project proposal is received.

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.
Relevant BIM Commitment	13, 37
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status	In-Compliance
Stakeholder Review	Transport Canada
Reference	N/A
Ref. Document Link	N/A

METHODS

Ship owners / 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.

4.8.2 Alternatives Analysis (PC Condition 178 through 184)

Ten (10) 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, one relates to the use of foreign flagged vessels and two relate to project monitoring of impacts to marine mammals. Baffinland's updates to these PC conditions are provided in the pages that follow.

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.
Relevant BIM Commitment	N/A
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	Not Applicable
Stakeholder Review	N/A
Reference	N/A
Ref. Document Link	N/A

METHODS

Shipping through Steensby Inlet is not currently part of the Project's operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

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.
Relevant BIM Commitment	4
Reporting Requirement	To be developed following approval by the Minister.
Status	Not Applicable
Stakeholder Review	N/A
Reference	NA
Ref. Document Link	N/A

METHODS

Shipping through Steensby Inlet is not currently part of the Project's operations.

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 Milne Inlet marine shipping component in order to limit and manage likely project effects, while balancing the need for operational flexibility.
Term or Condition	Until December 31, 2019, the total volume of ore shipped via Milne Inlet may exceed 4.2 million tonnes per year, but must not exceed 6.0 million tonnes in any calendar year. After December 31, 2019 the maximum total volume of ore shipped via Milne Inlet in a calendar year returns to 4.2 million tonnes per year, unless this condition has been further modified under s. 112 of <i>Nunavut Planning and Project Assessment Act</i> , S.C. 2013, c. 14, s.2.
Relevant BIM Commitment	4
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	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

METHODS

The total volume of ore shipped via Milne Inlet is tracked annually by Baffinland.

RESULTS

Baffinland shipped a total a total of 5,094,477 tonnes of iron ore during the 2018 shipping season.

TRENDS

The total volume of ore shipped via Milne Inlet in 2017 was 4.05 million tonnes. The volume of ore shipped each year has increased since the start of operations.

Baffinland continues to operate within the existing allowance for shipping limits outlined in PC Condition 179a.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes shipped.

The Phase 2 application proposes to increase shipping through the Northern Shipping Route to 12 million tonnes per annum. Baffinland will continue to work through the regulatory process to obtain anticipated approval in 2019.

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 Milne Inlet Tote Road land transportation component in order to limit and manage likely project effects, while balancing the need for operation flexibility.
Term or Condition	Until December 31, 2019, the total volume of ore transported by truck on the Milne Inlet Tote Road may not exceed 4.2 million tonnes per year, but must not exceed 6.0 million tonnes in any calendar year. After December 31, 2019, the maximum total volume of ore transported by truck on the Milne Inlet Tote Road in a calendar year returns to 4.2 million tonnes per year, unless this condition has been further modified under s. 112 of the <i>Nunavut Planning and Project Assessment Act</i> , S.C. 2013, c. 14, s. 2.
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.
Relevant BIM Commitment	4
Status	In-Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	N/A
Ref. Document Link	N/A

METHODS

The total volume of ore transported by truck on the Milne Inlet Tote Road is tracked annually by Baffinland.

RESULTS

In 2018 a total of 5,442,500 tonnes of iron ore was transported by truck on the Milne Inlet Tote Road.

TRENDS

In 2017, a total of 4.54 million tonnes total volume were transported by truck on the Milne Inlet Tote Road. The volume of ore hauled along the Tote Road each year has increased since the start of operations.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes transported by truck on the Milne Inlet Tote Road.

The Phase 2 application proposes to increase the volume of ore transported to Milne Port to 12 million tonnes per annum by rail, and to cease the transport of ore via truck along the Milne Inlet Tote Road. Baffinland will continue to work through the regulatory process to obtain anticipated approval in 2019.

Project Certificate Condition No. 179c

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure commitments made by the Proponent with respect to the 2018 production increase and delivery of benefits to Inuit are adhered to, and can be determined through a body of evidence.
Term or Condition	The Proponent shall be required to resource and support a third party to conduct performance audits of commitments made by the Proponent in relation to both the IIBA and every Proponent commitment and every terms or condition of the Project Certificate relating to environmental management of the Tote Road component or environmental management related to shipping.
Relevant BIM Commitment	N/A
Reporting Requirement	On a bi-annual basis, the Proponent shall file a Performance Audit Report with the NIRB. This report shall include the findings of the third-party auditor, and Baffinland's commitment to addressing findings of the auditor. This term and condition will remain in force for the duration of the Mary River Project, unless it is modified under the <i>Nunavut Planning and Project Assessment Act</i> .
Status	Partially-Compliant
Stakeholder Review	N/A
Reference	NA
Ref. Document Link	N/A

METHODS

In November, 2018, Baffinland hired a consultant to design an audit template that would meet the specific objectives of the terms and conditions of PC 179c. The audit was shared with the Qikiqtani Inuit Association (QIA) to confirm scope.

Baffinland also prepared a Scope of Service to share with potential third party consulting firms who may have the relevant qualifications and resources to conduct the audit.

RESULTS

A contract has been established with BDO to conduct the 179c audit. It is anticipated that the first Performance Audit Report will be filed to NIRB at the end of Q2 2019.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland anticipates filing the findings of the first bi-annual 179c audit to NIRB at the end of Q2 of 2019.

Project Certificate Condition No. 180

Category	Transboundary Effects - Makivik Corporation involvement in the Marine Environment Working Group (MEWG)
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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

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 are informed of Project plans.

RESULTS

Makivik received MEWG meeting minutes and other technical information in 2018.

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 (MEWG) 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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2018 MEWG Meeting Records
Ref. Document Link	Appendix C1

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 are informed of Project plans.

RESULTS

Makivik received working group meeting minutes and other technical information in 2018.

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.
Relevant BIM Commitment	N/A
Reporting Requirement	To be developed following approval by the Minister.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	N/A
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

Vessel transit information is publicly available on the Baffinland website. Baffinland will provide ship route deviation reports to Makivik when required. This condition is focused on shipping through the shared waters of Hudson Strait from Steensby Port. The Project has not utilized the southern shipping route to transport ore to date.

RESULTS

There were no changes to the ship route in 2018.

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.

Project Certificate Condition No. 183

Category	Project monitoring of impacts to marine mammals
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessment, and the identification of other mitigation measures that have the potential to further reduce potential impacts to marine mammals.
Term or Condition	The Proponent shall collaborate with the Marine Environment Working Group to develop impact avoidance or mitigation strategies for the protection of the marine environment. The Proponent shall implement any direction from the Department of Fisheries and Oceans for any avoidance or mitigation measures, including cessation of any activity, for the protection of the marine environment.
Relevant BIM Commitment	N/A
Reporting Requirement	Results of the observer program shall be provided in the Annual Report to the Board. Further, Baffinland shall report all data it generates from the implementation of monitoring of marine impacts it is required to implement pursuant to the Terms and Conditions of the Project Certificate.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Department of Fisheries and Oceans (DFO)
Reference	N/A
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

Baffinland will collaborate with the MEWG to develop impact avoidance or mitigation strategies for the protection of the marine environment.

Baffinland will implement any direction from DFO with respect recommendations for avoidance or mitigation measures, including cessation of any activity for the protection of the marine environment.

RESULTS

The MEWG provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The MEWG also serves as an advisory group to provide recommendations on appropriate management approaches related to the Project.

The MEWG has guided the development of the Marine Environment Effects Monitoring Program (MEEMP), and also reviews and provides comments on other draft marine environment monitoring reports.

In 2018, the MEWG held meetings on March 15, June 6, September 13 and December 10.

TRENDS

The MEWG has successfully provided valued input into the Baffinland annual marine monitoring programs.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MEWG to review and guide marine monitoring programs for the Project on an annual basis and develop mitigation measures or action plans as and when needed.

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

Project Certificate Condition No. 184

Category	Project monitoring of impacts to marine mammals
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessments, and the identification of other mitigation methods that have the potential to further reduce potential impacts to marine mammals.
Term or Condition	The Proponent shall collaborate with the Marine Environment Working Group to review the status of compliance with, and implementation of, all of the Terms and Conditions in Project Certificate No. 005 related to marine environmental protection.
Relevant BIM Commitment	N/A
Reporting Requirement	Results of the observer program shall be provided in the Annual Report to the Board. Further, Baffinland shall report annually all data it generates from the implementation of monitoring of marine impacts it is required to implement pursuant to the Terms and Conditions of the Project Certificate.
Status	In-Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Department of Fisheries and Oceans (DFO)
Reference	N/A
Ref. Document Link	http://www.baffinland.com/mary-river-mine/location/?lang=en

METHODS

Baffinland will collaborate with the MEWG to review the status of compliance with, and implementation of, all of the Terms and Conditions in Project Certificate No. 005 related to marine environmental protection.

The MEWG provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The MEWG also serves as an advisory group to provide recommendations on appropriate management approaches related to the Project.

The MEWG has guided the development of the Marine Environment Effects Monitoring Program (MEEMP), and also reviews and provides comments on other draft marine environment monitoring reports.

In 2018, the MEWG held meetings on March 15, June 6, September 13 and December 10.

RESULTS

Not applicable.

TRENDS

The MEWG has successfully provided valued input into the Baffinland annual marine monitoring programs.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MEWG to review and guide marine monitoring programs for the Project on an annual basis and develop mitigation measures or action plans as and when needed.

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

5 – NIRB CORRESPONDENCE

During 2018, Baffinland undertook two main exchanges of information with the NIRB regarding current operations. These information exchanges included:

- Baffinland response to reviewer comments received on the 2017 Annual Report to the Nunavut Impact Review Board (Baffinland, 2018f); and
- The NIRB's 2017-2018 Annual Monitoring Report for the Mary River Project (NIRB, 2018d) and Board's Recommendations (NIRB, 2018e).

5.1 NIRB SITE VISITS

In 2018, NIRB conducted two site inspections:

- April 17-20, 2018
- August 15-17, 2018

It was noted by NIRB (2018d) that conducted information sessions in the community of Pond Inlet prior to the April site visit and in Igloolik after the August site visit to provide updates to community members regarding the results of NIRBs monitoring for the Project.

It was noted by NIRB that during the 2018 site visits, *"Baffinland demonstrated compliance with most of the reporting requirements as contained in the Project Certificate, and as applicable to the current phase of the Mary River Project"* (NIRB, 2018d). NIRB however also highlighted that there were deficiencies with some monitoring items related to the marine and terrestrial environments. NIRB staff also noted during the site visits that there were reoccurring issues at the Project site in regard to:

- Used tire storage;
- Fencing around the waste landfill facility;
- Conditions of sedimentation ponds;
- Dust emissions from the crusher facility;
- Liner entrenchment in the landfarm;
- Terrain stability at the sewage outfall area; and
- Limited application of dust suppression measures at some facilities and throughout the site.

The identification of these issues was addressed to Baffinland by NIRB in the Board Recommendations Report (NIRB, 2018d); described further below.

5.2 COMMENTS ON THE 2017 ANNUAL REPORT TO THE NIRB

The NIRB presented Baffinland with regulatory agency comments on Baffinland's 2017 Annual Report on May 22, 2018 (NIRB, 2018f). Baffinland provided a response to comments in a letter to the NIRB on July 12, 2018. A summary and response to the feedback received is provided below.

Baffinland's Performance on Compliance with Licenses, Permits, Authorizations and Approvals

General comments received from reviewers on the 2017 Annual Report indicated that regulatory agencies still wish to see the number and extent of non-compliance with the Project Certificate reduced. In Baffinland's response to comments received on the 2017 Annual Report, Baffinland affirmed that all efforts to reduce the number and extent of non-compliances and accidents

is a top priority. A description of efforts to achieve compliance with specific terms and conditions was provided in this correspondence and is as follows:

- PC Condition 14 – In 2018, Baffinland developed and executed additional QA/QC measures for its noise and vibration monitoring program to ensure high quality testing is completed. This included extracting five (5) samples at the Mine site and five (5) samples at Port site, in both May and December 2018, respectively.
- PC Condition 83a – Sediment sampling was completed in 2018; two sampling stations (B-2 and B-5) were added along the East transect to account for the proposed ore dock as part of the Phase 2 proposal; and additional arctic char and shellfish were assessed for body burden analysis.
- PC Condition 89 – Baffinland purchased two new YSIs to complete ballast water sampling and will introduced an improved quality control procedure for ballast water testing and data management in 2018. A standalone Ballast Water Management Plan was developed for the Project, which includes an Appendix outlining a Standard Operating Procedure for ballast water testing.
- PC Condition 91 – In 2018, Baffinland conducted underwater video surveys along a series of horizontal transects along the hulls of ore carriers, interspaced to cover a representative range of depths of the submerged hulls. The collected video recordings were later examined by qualified biologists to identify potential biofouling species to the lowest practical taxonomic level.
- PC Conditions 106, 107, 108 and 123 – In 2018, the SBO Program was conducted from on-board the MSV Botnica, an Ice Management Vessel (IMV) that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The 2018 SBO Program took place from July 28 to August 7 and again from September 28 to October 17. Marine mammal surveys were conducted using conventional distance sampling methods.
- PC Condition 179a and 179b – In September Baffinland received a positive decision from the Minister of Intergovernmental and Northern Affairs and Internal Trade to increase hauling and shipping of ore via the Tote Road and Northern Shipping Route to 6 Mtpa for 2018 and 2019.

Baffinland Overview of Enhanced Stakeholder Engagement Efforts

In Baffinland's July 12, 2018 response to NIRB, the Proponent noted that Baffinland has invested significant efforts in 2018 to further enhance consultation with the North Baffin communities, and in particular with the community of Pond Inlet and the QIA. Baffinland also discussed specific engagement efforts made with the MEWG and TEWG to discuss reviewer comments that were provided on the 2017 Annual Report.

Based on the input received during consultation events held in 2018, Baffinland developed and implemented additional adaptive mitigations and monitoring activities for 2018. These include installing additional dust fall monitoring stations, increasing water quality sampling, making modifications to the Standing Instructions to Masters to ensure speed limits are followed, providing more detailed instructions to ship captains to avoid areas of potential interference with local hunting practices, and revising Baffinland's monitoring programs and management plans to reflect operational improvements.

Baffinland believes that the aforementioned measures that were implemented have effectively served to further enhance Project operations.

Baffinland Response to NIRB’s List of Comments

In Baffinland’s response to the NIRB regarding comments received on the 2017 Annual Report, Baffinland provided itemized responses to the comments received from DFO, ECCC, GN, CIRNAC, PC, QIA and WWF in the Company’s letter to NIRB on July 12, 2018. A complete version of the itemized responses is available on the NIRB Public Registry.

A summary of the main comments by reviewing agency is provided in Table 5.1.

Table 5.1 Summary of Agency Comments on Regulatory Performance

Agency	Summary of Comments on 2017 Regulatory Performance and Compliance
Qikiqtani Inuit Association (QIA)	<ul style="list-style-type: none"> • Project activities exceeding predicted levels for fugitive dust and a lack of control of dust sources including potential effects on freshwater resources as a result of dustfall • Concerns related to the study and design and level of effort for monitoring the potential effects of the Project on caribou • Concerns related to ballast water monitoring and the potential introduction of aquatic invasive species as a result of Project-related shipping • Request for Baffinland to submit a Climate Change Strategy for the ERP • Concerns related to the potential effects of dustfall on freshwater resources and the potential for obstruction of fish passages at culverts along the Tote Road
Government of Nunavut (GN)	<ul style="list-style-type: none"> • Concerns related to the potential effects of the frequency and altitude of helicopter overflights on wildlife • Concerns related to the study and design and level of effort for monitoring the potential effects of the Project on caribou • Year-to-year exceedances of dust fall relative to predictions made in the FEIS and need for additional mitigation measures for dustfall to be implemented • Request for updated power analysis to be completed for vegetation monitoring to determine the appropriateness of current study design and level of effort for vegetation distribution and abundance monitoring • Potential indirect effects of the Project on community health service resources
Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	<ul style="list-style-type: none"> • Request for updates on the FEIS predictions on new baseline data collected as pertaining to mine waste rock geochemistry and waste rock drainage • Concerns related to the management of ARD • Concerns regarding the lack of information on the quality and volumes of five unauthorized discharges of non-compliant contact water
Environment and Climate Change Canada (ECCC)	<ul style="list-style-type: none"> • Acknowledges Baffinland’s response to previous ECCC comments to conduct stack testing on a more frequent basis (beyond PC No. 005 requirement to conduct stack testing prior to commissioning incinerators at the Port and Mine site). ECCC noted they are currently considering Baffinland’s commitment to conduct stack testing every five years and may provide further comments on this commitment in the future • Request for Baffinland to ensure that effluent is consistently fully characterized for samples used for tests as well as periodically conducting routine tests • Request for a description of the proposed water treatment system procured by Baffinland to treat non-compliant waters in the Waste Rock Facility pond • Raised concerns related to sediment accumulation in Sheardown Lake. Recommended continued execution of sedimentation monitoring study at Sheardown Lake and ongoing implementation of management measures to minimize dust generated from the Project
Department of Fisheries and Oceans (DFO)	<ul style="list-style-type: none"> • Request for reinstatement of the Ship-Based Observer program to ensure that Baffinland has met requirements to provide sufficient marine mammal observer coverage on Project vessels to monitor marine mammal interactions with Project vessels

Agency	Summary of Comments on 2017 Regulatory Performance and Compliance
	<ul style="list-style-type: none"> Concerns related to the potential loss of juvenile char in the downstream area from the BG-50 crossing, which has the potential to results in additional serious harm to fish not accounted for in the issued <i>Fisheries Act</i> Authorization
Parks Canada (PC)	<ul style="list-style-type: none"> Concerns related to the placement of tidal gauge in Milne Port Request for acoustic monitoring to understand potential effects of Project-related vessel noise on marine mammals in the RSA Concerns related to speed of Project-vessels travelling along the nominal shipping route
World Wildlife Fund (WWF)	<ul style="list-style-type: none"> Request for Baffinland to develop Early-Warning Indicators for marine mammals Request for a more ‘comprehensive’ approach for marine mammal monitoring Request for NIRB to play a more active role in Baffinland environmental monitoring via increased oversight of environmental Working Groups and the development of a NIRB mandated monitoring framework for the Project

5.3 NIRB’S ANNUAL MONITORING REPORT AND BOARD RECOMMENDATIONS

On November 8, 2018 the NIRB issued its 2017-2018 Annual Monitoring Report for Baffinland Iron Mines Corp.’s Mary River Project and the Board’s Recommendation (NIRB, 2018) which included comments subsequent to NIRB’s Winter and Summer 2018 Site Visits. The Monitoring Report also contained 21 Recommendations to Baffinland.

Baffinland’s responses to the NIRB Board’s recommendations, including further updates requested by NIRB for inclusion in the 2018 Annual Report, can be found in Appendix E.

6 – MANAGEMENT PLAN UPDATES

Table 6.1 provides an extensive list of all the Management Plans for the Project.

Table 6.1 Current List Environmental Monitoring and Management Plans

Document Number	Plan Name	Current Revision Date
BAF-PH1-300-P16-0002	Snow Management Plan	Mar-19
BAF-PH1-830-P16-0001	Surface Water Sampling Program - Quality Assurance and Quality Control Plan	Mar-17
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan	Mar-16
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan	Mar-14
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	Mar-16
BAF-PH1-830-P16-0008	Environmental Protection Plan	Aug-16
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan	Mar-19
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan	Mar-17
BAF-PH1-830-P16-0012	Interim Abandonment and Reclamation Plan	Mar-16
BAF-PH1-830-P16-0013	Oil Pollution Emergency Plan - Milne Inlet (OPEP)	Jun-17
BAF-PH1-830-P16-0017	Q1 Quarry Management Plan	Jul-17
BAF-PH1-830-P16-0023	Roads Management Plan	Mar-16
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan	Mar-16
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	Mar-16
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystems Management Plan	Mar-19
BAF-PH1-830-P16-0027	Terrestrial Environmental Management and Monitoring Plan	Mar-16
BAF-PH1-830-P16-0028	Waste Management Plan	Mar-18
Golder Associates Ltd.	Phase 1 Waste Rock Management Plan	Mar-19
BAF-PH1-830-P16-0030	Borrow Source Management Plan – Kilometre 2	Oct-14
BAF-PH1-830-P16-0031	Life of Mine Waste Rock Management Plan	Apr-14
BAF-PH1-830-P16-0032	Borrow Source Management Plan - Kilometre 97	Oct-14
BAF-PH1-830-P16-0035	Borrow Source Management Plan - Kilometre 104	Mar-14
BAF-PH1-830-P16-0036	Spill Contingency Plan	Mar-17
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan	Jun-14
BAF-PH1-830-P16-0038	Exploration Closure and Reclamation Plan	Jul-14
BAF-PH1-830-P16-0039	Aquatic Effects Monitoring Plan	Oct-15
BAF-PH1-830-P16-0040	QMR2 Quarry Management Plan	Jul-17
BAF-PH1-830-P16-0041	Polar Bear Safety Plan	Mar-16
BAF-PH1-830-P16-0042	Spill at Sea Response Plan	Aug-15
BAF-PH1-830-P16-0046	Marine Environmental Effects Monitoring Plan	Mar-16
BAF-PH1-830-P16-0047	MMER Emergency Response Plan	Mar-19
BAF-PH1-840-P16-0002	Emergency Response Plan	Mar-18

Document Number	Plan Name	Current Revision Date
H349000-3000-07-245-0001	Q7 Quarry Management Plan	Oct-13
H349000-3000-07-245-0002	Q11 Quarry Management Plan	Oct-13
H349000-3000-07-245-0003	Q19 Quarry Management Plan	Oct-13
H349000-4200-07-245-0001	D1Q1 Quarry Management Plan	Oct-13
H349000-4200-07-245-0002	D1Q2 Quarry Management Plan	Oct-13
	Ballast Water Management Plan	Mar-19

A copy of Baffinland's Environmental Management Plans are available on the document web portal: <http://www.baffinland.com/document-portal-new/?cat=9&archive=1&lang=en>.

Most of the above plans are being further updated by Baffinland to incorporate additional mitigation and monitoring requirements of the Phase 2 Proposal.

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APPENDIX A
STATUS OF PC CONDITIONS IN 2018

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Climate	1	N/A	Annually	In-Compliance	GPS/tidal gauge monitoring of sea levels and storm surges.
	2	58	As needed	Not Applicable	Validation and update of climate change impacts of the project on the LSA and RSA.
	3	63	Annually	In-Compliance	Exploring and implementing steps to reduce GHGs.
	4	N/A	As needed	Not Applicable	Engage Inuit in climate change related research and studies.
	5	59	As needed	In-Compliance	Reasonable measures to ensure that Project-site weather related information is publically available.
	6	N/A	As needed	In-Compliance	Provide results of SO ₂ , NO ₂ , and GHG emissions calculations using fuel consumption or other relevant criteria.
Air Quality	7	57, 61, 62	Prior to construction	In-Compliance	Update AQ and noise abatement plan to include continuous SO ₂ and NO ₂ monitoring at port sites to capture operations phase ship-generated emissions for several seasons.
	8	61	Annually	In-Compliance	Demonstrate through SO ₂ and NO ₂ monitoring at the mine site and ports that emissions remain within predicted levels. Provide rationale and mitigation measures for exceedances.
	9	57	Annually	In-Compliance	Provide calculations of GHG emissions at the port sites and other Project sources including Project associated aircraft.
	10	2, 57	Prior to construction	In-Compliance	Update to dust management plan to include monitoring and management plans. Implement the dust management plan, report all monitoring data to NIRB annually, and take all adaptive management measures if monitoring indicates ambient air or dust deposition is greater than initially predicted.
	11	57	Prior to construction	In-Compliance	Develop and implement Incineration Management Plan.
	12	N/A	As needed	In-Compliance	Conduct at least one stack test immediately following commissioning new incinerators.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Noise and Vibration	13	N/A	As needed	In-Compliance	Work with Fisheries and Oceans Canada to select overpressure threshold applied to explosives for the protection of fish and aquatic life.
	14	32	Annually	In-Compliance	Conduct noise and vibration monitoring at Project accommodations in summer and winter during all phases of the project.
	14a	32	As needed	In-Compliance	Demonstrate appropriate adaptive management practices during construction for activities with the potential to disrupt marine mammals.
	14b	32	Annually	In-Compliance	Demonstrate appropriate adaptive management practices for project activities with the potential to disrupt terrestrial wildlife and Project site users.
	15	32	Annually	In-Compliance	Collaborate with the QIA and local Hamlets when undertaking consultation with communities regarding railway, tote road and marine shipping operations. Provide visuals and discuss safety considerations.
Hydrology and Hydrogeology	16	N/A	As needed	In-Compliance	Ensure that water related infrastructure is consistent with FEIS and FEIS addendum.
	17	6	As needed	Partially-Compliant	Develop and implement measures to ensure that all effluent satisfies discharge criteria established by relevant regulatory authorities.
	18	42	As needed	In-Compliance	Confirm and update, as needed, the approximate fill time of the mine lake pit identified in the FEIS.
	19	57	As needed	In-Compliance	Develop and implement adequate water infrastructure monitoring to ensure that natural water flow is not significantly hindered. Monitor and report water withdrawal rates and water use for domestic and industrial purposes.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Groundwater and Surface Waters	20	57, 65	As needed	In-Compliance	Monitor the effects of explosive residue and by-products from Project related blasting. Implement measures to ensure explosives do not negatively effect the surrounding area.
	21	2	As needed	In-Compliance	Ensure that the scope of the AEMP is consistent with the requirements in the condition.
	22	57	Prior to construction	In-Compliance	Develop a Sediment and Erosion Management Plan.
	23	57	Prior to construction	In-Compliance	Develop and implement Groundwater Monitoring and Management Plan.
	24	6	As needed	Partially-Compliant	Ensure that effluent discharge conditions are met all times.
	25	N/A	Prior to construction	In-Compliance	Identify sensitive landforms and develop and implement measures to minimize Project impacts on identified landforms.
	26	57	Prior to construction	In-Compliance	Develop and Implement Erosion Management Plan.
	27	N/A	Annually	In-Compliance	Record notes on impacts to the aesthetic value of the Project area heard in public consultations.
	28	N/A	As needed	Partially-Compliant	Monitor Project effects on permafrost and ensure its integrity.
	29	N/A	As needed	In-Compliance	Provide construction design and drawings for review and acceptance by relevant authorities. Provide as-built drawings to authorities following construction.
	30	65	As needed	In-Compliance	Develop site-specific quarry operation and management plans before the development of any potential quarry site or borrow pit.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Vegetation	31	N/A	As needed	In-Compliance	Ensure that Project activities are planned and conducted to minimize the Project footprint.
	32	N/A	As needed	In-Compliance	Ensure that all supplies brought to site are clean of soil that could contain plant seeds not naturally occurring in the area. Inspect vehicle tires prior to initial use in Project area.
	33	57	Annually	In-Compliance	Include relevant monitoring and management plans within the TEMMP.
	34	N/A	As needed	In-Compliance	Conduct soil sampling to determine levels of metals in soils where berry producing plants are, near any potential development area prior to commencing operations.
	35	N/A	Prior to construction	Not Applicable	Monitor baseline metal levels in organ tissue of caribou harvested with the local study area, prior to commencing operations.
	36	67	Annually	In Compliance	Establish an on-going monitoring program of vegetation used as caribou forage near project development areas, prior to commencing operations.
	37	43, 68	As needed	Not Applicable	Incorporate methods to evaluate the potential introduction of invasive plant species into the Terrestrial Environment and Monitoring Plan. Report non-indigenous plant species to the Government of Nunavut.
	38	N/A	Annually	In-Compliance	Review and adjust all monitoring information and management plans annually and adjust as needed to prevent/reduce adverse project effects on vegetation.
	39	39	Prior to construction	In-Compliance	Develop a progressive revegetation program for disturbed areas no longer in use.
	40	N/A	As needed	In-Compliance	Include revegetation plans in the Site Reclamation Plan that promotes progressive reclamation compatible with the surrounding environment.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Freshwater Environment	41	64	As needed	In-Compliance	Maintain a 100-m naturally vegetated buffer between the high water mark of any fish-bearing water bodies and permanent quarries with the potential for acid rock drainage, unless otherwise approved.
	42	N/A	As needed	In-Compliance	Maintain a 30-m naturally vegetated buffer between the mining operation and adjacent water bodies.
	43	N/A	Prior to construction	In-Compliance	Submission of a Site Drainage and Silt Control Plan to the relevant authorities prior to the start of construction.
	44	N/A	As needed	In-Compliance	Meet or exceed guidelines for blasting thresholds set by Fisheries and Oceans Canada for the protection of fish and fish habitat.
	45	N/A	As needed	In-Compliance	Adherence to the No-Net-Loss principle at all phases of the Project.
	46	64	As needed	Partially-Compliant	Ensure runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities generating liquid effluent and runoff meet discharge requirements.
	47	N/A	As needed	Partially-Compliant	Design and construct all Project infrastructure so as they do not prevent or limit the movement of water in fish bearing streams.
	48	N/A	As needed	In-Compliance	Engage with Fisheries and Oceans Canada and the QIA to explore Project specific thresholds for blasting that would exceed guidelines.
	48(a)	N/A	Annually	In-Compliance	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. Consult with MHTO re: the design, timing, and location of proposed surveys and ongoing monitoring.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Terrestrial Environment	49	46, 47, 49, 50	As needed	In-Compliance	Establish a Terrestrial Environment Working group to serve as an advisory body.
	50	70	As needed	In-Compliance	Develop and implement a Project specific terrestrial monitoring plan.
	51	58	As needed	In-Compliance	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. Give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou.
	52	N/A	As needed	In-Compliance	Initiate and develop a timeline to test and implement deterrence mechanisms for caribou near hazardous areas, within 3 months of issuances of the project certificate. Report information back to the Terrestrial working group.
	53	15, 71, 73	Annually	In-Compliance	Proponent shall demonstrate all measures outlined in the condition to mitigate impacts to caribou.
	54	N/A	Prior to construction	In-Compliance	Provide an updated Terrestrial Environment Monitoring Plan which includes all aspects included in the condition.
	55	57, 74	As needed	Not Applicable	Develop an adaptive management plan applicable to wolves and wolf habitats in collaboration with the Government of Nunavut.
	56	N/A	As needed	In-Compliance	Develop a progressive strategy for the recovery of terrestrial wildlife habitat that is consistent with the Nunavut Wildlife Act.
	57	N/A	Annually	In-Compliance	Report annually on terrestrial environment monitoring efforts including information included in the condition.
	58	60	Annually	In-Compliance	Incorporate a review section in the NIRB annual report including the information outlined in the condition.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Terrestrial Environment	59	N/A	Annually	In-Compliance	Ensure that aircraft maintain, whenever possible altitudes outlined in the condition. Develop measures to ensure all employees and subcontractors providing aircraft services are respectful of wildlife and Inuit harvesting that may occur in the Project development area.
	60	N/A	Prior to construction	In-Compliance	Develop a blasting program to minimize the effects of blasting on terrestrial wildlife, prior to construction.
	61	N/A	As needed	In-Compliance	Implement a stop work policy when wildlife in the area may be endangered by Project work, whenever practical and not causing human safety concerns.
	62	N/A	As needed	In-Compliance	Prohibit Project employees from transporting firearms to site and from operating firearms in the Project area for the purpose of wildlife harvest.
	63	N/A	Annually	In-Compliance	Liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. Meet with the organizations annually to discuss wildlife monitoring.
	64	N/A	As needed	In-Compliance	Ensure the environment protection plan incorporates waste management provisions to ensure carnivores are not attracted to Project site(s).
Birds	65	N/A	As needed	In-Compliance	Ensure all employees at site receive bird awareness training (avoidance of nests and large concentrations of foraging and moulting birds).
	66	75	As needed	In-Compliance	Avoid bird Species at Risk and their nests; establish avoidance zones as per TEMMP.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Birds	67	75	As needed	In-Compliance	Ensure mitigation and monitoring strategies for bird Species at Risk are updated for consistency with applicable status reports, recovery strategies, action plans and management plans.
	68	N/A	As needed	In-Compliance	Install flashing red, red strobe or white strobe lights and guy-wire deterrents on communications towers. Consider reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.
	69	N/A	As needed	In-Compliance	Prior to bird migrations and nesting, identify and install nesting deterrents (e.g. flagging) to discourage birds from nesting that will be disturbed by construction/clearing activities.
	70	N/A	As needed	In-Compliance	Protect any nests found (or indicated nests) with a buffer zone as per setback distances outlined in the TEMMP.
	71	N/A	Annually	In-Compliance	Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: <ol style="list-style-type: none"> 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.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Birds	72	N/A	Annually	In-Compliance	Ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths is maintained and available for regulatory authorities.
	73	N/A	As needed	In-Compliance	Develop detailed and robust mitigation and monitoring plans for migratory birds taking into consideration input from relevant organizations.
	74	57, 77	Prior to construction	In-Compliance	Develop and update relevant monitoring plans for migratory birds prior to construction including the key indicators included in the condition.
	75	77	Annually	In-Compliance	Report annually on terrestrial habitat loss due to the Project to verify impact predictions and project footprint.
Marine Environment	76	40, 51, 79, 84, 85	As needed	In-Compliance	Develop a comprehensive environmental effect monitoring program to address concerns and identify potential impacts on the marine environment.
	77 (revised)	46, 49, 51	As needed	In-Compliance	Establish a Marine Environment Working Group.
	78	N/A	Annually	In-Compliance	Update baseline information for landfast ice using a long term data-set and with inter-annual variation.
	79	N/A	As needed	In-Compliance	Provide the Canadian Hydrographic Services with bathymetric data and other information in support of Project shipping where possible.
	80	N/A	Prior to construction	In-Compliance	Prior to commercial shipping of iron ore, a detailed risk assessment is to be conducted for Project related shipping accidents.
	81	84	As needed	Not Applicable	Reassess the potential for ship wake impacts to cause coastal change following changes to the proposed shipping route.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Environment	82	N/A	As needed	Not Applicable	Encouraged to have ore carriers to be subjected to sea trials to measure wake characteristics at various speeds.
	83	N/A	As needed	In-Compliance	Install tidal gauges at Steensby and Milne Ports to monitor sea levels and storm surges.
	83 (a)	N/A	Annually	Partially-Compliant	Identify potential for and conduct monitoring to identify effects of sediment redistribution associated with construction and operation at Milne Port.
	84	N/A	As needed	Not Applicable	Update sediment redistribution modelling once ship design has been completed and sampling should be undertaken to validate the model and inform sampling sites and the monitoring plan.
	85	84	As needed	Not Applicable	Develop a monitoring plan to verify Project impact predictions associated with sediment redistribution resulting from propeller wash in shallow water locations along the shipping route. Additional mitigation measures are required if monitoring detects negative impacts.
	86	85	Prior to construction	Partially-Compliant	Prior to commercial shipping of iron ore, use more detailed bathymetry collected from Steensby and Milne Inlets to model anticipated ballast water discharges from ore carriers. This information should be used to update ballast water discharge impact predictions and sampling should be conducted to validate the model.
	87	85	Annually	In-Compliance	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. Initiate program several years prior to any ballast water discharge at Steensby or Milne Inlets.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Environment	88	85, 86	Prior to construction	In-Compliance	Prior to commercial shipping of iron ore, provide update risk analysis regarding ballast water discharge to assess the adequacy of treatment and implications on the receiving environment.
	89	57, 87	As needed	Partially-Compliant	Develop and implement a ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with or exceeds applicable regulations. The management program should reflect all inclusions outlined in the condition.
	90	57	As needed	In-Compliance	Incorporate into the Project Shipping and Marine Wildlife Management Plan provisions to achieve compliance with the requirements under the International Convention for the Control and Management of Ships Ballast Water and Sediment (2004) or its replacement regulation as amended.
	91	N/A	As needed	In-Compliance	Develop a detailed monitoring plan for Steensby and Milne Inlets for fouling that complies with all applicable regulatory requirements and guidelines issued by Transport Canada.
	92	10, 108, 110	Annually	In-Compliance	Ensure that the Proponent maintains the necessary equipment and trained personnel to respond to all sizes of potential spills in a self sufficient manner.
	93	N/A	Prior to construction	Not Applicable	Prior to construction, based on vessel selection, reassess the risk analysis of using vessel -based fuel storage with the inclusions outlined in the condition.
	94	106	As needed	Not Applicable	Consult directly with affected communities regarding its plans for over-wintering of fuel in Steensby Inlet.
	95	8	As needed	Not Applicable	Meet or exceed all regulatory regulations and requirements to the practice of overwintering of a fuel vessel at Steensby Inlet with reporting to NIRB and Transport Canada.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Environment	96	8	Deferred	Not Applicable	Update the NIRB on the results of all compliance monitoring and site inspections undertaken by government agencies for the overwintering of a fuel vessel at Steensby Inlet.
	97	N/A	Prior to construction	In-Compliance	Prior to commercial shipping of iron ore, conduct fuel spill dispersion modelling that minimally includes those items outlined in the condition.
	98	11, 106	As needed	In-Compliance	Incorporate the results of revised fuel dispersion modelling into its impact predictions for the marine environment and the spill response and emergency preparedness plans.
Marine Wildlife	99	81	As needed	In-Compliance	With the Marine Environment Working Group, consider and identify priorities for conducting supplemental baseline assessments for the items outlined in the condition.
	100	57	Deferred	Not Applicable	Update the Project 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.
	101	N/A	Annually	In-Compliance	Incorporate all items outlined in the condition into the appropriate monitoring plans.
	102	30, 36	Annually	In-Compliance	Ensure that routing of project vessels is tracked and recorded for both the southern and northern shipping routes, with data made real-time available to communities in Nunavut and Nunavik.
	103	N/A	Annually	In-Compliance	Report annually to the NIRB regarding project related ship track and sea-ice information including all items outlined in the condition.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Wildlife	104	N/A	Annually	In-Compliance	Plan shipping routes to Steensby Port in accordance with the items outlined in the condition. Summarize all incidences of significant deviations from the nominal shipping route presented in the FEIS to/from Milne and Steensby Ports.
	105	N/A	Prior to construction	Partially-Compliant	Ensure that measures to reduce the potential for interaction with marine mammals particularly in Hudson Strait and Milne Inlet area identified and implemented prior to commencement of shipping operations.
	106	N/A	As needed	In-Compliance	Ensure that shipboard observers are employed during seasons where shipping occurs and provided with the means to effectively carry out the duties. The role of shipboard observers should be taken into consideration in the design of any Project purpose built ships.
	107	N/A	As needed	In-Compliance	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.
	108	N/A	As needed	In-Compliance	Ensure that data produced by the surveillance monitoring program is analysed by experienced analysts (in addition to being discussed as proposed in the FEIS) to maximize effectiveness in providing baseline information and/or detecting potential effects. Data from the long term monitoring should be treated with the same rigor.
	109	N/A	As needed	In-Compliance	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.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Wildlife	110	84	As needed	Partially-Compliant	Immediately develop a monitoring protocol that includes acoustical monitoring to assess short, long term and cumulative effects of vessel noise on marine mammals. Work with the MEWG to identify appropriate early warning indicators that will ensure rapid identification of negative impacts along southern and northern shipping routes.
	111	N/A	As needed	Partially-Compliant	Develop clear thresholds for determining if negative impacts as a result of vessel noise is occurring.
	112	N/A	Prior to construction	Partially-Compliant	Prior to commercial shipping of iron ore, in conjunction with the MEWG, develop a monitoring protocol that includes acoustical monitoring that provides an assessment of the negative effects of vessel noise on marine mammals. Consideration of early warning indicators and thresholds of impacts should be included.
	113	N/A	Annually	In-Compliance	Conduct monitoring of marine fish and fish habitat including monitoring for Arctic Char stock size and health condition in Steensby and Milne Inlets, as recommended by the MEWG.
	114	N/A	As needed	Not Applicable	In the event of the development of a commercial fishery in Steensby Inlet or Milne Inlet areas, in conjunction with the MEWG, shall update the monitoring program for fish and fish habitat to ensure that the ability to identify Arctic Char stock(s) and any changes in stock size and structure of affected stocks and fish health is maintained to address any monitoring issues relating to the commercial stock fishery.
	115	N/A	As needed	In-Compliance	Continue to explore off-setting options in both the freshwater and marine environment to offset serious hard to fish which will result from the construction and infrastructure associated with the project.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Wildlife	116	N/A	Prior to construction	Not Applicable	Prior to construction, develop mitigation measures to minimize the effects of blasting on marine fish and fish habitat, marine water quality and wildlife that includes compliance with the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.
	117	N/A	As needed	Not Applicable	Ensure that blasting in, and near, marine water shall only occur during periods of open water. Blasting in, and near, fish-bearing freshwater should occur to the greatest degree possible in open water. Blasting during ice-covered periods must meet requirements established by Fisheries and Oceans Canada.
	118	N/A	Prior to construction	In-Compliance	Prior to construction, incorporate into the appropriate mitigation plan, thresholds for the use of specific mitigation measures meant to prevent or limit marine wildlife disturbance.
	119	N/A	Prior to construction	Not Applicable	In conjunction with the MEWG, monitor ringed seal birth lair abundance and distribution for at least two years prior to the start of ice-breaking to develop a baseline, with continue monitoring over the life-time of the project.
	120	N/A	Annually	In-Compliance	Ensure, subject to vessel and human safety, that all Project shipping adhere to mitigation measures outlined in the condition for the protection of marine wildlife.
	121	80, 83	As needed	In-Compliance	Immediately report any accidental contact by Project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada, respectively.
	122	N/A	Annually	In-Compliance	Summarize and report annually to the NIRB regarding accidental contact by Project vessels with marine mammals or seabird colonies through the applicable monitoring report.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Wildlife	123	N/A	As needed	In-Compliance	Provide sufficient marine mammal observer coverage on Project vessels to ensure that collisions with marine mammals and seabird colonies are observed and reported throughout the lifecycle of the Project. The marine wildlife observer protocol should include those items outlined in the condition.
	124	N/A	As needed	In-Compliance	Prohibit all Project employees from recreational boating, fishing and harvesting of marine wildlife in Project areas, including Steensby and Milne Inlets.
	125	41	Prior to construction	Not Applicable	Prior to the use of acoustic deterrent devices, carry out consultations with communities along the shipping routes and nearest to Steensby and Milne Inlet Ports to assess acceptability of the devices. Feedback from consultation should be incorporated into the mitigation plan.
	125(a)	35	Annually	In-Compliance	Consult with potentially affected communities and groups, particularly the 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 from the consultation should be incorporated.
	126	N/A	As needed	In-Compliance	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.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Marine Wildlife	127	27, 28	Annually	In-Compliance	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.
	128	27, 28	As needed	In-Compliance	Consult with local communities as fish habitat off-setting options are being considered and demonstrate incorporation of this input in the design of the Fish Habitat Off-Setting Plan.
Population Demographics	129	41, 43, 45, 46	Annually	In-Compliance	Encouraged to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee along with other agencies and affected communities, endeavoring to identify areas of mutual interest into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities and the North Baffin region as a whole.
	130	41, 43, 46	As needed	In-Compliance	Consider establishing and coordinating with smaller socio-economic working groups to meet Project specific monitoring requirements throughout the life of the Project.
	131	45	As needed	In-Compliance	The Qikiqtaaluk Socio-Economic Monitoring committee is encouraged to engage in monitoring of demographic changes including the movement of people into and out of the North Baffin communities and the territory as a whole.
	132	N/A	As needed	In-Compliance	Encouraged to partner with other agencies in the North Baffin region, the Municipal Training Organization and the Government of Nunavut in developing/implementing programs which encourage Inuit to remain living in their home communities while seeking ongoing and progressive training and development.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Population Demographics	133	43, 45	Annually	In-Compliance	Encouraged to work with the Qikiqtaaluk Socio-Economic Monitoring committee and with the Government of Nunavut and other relevant stakeholders to design and implement a voluntary survey to be completed by its employees on an annual basis in order to track housing status and migration intentions. Non-confidential findings are to be reported to the Government of Nunavut and the NIRB.
	134	N/A	Annually	In-Compliance	Provide in the annual report to the NIRB a summary of employee origin information including information outlined in the condition.
Education and Training	135	93	As needed	In-Compliance	Encouraged to consider offering additional options for work/study programs available to Project employees.
	136	92, 94	As needed	In-Compliance	Encouraged to work with training organizations and/or government departments offering mine-related or other training in order to provide additional training opportunities for employees which are transferable and meaningful.
	137	92	Annually	In-Compliance	Prior to construction, develop an easy referenced listing of formal certificates and licences that may be acquired via on-site training or training during employment at Mary River. Listing to be updated on an annual basis, provided to the NIRB upon completion and whenever it is revised.
	138	92	As needed	In-Compliance	Encouraged to work with the Qikiqtani Inuit Association to ensure timely development of effective Inuit training and work-ready programs.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Education and Training	139	N/A	Prior to construction	In-Compliance	Prior to construction, undertake and provide results of a detailed labour market analysis which provides quantitative predictions on the number of employees to be sourced from southern Canada and foreign markets. Within 90 days of receipt of the Project Certificate, submission of an updated labour market analysis must be submitted.
	140	N/A	Annually	In-Compliance	Encouraged to survey Nunavummiut employees as they are hired and specifically note the level of education obtained and whether the incoming employee resigned or left an educational institute to take up employment with the Project.
	141	92	As needed	In-Compliance	Prior to construction, encouraged to work with the Qikiqtani Inuit Association in order to prioritize the provision of training of Inuit to serve as employees in monitoring or other such capacities.
Livelihood and Employment	142	105	As needed	In-Compliance	Encouraged to address the potential direct and indirect effects that may result from Project employee's on-site use of various Inuktitut dialects as well as other spoken languages.
	143	N/A	As needed	In-Compliance	Encouraged to consider the use of both existing and innovative technologies as a way to ensure Project employees are able to contact their family and friends.
	144	N/A	As needed	In-Compliance	Encouraged to make requirements for employment clear in its work-readiness and other programs and documentation.
	145	43, 45	As needed	In-Compliance	Encouraged to work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring committee to monitor the barriers to employment for women.
	146	N/A	As needed	Not Applicable	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to investigate the possibility for Project revenue streams to support initiatives or programs which offset or subsidize child care for Project employees.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Livelihood and Employment	147	43	As needed	In-Compliance	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 an obtain manageable rental rates.
Economic Development	148	45	As needed	In-Compliance	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 broad indicators of dietary habits.
	149	N/A	Prior to construction	In-Compliance	Prior to operations, required to undertake an analysis of the risk of temporary mine closure giving consideration to the affects of such to the North Baffin region.
	150	34	Prior to construction	Not Applicable	Ensure that specific conditions are met in regard to Sirmilik National Park, as outlined in the condition.
	151	N/A	As needed	In-Compliance	Encouraged to investigate measures and programs designed to assist Project employees with home ownership or access to affordable housing options.
	152	N/A	As needed	Not Applicable	The Qikiqtani Inuit Association is encouraged to provide the Board and the Qikiqtaaluk Socio-Economic Monitoring committee which information regarding the effectiveness of any provisions within the Inuit Impact Benefit Agreement which may require that larger contracts are broken into smaller contracts.
Human Health and Wellbeing	153	96	As needed	In-Compliance	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.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Human Health and Wellbeing	154	43, 45	As needed	In-Compliance	Work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic committee to monitor potential indirect effects of the projects.
	155	N/A	Prior to construction	In-Compliance	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.
	156	N/A	As needed	In-Compliance	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' absence from home and community life.
	157	96	As needed	In-Compliance	Consider providing counselling and access to treatment programs for addictions, domestic parenting, and marital issues that affect employees and/or their families.
Community Infrastructure	158	43	As needed	In-Compliance	Encouraged to work with the Government of Nunavut and other relevant parties to develop a Human Health Working Group.
	159	43	As needed	In-Compliance	Encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increases to community based and airport infrastructure in the local study area and Iqaluit.
	160	N/A	As needed	In-Compliance	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure that benefits are in a broad sense distributed across impacted communities and demographic groups that best offsets Project related impacts to infrastructure or services.
	161	N/A	As needed	In-Compliance	The Government of Nunavut should be prepared for the potential need for increased policing to handle on-going Project related demographic changes in subsequent crime prevention.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Culture Resources and Land Use	162	97	As needed	In-Compliance	Make all reasonable efforts to engage Elders and community members of the North Baffin communities for input into monitoring programs and mitigative measures to ensure that they are informed by traditional activities, cultural resources and land-use.
	163	N/A	As needed	In-Compliance	Continue to engage and consult with the communities of the North Baffin region to ensure that Nunavummiut are kept informed about Project activities.
	164	30, 34	As needed	In-Compliance	Provide notification to communities regarding scheduled ship transits throughout the Regional Study Area including Eclipse Sound and Milne Inlet. Real-time data should be made available. Changes to proposed shipping routes should be provided to the MEWG, the community of Pond Inlet and communities in the region.
	165	14	As needed	In-Compliance	Encouraged to provide buildings along the rail line and Tote Road for emergency shelter purposes to be made available for employees and land users of the area.
	166	30	As needed	In-Compliance	Ensure through consultation efforts and public awareness campaigns that the public has access to shipping operations personnel for transits into and out of Steensby and Milne ports via telephone or internet contact to ensure information regarding ice conditions and ship movements can be shared.
Benefits, Royalties and Taxation	167	43	As needed	Not Applicable	Encouraged to enter into negotiations for a Development Partnership Agreement with the Government of Nunavut.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Governance and Leadership	168	45	As needed	In-Compliance	Include the aspects outlined in the condition into the monitoring program adopted by the Qikiqtani Socio-Economic Monitoring committee.
	169	N/A	Annually	In-Compliance	Provide an annual monitoring summary to the NIRB on the monitoring data collected related to the regional and cumulative economic effects associated with the Project and any proposed mitigation measures.
Accidents and Malfunctions	170	N/A	As needed	Not Applicable	Include an updated Terrestrial Wildlife Management and Monitoring Plan plans for increased caribou monitoring efforts including weekly winter track surveys and bi-monthly surveys in the summer and fall.
	171	N/A	As needed	Not Applicable	Include within the updated Terrestrial Wildlife Management and Monitoring Plan, a commitment to establish deterrents along the railway and Tote road embankments at any areas where the movement of caribou presents a likelihood of mortality to occur.
	172	8	Prior to construction	Not Applicable	Encouraged to provide the Government of Nunavut with evidence that the vessel intended for use for the overwintering of fuel has been designed and certified for use under the operational conditions. Proof of vessel owner's insurance policies are required.
	173	9	As needed	In-Compliance	Employ best practices and meet all regulatory requirements during ship to shore and other marine based fuel transfer events.
	174	108, 110	As needed	In-Compliance	Provide, as well as the Canadian Coast Guard, spill response equipment and annual training to Nunavut communities along the shipping route.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Accidents and Malfunctions	175	34, 57	Deferred	Not Applicable	In coordination with the Qikiqtani Inuit Association and the Hunters and Trappers Organizations of the North Baffin communities and Coral Harbour, provide updates to the Shipping and Marine Wildlife Management Plan to include adaptive management measures to take should the placement of route markers along the ships track during ice breaking not prove to be feasible for marking the route.
	176	N/A	Prior to construction	Not Applicable	Required to revise its spill planning to include additional trajectory modelling for Hudson Strait, where walrus concentrate, as well as Milne Inlet, Eclipse Sound and Pond Inlet during winter conditions.
	177	13, 37	As needed	In-Compliance	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.
Alternatives Analysis	178	N/A	As needed	Not Applicable	Subject to safety requirements, require all Project vessels to maintain a route to the south of Mill Island to prevent disturbances to walrus and walrus habitat.
Operational Variability	179	4	Deferred	Not Applicable	Not to exceed 20 ore carrier transits to Steensby Port per month during the open water season (242 transits per year).
	179a	4	Annually	In-Compliance	The total volume of ore shipped via Milne Inlet shall not exceed 4.2 million tonnes per year (Mtpa). Until December 31, 2019, the total volume of ore transported may exceed 4.2 Mtpa but must not exceed 6 Mtpa.
	179b	4	Annually	In-Compliance	The total volume of ore transported by truck on the Tote road shall not exceed 4.2 Mtpa. Until December 31, 2019, the total volume of ore transported may exceed 4.2 Mtpa but must not exceed 6 Mtpa.
	179c	N/A	Annually	Partially-Compliant	Resource a third-party to conduct performance audits of IIBA commitments, proponent commitments and each PC condition relating to environmental management of the

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
					tote road and shipping components of the Project, and file a Performance Audit Report with the NIRB.

Subject Area	PC Condition No.	Proponent Commitment ¹	Reporting Requirement ¹	2018 Condition Status ²	Summary of Condition Requirement
Transboundary Effects	180	N/A	As needed	In-Compliance	The Marine Environment Working Group shall invite a representative from Makivik Corporation to be a member of the group.
	181	N/A	Annually	In-Compliance	Regardless of whether Makivik Corporation participates as a member of the Marine Environment Working Group, the group will provide Makivik with regular updates throughout the life cycle of the project.
	182	N/A	As needed	In-Compliance	Make available any ship route deviation routes provided to the NIRB to Makivik Corporation.
Verification of Project Monitoring and Mitigation for Potential Effects on Marine Mammals	183	N/A	Annually	In-Compliance	Collaborate with the Marine Environment Working Group to develop impact and mitigation strategies for the protection of the marine environment. Implement any direction from Fisheries and Oceans Canada for any avoidance or mitigation measures, including cessation of any activity, for the protection of the marine environment.
	184	N/A	Annually	In-Compliance	Collaborate with the Marine Environment Working Group to review the status of compliance with, and implementation of, PC conditions related to marine environmental protection. Results of the ship observer program to be provided in the Annual Report to the Board.

NOTES:

1. Reporting Requirements are generally grouped as follows:

Annually - Condition is reported on in the Annual Report.

As Needed - Condition is reported on based on changes to the Project or specific timelines and as the Condition dictates.

Prior to Construction - Condition is reported on prior to the construction phase and generally includes the timelines "prior to operation" and "prior to shipping".

Deferred - Condition is specific to an aspect of the Project which is not yet viable and will be reported on when said aspect does become viable and as the Condition dictates.

2. Condition Statuses are generally grouped as follows:

In-Compliance - Condition requirement(s) has/have been met.

Partially-Compliant - Condition requirement(s) has/have been partially met. Demonstrable efforts towards meeting compliance requirements is evidenced.

Non-Compliant - Condition requirement(s) has/have not been met. Rationale for being unable to meet compliance requirements is provided.

Not Applicable - Condition is tied to a project phase or component that was not active during the reporting year, or the responsible party is not the Proponent.

APPENDIX B
2018 COMMUNITY ENGAGEMENT RECORDS

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	Last year there were 3 vessels floating in Eclipse Sound and this was really disturbing. This wasn't just at the beginning of the season. Is it true that Baffinland could put goods for the community on BIM vessels?	Yes, Baffinland has been talking to Worley Parsons about bring stuff up from the small craft harbor. We will continue to explore this to the greatest extent possible until we hit a wall. Right now this looks like something we could do. The biggest obstacle will be ice conditions on Pond Inlet shore. We are trying to start our shipping seasons between July 20-25 each year.
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	Ship speeds need to be closely monitored and we need to make sure that no ships enter Koluktoo Bay like what happened last year.	Agreed. This year we will increase communications with all ships, not just ore carriers, regarding speed limits in the Inlet.
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	We want to see more Inuit employed in the workforce. What benefits will there be for Inuit? There used to be benefits, now there are none. These areas are traditional hunting grounds in Milne Inlet, Pond Inlet and Clyde River that are being most affected by ships. How will these communities benefit? I'm starting to better understand the operation, but I would like more clarity on what benefits there are? Nina: I have heard so many times that Baffinland does not meet their commitments though.	No matter what our production levels we are at; we need to improve the benefits for Inuit. We are training Inuit in the areas of our operations where there are the highest number of positions available, such as Heavy Equipment Operators. We are with QIA on these initiatives. We want to build the employees for the future from Baffinland communities. Brian: I understand. We understand that mistakes have been made in the past, but we are positive that we can continue to improve moving forward.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	You mentioned no harmful chemicals. We are worried about drinking water. There are lots of lakes from Mary River to Milne. We would like a report to show all of the drinking water back to the HTO? Are the lakes safe to drink from?	Yes, the water is safe to drink. We use guidelines to measure what is in the water is safe for fish and for drinking. Although the iron in the water may alter the look or taste, it is completely safe to drink.
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	Did you mean to say that Inuit will not be hired anymore?	No, absolutely not. Our goal is to continue to increase Inuit employment. Right now it seems that we have hit a plateau with our workforce. But overall our Inuit employment rate has increased and we are taking steps to see it continue increasing.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	<p>Baffinland does not do what they say they are going to do. In the beginning they said they would cover the trucks, but they haven't. There is dust in the snow, and when you melt the snow it is black. The federal government and the HTO have all expressed concerns about the quality of the drinking water. There are red foxes. Also - the ships do not stay at the anchorage sites and they are getting really close to the shoreline. Cruise ships are chasing narwhal to observe. Maybe Pond Inlet would be happier if the Project shut down. Maybe if the Project shuts down and you want to re-open it, you will have to sign a new agreement. Now you even want to increase production more.</p>	<p>Our largest area of dust is by the crusher. Our plan is to move secondary crushing indoors as part of the Phase 2 Project. We want to decrease the amount of dust in the atmosphere. I have also seen the red foxes. They are red because they get close to site if people are feeding them, so we have enforced even stricter rules to prevent this. We have also brought the head of shipping here to hear your concerns and to make sure that vessels stay within the shipping routes and are anchored only at approved locations. Joe: Baffinland has never made a commitment to cover the trucks, but this is a recommendation that has been made by the community in the past.</p>
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	<p>Why do you want to increase the Project to 6MTPA now when you said before that the project would go on for a very long time.</p>	<p>The amount of ore in the deposit is fixed, and our costs of running the operations are also fixed. If the price of ore is high, you can maintain production at the same rate and still make money. If the price of ore goes down, but our costs for operations don't decrease as well, we won't make money. So the solution is to increase production to improve our ability to make money.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	Last year the HTO lost money as a result of the employees that were hired for the DFO tagging program. A ship also lost some equipment as a result of wakes from ships at Bruce Head. We looked into the IIBA and these issues are not in there. QIA looks after the IIBA, and because the hunter was not actively hunting when this damage occurred, they were not eligible to receive compensation through the wildlife compensation fund.	We are currently in the process of renegotiating the IIBA so I can bring that back to my team to see if we can address this.
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	Travel to Igloolik has been affected as a result of the haul road. And now we have negotiated the alignment of the railroad.	Baffinland will be back next week to discuss potential effects the current and future phases of the Project may have on travel routes.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-06-07 - HTO Pond Inlet	Pond Inlet	<p>By the freight dock there are travel routes and the dock is going to interfere with it.</p> <p>Has the contract for this already been awarded? Will any Inuit be hired? Any types of major construction activities like this should involve a community site visit, so we can understand what effects are occurring from construction and how Baffinland is managing this. Our site visits should be more than once per year and should include representatives from both the HTO and the Hamlet.</p>	<p>We will set up a schedule for site visits and share with the Hamlet and HTO for feedback.</p>
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>There is a railway line. I am lost getting ready to approve of this. The rail line will block traditional routes, steep embankment. I would request that if I was travelling I would be able to cross the rail way line. We can cross it that is good.</p>	<p>Good point about crossings. We ensure that crossings for both wildlife and hunters travelling along traditional routes will be established for the railway. The final location of these crossings will be developed in consultation with local communities throughout the Phase 2 EA process. need them for caribou and people to cross.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	As soon I was there last year, I thought there would be a lot of regulations but that was not the case. BIM is working with us to identify crossings. Maybe areas underground for crossing?	<p>Maybe that is an option? Final design is not yet done. Not sure if that can work but something that can be seen. This rail line does not have any tunnels through rock. Steensby line will.</p> <p>Closer to the Mine site on the right side the rail line near the mountain will deviate from the road because of the steep grade.</p> <p>Biggest thing we are looking at now is ice lenses and permafrost. Drilling continues to determine good locations for the rail line.</p> <p>Components of monitoring we have done are aerial surveys, shore based monitoring at Bruce Head, acoustic monitoring (same as oceans north), ship based monitoring, in 2017 narwhal tagging study.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>Navy Board Inlet brings us a lot of sea mammals. Navy Board brings a lot of the food that the animals need. Ice escapes from Navy Board and brings animals here.</p> <p>Hunters used to oppose Navy Board Inlet. But now looking to keep the Eclipse areas open. We want more monitoring year round.</p> <p>Yes that might be possible.</p>	Can we have some ships in Eclipse Sound and in Navy Board?
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>Near Canada dear we were near Button Point. We were there it was raining, but it was very nice. You want to encourage young people to get to the flow edge. Month of July easier to hunt Narwhal. If ships start travelling through, Navy Board, wildlife will migrate through Navy Board. You also mentioned to start shipping earlier in July. So maybe only use Navy Board in July.</p>	That is partially the reason why we can't say an exact number of ships. Ice determines what kind of ships we can use. Navy board was looked at, but the safety of the ship is also a big concern.
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>When ice starts breaking up. Multi-year ice comes from the Resolute Bay area. We can expect when the tough ice will approach the area. This would cause some safety concerns with large ice.</p>	This year we asked the HTO when we could bring in the ships, like every year.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>From last year, this past summer the ships used their designated route. Much better than other years. Need another monitoring station. No permanent monitoring stations. Eclipse sound and Navy Board need monitoring. We have asked WWF to do this for us. Want to talk to Baffinland about where animals are impacted the most. We need science and IQ to determine all of this info. At that time we can see the.</p> <p>Hunters in town have ideas where the monitoring stations should/could be, by. Bruce Head is good. Monitoring shows that narwhals are affected. Need more monitoring stations run by this community. Communicate monitoring stations to ships.</p>	We developed the shipping fact ship. Received two concerns. Addressed them right away.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>We went on the site visit. HTO identified pathways between Milne Inlet and Mine. Hardly any caribou near the mine. The railway line, if built, we have to consider potential crossings. The hunters go hunting the sleds are light when we leave. If we harvest, the sled is heavy. This needs to be considered. It's almost trying to cross where snow has been cleared. Rocks along the Tote Road make travel dangerous. Sometimes we have to off-load then cross. Need to address this. Better to go under the railway line with loaded sleds. Also, if we need to go over an embankment, two snowmobiles are required to pull a sled. At site we want slopes that are not too steep. We address that info while at site.</p> <p>We also went to Labrador to see winter shipping and saw the crossing from the ships. We saw the crossings that were built that is the preference for crossings at site. Plastic over wood.</p>	They did a good job in Labrador? Caleb - Yes, they did a good job. The ships only come so many months a year.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>Seals congregate but when BIM ships come the seals go away. When BIM season is done then animals come back. That is very apparent these days. I always monitor the wildlife.</p> <p>We don't mind if you go through Navy Board Inlet, but we do not want winter shipping. This is prime hunting time.</p> <p>Winter shipping is the biggest concern.</p>	<p>You mentioned if we get support? What did you mean? Elijah- you are in planning now, you need to identify benefits from community if you increase shipping, then scenario would change. I am not clear on what the impact would be?</p>
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>You will be using Cape Size Vessels to Milne Inlet. Would the large ships go direct or have to anchor?</p>	<p>Hopefully direct. But may have to anchor. But we won't be doing the transfer onto larger ships, that is not being proposed. We will be constructing a new dock for the larger ships. Existing dock cannot fill the bigger ships.</p> <p>Maybe Arctic Bay and Pond HTO and BIM should all get together. Have a discussion together.</p>
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	<p>When would you use the big ships would you not use the smaller ships?</p>	<p>We would use all vessels. Big ships are not good in ice conditions. They were to bring ore from Brazil and Australia to China.</p> <p>We contract the ships so we cannot say for certain how many vessels or each size. Depends on what is available, ice and weather conditions.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	Training Centre linked to Phase 2?	Progress is being made now. We are moving forward.
Community Group Meeting	2018-11-21 - Phase II Consultation - Pond Inlet	Pond Inlet	HTO is moving into elections soon. If Phase 2 proceeds we want to continue working with Baffinland.	Please pass along this information to other member of Hamlet and HTO.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	Shipping already going to Milne Inlet. Would Phase 2 ships be more traffic? Does bigger ships mean less traffic?	Yes to both Questions. July-November is shipping depending on ice conditions. 3 types of ships we will look at using Supermax, Panamax, and Cape Size. This past season 71 ships came in. Estimating that this will increase to 178 ships. Combination of three types of ships 30 small, 133 Panamax, and 13-14 of Cape Size vessels. Ship type planning depends on the availability of ships Baffinland can acquire since we do not have our own fleet.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	NIRB did not approve the 6 mtpa. If wildlife is impacted, that impacts the communities. Would you be able to compensate for that?	Its recommendation, NRIB said that company did not explain itself well enough. Animals leave if noise is loud enough, and animal strikes affect marine mammals. Whale strikes can occur more frequently when ships are travelling faster, over 13 knots. Ships in Milne have a limit of 9 knots. High pitch sounds can affect marine mammals as well. IIBA has a wildlife compensation fund, monitoring marine mammals, and environmental equipment funding for this purpose. If communities do not support projects, they do not last very long. If there is a proven effect on marine mammals it would be hard for company to continue an activity.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	When do you envision that you will start Steensby Inlet?	Current plan, which is subject to change, 2 years after Northern rail route is completed we will start work on Steensby. Steensby will be ready midlate 2020's. This project that we are talking about today costs about 1 billion dollars, Steensby will cost us 5 billion. That is why we have phased growth. With 12 mtpa we can pay back lenders and continue investment in project to build Steensby.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	How likely is it that the Phase 2 request is going to be approved?	You are asking the wrong guy. I thought 6 mtpa would have a positive recommendation. We have learned from what went on in the 6 mtpa process. We have a strong application. And a strong likelihood that it will be approved.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	I have heard about dust control. I am not concerned about it. No one lives there at Milne Inlet. We in the communities breathe dust from municipal services, marine mammals get affected by the same dust. Can there be a plan for building proper roads in the communities?	With respect to dust we are looking at different ways to bind the dust. If these ways work, it is something we can work at in the Hamlet as well. We have been having some of these chats in Pond Inlet as well.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Pond Inlet residents have concerns and they are our colleagues. Hunters in Pond Inlet are already saying there are no more seals. In AB we had more seals this year. Animals like to live in a very quiet place. Obviously if you increase ships it will impact marine mammals negatively. They change their habitat to be away from noise. We saw this this fall during the ice freeze up, seals basking on the ice. Lots more seals on the ice near AB. With an increase in BIM shipping, cruise ships, this means that the seals will be scattered and away from the area more. You need to consult with the community to get more recordings to determine the noise generated by the ships. We rely on seals, polar bears rely on seals. We need to monitor from Arctic Cod to Walrus and everything between. Need to record ship traffic using underwater microphones. Communities will be very vocal about this. Make sure you have your studies to back your plan to respond to hunters concerns.</p>	<p>Since the beginning of the project the MEWG has been going through some of your suggestions. Some of them have been brought up at that group. It's made up of BIM, QIA, Government, NGO, and Community. Last year we installed acoustic microphones, tagging narwhal. The IIBA fund for research allows for these types of programs to continue AB saw more seals this year? (nod yes). Pond Inlet say less? (nod yes)</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	Yes Pond Inlet saw this. They agree with what I am saying. They are saying less seals than before. We always negotiate and communicate with each other to find good hunting grounds. We manage the environment well. Hunters know everything needs to be better managed.	
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>No one in Pond Inlet saw any Narwhals this year due to shipping. We let them hunt over here.</p> <p>Right now Pond Inlet has not seen any seals. I went to Victor Bay. There were well over 100 seals basking in the sun. Look in the past, talking to MHTO and Elders say those seals left Pond Inlet and came to Arctic Bay. Hunters say they have different species here in Arctic Bay that we do not normally see because of the ship's increased shipping. We need to sit down and discuss wildlife issues from the smallest animal to the biggest animal.</p>	Was there an increase in Killer whales this year? Joe T- in Pond Inlet more than 1 hunter stated that Clyde and Qik got more Narwhals but they also saw many killer whales, they said that shipping is not the only reason. Killer whales are increasing. Not a lot of ice this year in Clyde and Qik. That's why they got more Narwhal.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Even with Killer whales, we know that yes. It might be true or not. But we need to look at the issue. We need to look at monitoring to see the truth. As AB resident the Killer whales do not scare Narwhals but press them against the shore. We are anxious for Killer whales because they bring the Narwhal closer to the community. Killer whales are our friends.</p> <p>We talked so much this past year about killer whales.</p>	
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>The rail-line. Trains. More opportunities for employment. Mary River when it was planned. There was going to be so much % of Inuit employment. The rail-line. There would be training on being an operator.</p> <p>The rail-line if it is approved, can Inuit be trained to operate? You have not hit your percentage yet, so hire more Inuit to work on the trains. Training opportunities would do that</p>	<p>Yes, training for the rail-line and employment opportunities generated from the rail-line, if approved, would be available for Inuit. We also have training programs and commitment through the IIBA and Q-STEP that we are pursuing now to get more Inuit employed.</p> <p>We had a 20% increase over Q2 this year in Inuit employment. I see you have our IIBA report highlights information sheet. This is something that the company is proud of. But we know we need to do more, we are committed to doing more.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>We see benefit of training and employment in Arctic Bay. Put Pond Inlet is complaining about marine wildlife. We need to find a way to have BIM operate for good of AB, but also look at wildlife issues.</p> <p>Have we thought of another location for a rail-line? Say between Pond Inlet and Clyde River to maybe build a port there.</p>	<p>Very difficult landscapes around Pond to Clyde River, lots of mountains that make it very difficult. Best place is where the port is currently. It has the right geographic features.</p>
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Did not give any documents of the proposal? You want more ships, you are increasing ships. Not keeping up with production. So, you want more ships to Milne Inlet. Loading from the dock in Milne. Are you going to do that now? This summer did you do the bigger ships?</p>	<p>Partly. We use the Super Max and Panamax. We did not use a Cape Size.</p> <p>I think you meant did you do mid oceans transfer? Yes (nod). No, we did not do that.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Myself, the dust is dust. Like here in the community we have very dusty conditions. It's not contaminated. It's only dust from the ground. Nanisivk was a small mine but had lots of contaminants. Road dust is not contaminated. It will not affect wildlife. I am not concerned about it. I was a committee member when they were diamond drilling, I worked at Nanisivk. We did not get paid a lot, there was alcohol available, people were fired or late for work because of alcohol abuse. After 3 months people could reapply for work. We were told it (Mary River) will be big, lots of revenue, we believed that. I heard that Clyde River a person who could not speak English, when he was assessed he could not speak English, the Company returned him home. It turned out that Nanisivk was good. Hire Inuit for the work they can do. We used to get hired, even though we didn't not speak English. We can be trained. There is always help available. Even a person who does not speak English can gain the skills.</p>	<p>Agree with you completely. Inuit should be able to speak the language they want at work. And we allow that. But people have to operate safely. IIBA guarantees this. It is very important that the company gets better at this and we are working to do that. We installed Inuktitut signs at site, hired more Inuit Cultural Advisors or elders to not only support employees but to support the managers and supervisors. They talk about cultural differences to make the workplace better for Inuit. We have taken big steps on this but know we can and should do more.</p> <p>I started out in underground mining and you are right, there is a mining culture that needs to be reflected in training and orientation programs. The Work Ready program does this, but we are looking for ways to do more.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	It is difficult for a mine. When the community's life is different from mine life. Its rotating. there are conflicts in schedules. People can practice working.	
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	Killer whales are predators. Without them Narwhal would be everywhere. They herd the Narwhal close to shore. When Narwhal comes to shore the Killer whales kill so many of them. I know that being predators Narwhal are scared of them and will run away. Same with human on land.	
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	What is your timeline for getting EIS completed? How many times are you coming back here? What are you doing for cultural orientation, to workers have to take something? If yes, how long is it?	<p>Yes, we have mandatory cultural orientation that is done. All employees at the project have to do it. Online and onsite portion to this training. We are also developing a new cultural training program. This will not replace existing program but will compliment it.</p> <p>We will give you the schedule of when we are coming back here as far in advance as possible. Hopefully we will be done the EIS process through NIRB in June. Federal election may impact the timeline. We are talking to NIRB about that.</p>

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Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	In Pond Inlet the shipping is causing the wildlife to move out. I think BIM-QIA have a plan for the hunters to get support, getting them gas? If it is determined there is impact on wildlife in AB would you offer assistance to provide fuel for hunters here as well?	If there was an effect caused by the company, we would seek to use the IIBA Wildlife Fund. If it was determined to be something else, we would be in discussion with you about what we could do together to address potential impacts.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	Milne Inlet, does it have a lot of employment opportunities there? My son has been waiting for a long time for a call. He asked Meena for work.	<p>Most of the shipping/port jobs will be at Steensby after Phase 2. We do not need more rooms at Milne for phase 2, but yes there are jobs there. New opportunities with rail-line. Real activity is during the shipping season at Milne Inlet.</p> <p>I can speak to you after the meeting and see what we can do to help.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	You seem to be very busy planning, Joe especially. Arctic Bay and Pond Inlet is very stingy, selfish. We heard today that you are building a training center in Pond Inlet. You also have HEO training in Morrisburg. Will you be moving all of that training to Pond Inlet?	<p>Company has committed 10 million towards training center. Not just for people in Pond Inlet. For all communities, and Inuit in Baffin. We contract Morrisburg OETIO to provide training, so we would not be moving that here but looking to see what kind of activities we can do in Pond Inlet.</p> <p>I do not think it will be possible to offer all courses in Pond Inlet that are offered by OETIO. They have a huge facility lots of equipment. We will provide updates further as things move forward.</p>
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	Who selects the applicants for training? My son keeps applying for the training course. He is the same as the other applicants. Terms of selecting the criteria seems to be bias. People with less education may have been selected.	QIA and Baffinland pick candidates jointly. We can get a fact sheet made up with all of the answers about how applications for the program work.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	During public meetings, QIA have to fly in on schedule flights. Can you increase the size of planes you use to bring QIA with you? Perhaps Baffinland and QIA could go on the same plane?	We do it when we can, on community tours for Phase 2 they will be invited. During formal Phase 2 meetings they will be invited.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	I heard "other communities", there are 6 communities, will other Baffin communities get a chance to get into training communities?	Point of Hire is first, then Baffin region, then Nunavut Inuit. That is what the IIBA says. Joe T- Per IIBA company will cover costs and meals.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Are you doing community feast? Are we going to eat caribou?</p> <p>Thank you coming up here. What did you want from us here today.</p> <p>After your tour in the communities. Will you give us a report?</p> <p>Pond inlet is most affected. Arctic Bay and Clyde after that. It would be nice to get a summary report of what communities are saying.</p> <p>Joe said he is going to get caribou feast. But I have over 50 roast beef.</p> <p>Since the mine started there was lots of complaints about Southern-Northern employee's relations.</p>	<p>We are still planning everything. But we will do our best to get some here at Christmas time. Early stages of planning.</p> <p>We are planning community feasts for all the north Baffin communities.</p> <p>BIM is taking this issue seriously. Great efforts being made. We learned our lesson very quickly from what happened in June. And our CEO takes it very seriously.</p> <p>What outcome are we looking at for today? Just a conversation. You all made good suggestions. This is what we were looking for.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>"What is your title Joe.?"</p> <p>When people apply it takes forever to get a reply.</p>	<p>I work for BIM. I work with CLOs and Meena.</p> <p>Meena collects resumes and headquarters reviews them and makes decisions. They screen and review. Inuit who are qualified are a priority. We are gaining momentum to hiring more Inuit. There are many obstacles look at the job description, you need certain skills to do that work. Applicants sometime do not have those skills all the time. We also have medical checks that take a long time and criminal background checks.</p>
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>When Mary River was starting, HTO would go to tour the Mine site. At least once a year.</p>	<p>Yes, we can do that. We can work with you to make site tours happen more regularly.</p>
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>"I applied for funding through Kakivak Association to see what kind of revenue or income I can apply for. We were told that economic development from GN had money.</p> <p>What types of programs do you have for retired people?"</p>	<p>We do not have programs for retired people specifically, but we have the 3 IIBA funds that you can access. They are managed by QIA, their CLO can tell you about how to apply. You can also apply for BIM training programs, they are open to everyone.</p>

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Back when we were employed with oil companies when we worked for Pan-Arctic oil.</p> <p>Use to have a small canteen. You could buy things you needed. Same with Nanisivik. Small canteen as well run by the kitchen crew.</p> <p>Now Mary River does not have one.</p>	Yes, we are planning for one as we speak. Working with QIA. Will sell Inuit arts and crafts as well.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Supplement to earlier question. The un employed here want to know how to access training programs. It is not clear? People apply for Morrisburg, but do not hear back on the status of their application.</p>	Need info to send back to applicants.
Community Group Meeting	2018-11-19 - Phase II Consultation Meeting - Arctic Bay	Arctic Bay	<p>Discussed training. HEO training. Can you consider each community? I think they do 6 weeks of training. Can you consider, for example, having 12 people from one community. So, train people from one community at a time.</p>	Interesting idea. Not something we have talked about before.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	<p>Job opportunities are not open for a long time.</p>	Some opportunities are time limited i.e. freshet work, so have to be filled quickly. However, BIM trying to hire more directly, which will improve this process
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	<p>Less contractors going forward why? What will happen to contractor employees?</p>	We want more people working directly for the company. Makes business sense.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Some people work with QIL, will they become BIM.	At this time no plan to take housekeeping catering functions away from contractors.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	That's not good. QIL does not treat employees well.	We understand that is an issue. As BIM's contractors we want to ensure their contract benefits their Inuit employees.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	My wife worked for QIL, now she is sick and on leave, cannot get EI can you help?	QIL not here to answer that question but we can talk to you privately to get the right information and see what can be done.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	How much do contractor employees get paid?	That is a bit of a complicated answer. Will speak to you about it on the break.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Kakivak Presentation- If we get funding do we have to give it back?	Depends on the program. We have different funding models.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Kakivak Presentation- I know how to start budgeting and a business, but hard to know how to do business with BIM. BIM needs a commissary store at site.	We are working on setting up a commissary store at the site to allow employees to buy goodies. This is in the early stages but it will include the sale of Inuit arts and crafts. can promise it will be run by Inuit and sell products that people want to buy.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Who looks after laundry services?	Qikiqtani Industries Limited (QIL).
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	You need big industrial machines and dry cleaning. Who does this service?	QIL
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Next time BIM is here to talk about this stuff you should bring QIL along. Lots of issue for them.	Thank you for that tip. We will definitely take it under consideration for next time.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Need ground transportation.	We totally agree. Are working on setting up a business in town to provide that service for BIM. We think that is the best way to do this not by simply bringing a van into the town.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	There are 3 Kudlik Corp buildings in town. BIM should buy and renovate and turn into rental units. Also use for meetings.	Thank you for that suggestion. We are a mining company we are not in the real estate business. We also think it is best that we rent facilities in town so that money stays in the community and supports local business.
Community Group Meeting	2018-10-15 - Hall Beach - Procurement Tour	Hall Beach	Can you talk about training programs?	Currently running the Q-STEP program in partnership with QIA. This includes HEO, Apprenticeship and Work Ready. Amended IIBA has many new training commitments. Can speak to you one on one to discuss everything in detail.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	You are hear talking about decisions that have already been made?	Baffinland and Kakivak are to talk about current and future business opportunities.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Need a committee between Company and Hall Beach / Igloolik.	One of the APRF recommendations as well. QIA and BIM talking about this.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Need to have EDO and QIA at these meetings. Very important.	The Mayor is represented here. We thank him for coming, as well as MLA Quassa. QIA wanted to be here, but due to conflicts was unable to. However, QIA and BIM have the Contracting Committee and will be talking about all the issues raised.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	How does BIM define an Inuit Firm?	Through the IIBA we define them. Those firms on the NTI Registry.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Can't start a business in Public Housing? What can you do about that?	That is a real issue. BIM and Kakviak can continue to discuss this issue. It is important the MLA Quassa is here to hear that concern directly.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	What opportunities exist for contracting?	Opportunities are really endless. We have many services, labor, construction, and some new items such as ground transportation and laundry repair services that we are working on.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Since we have an IIBA do people make contracts with Baffinland or QIA?	BIM is the customer looking for services and therefore works directly with providers. QIA and BIM work on contracting Issues through the IIBA.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Kakivak should visit communities more.	Thank you for that comment. We do our best to get out to communities and we are always open for emails, phone calls, to help anyone interested in our programming.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Traditional food production would be a good business opportunity. Would BIM be interested in this?	Yes, we would. This is something the company needs to get better at. Food safety is a big concern for the Company, but something we discuss one on one.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Public housing is an issue for starting a business. Need to address this.	That is a real issue. BIM and Kakviak can continue to discuss this issue. It is important the MLA Quassa is here to hear that concern directly.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Can you explain training programs that exist and how people can apply?	Currently running the Q-STEP program in partnership with QIA. This includes HEO, Apprenticeship and Work Ready. Amended IIBA has many new training commitments. Can speak to you one on one to discuss everything in detail.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Kakivak Presentation- Do I have to pay back program funds?	It depends on the programs. We have many different programs that have different rules. We can help walk anyone through those programs.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Can we have a business in public housing?	Different community by community. Important you speak to your MLA and Mayor. Good that MLA Quassa is here to hear that issue.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Can BIM contract with co-ops? And can Kakivak fund the co-op?	Yes, and yes.
Community Group Meeting	2018-10-16 - Igloolik - Procurement Tour	Igloolik	Will BIM consider offering laundry services to a community-based business?	Yes. That is something we are thinking about. We are working with a company based in Igloolik called Inuk Stitches to see about have a coverall repair business established and a contract signed with BIM.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	How do I get a business license in town?	Talk to Hamlet EDO. Kakivak can help as well. I can speak to you directly after my presentation.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Are there sea run char at site?	We are not sure. We can follow up with you on that through our BCLO Meena.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Nanisivik created lots of dust here in Arctic Bay. Does Baffinland monitor dust?	Yes, we monitor dust spend about 5-6 million on monitoring programs. We worked directly with MHTO to determine new dust monitoring locations. Dust over time at the Mine has decreased.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Inuit are not paid as much as non-Inuit	Pay is based on your position not on Inuit or non-Inuit.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Cannabis is going to be a real problem now that it is legalized. This will hurt people's chances of getting employed.	Baffinland is a 0-tolerance site. No alcohol or drugs allowed. Thank you for sharing your concern about this.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	If someone needs to establish a business, they need support for accounting/ financial services.	Kakivak can provide these types of services and supports for businesses in the form of training. If you would like to talk about it directly please let me know.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Concerns about my employment with BIM. I have applied but I have not yet heard back.	We can discuss this one on one and see what information we can find out for you.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Where is the iron ore sold? What is iron ore used for?	It is sold to steel mills in Europe. One of our owners, Arcelor Mittal has steel mills across Europe which use Mary River iron ore. Iron ore is one of the main ingredients in the steel making process. Mary River iron ore can be used to make anything from car parts to the steel roof beams you see in the Community hall this evening. High quality ore means high quality steel.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Training is very hard to access.	BIM and QIA working to make that easier through the Q-STEP program. We encourage not to give up, we can discuss directly and see what can be done to help. Kakivak can also provide your financial supports. You should not get discouraged.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Employees families need support in the community when they are out at work.	Baffinland agrees and it is also important to the Company. In amended IIBA we will be developing an in community counselling program which will be designed to help communities.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Dust is a problem. What are you doing about it? I do not agree that road is only place dust comes from I think that is not true.	We monitor dust annually throughout the sites and along the tote road. We had the MHTO at site late August and collaboratively worked to identify additional monitoring sites along the road. This will provide even more information. We also use water and calcium chloride to keep the dust down, as well an entire road maintenance team to look after the road to keep dust as low as possible. Thank you for your comment. You are correct dust is also generated during blasting, crushing and ship loading. However, based on our monitoring to date the road generates the most dust due to wheel contact with the road.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Milne Inlet lake (Anijurjak) is polluted what are you doing about it?	We have extensive monitoring programs in place to monitor marine and fresh water environment. We do not have the data with us here today, but we would be happy to get it to you. I will come and speak to you after the presentation about it. This group is here to talk about procurement and contracting so we don't have that information readily available.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Contractors have different rules than Baffinland. This makes getting a job with a contractor harder.	Thank you for telling us about this. I will speak to you after and we can discuss the specifics of the problem you faced and try to resolve it.
Community Group Meeting	2018-10-17 - Arctic Bay - Procurement Tour	Arctic Bay	Before we used travel by foot between Arctic Bay and Pond Inlet. During our trips we would get minerals, and oil on our Kamiik. This was well before any mining company was ever up here, before we had trucks, ATVs, and snow machines. It was natural it just happened to be in the environment around us.	Thank-you for sharing your story.
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	Contracting documents should be in Inuktitut.	Yes, the document you have (Pre-Qualification Questionnaire) is available in Inuktitut as well. It is at the front table with Tina (BIM CLO).

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	QIA Representative David Curley; What does the term "qualified" mean as it relates to an Inuit firm.	Baffinland needs to ensure that contractors performing work at site are qualified to carry out the work they are bidding on. The pre-qualification questionnaire we have handed out and spoke about is one way we determine this. BIM works with contractors to fill out the form is asked.
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	QIA Representative David Curley; Can you help me become qualified?	If you are looking to setup a business or have a business idea the Kakivak Association can talk to you about their business development and support programming. If you are interested in talking about pre-employment training programs you and I can speak, and we can chat about the Q-STEP program and associated programs.
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	Boazie Otova, Hamlet Councilor: Are there training programs or ideas you have for training outside of HEO and Apprenticeship?	Yes, we have a work ready program, have delivered financial literacy training, and will be developing an Inuit internship program that will include programs in departments such as HR and finance. But this is still in development.
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	I called Kakivak and QIA and asked for business development help, but no one ever called me back.	I am sorry to hear that. But we (Kakivak) are hear tonight and can work through any and all questions you have.

Event Type	Event Name	Community of Interest	Stakeholder Comment	Baffinland Response
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	Can I get fuel if I go to Milne Inlet?	Yes, Baffinland will provide fuel to hunters and visitors who access site.
Community Group Meeting	2018-10-18 - Pond Inlet - Procurement Tour	Pond Inlet	Contracting documents should be in Inuktitut.	Yes, the document you have (Pre-Qualification Questionnaire) is available in Inuktitut as well. It is at the front table with Tina (BIM CLO).

APPENDIX C
2018 WORKING GROUP MEETING RECORDS

**APPENDIX C1
MEWG MEETING RECORDS**

Marine Environment Working Group Meeting

Date: March 15, 1pm-5pm

Location: Teleconference

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	P	Parks Canada	Francine Mercier (FM)	P
	Joe Tigullaraq (JT)	P	Makivik	Gregor Gilbert	N
	Emma Malcolm (EM)	P			
Qikiqtani Inuit Association (QIA) and Consultants	Stephen Williamson Bathory (SB)	N	Mittimatalik Hunters and Trappers Organization (MHTO)	Elijah Panipakoocho (EP)	P
	Lisa Oolooyuk (LO)	N		Daisy Koono (DK)	P
	Nadine Chislett (NC)	N		Caleb Sangoya	P
	Fai Ndofor (FN)	P		Billy Merkosak (BM)	P
	David Qamaniq (DQJ)	P			
	Jeff Higdon (JH)	P		Observer Organization	Participants
Fisheries and Oceans Canada (DFO)	Kim Howland (KH)	P	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD)	N
	Laura Watkinson (LW)	P		Amanda Hanson Main (AHM)	P
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG)	N	Oceans North Canada	Chris Debicki (CD)	N
	Anne Wilson (AW)	P		Kristin Westdal (KW)	P
	Loretta Ransom (LR)	N			
Government of Nunavut	Brad Pirie (BP)	P	Baffinland Consultants	Participants	
	Lauren Perrin (LP)	N	Golder	Phil Rouget (PR)	P
	Jon Neely (JN)	N	Golder	Erin Linn (EL)	N
	John Ringrose	P	Golder	Mitch Firman (MF)	P
			Golder	Ainsley Allen (AA)	P
		Golder	Krista Joyce (KJ)	P	

P-phone in participation, I – In person, N- Not attending

Agenda	
Time	Activity
1:00pm – 1:15pm	Welcome and introductions (Baffinland, All)
1:15pm – 1:45pm	Baffinland Update (Baffinland) <ul style="list-style-type: none"> • Report Distribution and Comment Form • 2018 Ice Management Vessels • Baffinland Project Update
1:45pm – 3:15pm	2017 Marine Monitoring Programs Results (Golder) <ul style="list-style-type: none"> • MEEP and AIS Monitoring Program • Tremblay Tagging Program • 2016 Aerial Survey • Bruce Head Shore-based Monitoring Program
3:15pm – 3:30pm	Health Break
3:30pm – 4:30pm	2018 Marine Monitoring Program Planning (Baffinland and Golder) <ul style="list-style-type: none"> • MEEMP and AIS Monitoring Program • Tremblay Tagging Program • Ship-board Observer Program • Aerial Surveys • Shore Based Monitoring
4:30pm – 5:00pm	Roundtable and Action Items

Discussion and Comments
<p>Welcome and Introductions lead by MLH</p> <p><u>Baffinland Project Update</u></p> <p>Report Distribution and Comment Form</p> <ul style="list-style-type: none"> • MLH reviewed marine report distribution schedule and processes: <ul style="list-style-type: none"> ○ MEEMP and Bruce Head draft reports have gone out, received comments back from MEWG members, these will be responded to and updates will be made as required. ○ DFO Habitat Offset Application for new floating dock was submitted to the MEWG February 2 and provided to DFO on January 1 ○ 2016 Aerial Survey Report was submitted to the MEWG March 13, 2018. This was first sent to DFO for their review before being distributed to MEWG members. This report is still open for comments. ○ Tremblay Tagging Program Report, this is still under development and Golder will provide an update on the results in this meeting. ○ NIRB Annual Report will be sent to NIRB March 31 and distributed to MEWG members on that date or shortly thereafter. ○ Distribution of all past monitoring reports (this was an action item from the last meeting), completed on December 18, 21017. The 2015 Aerial Survey Report was distributed March 13, 2018.

- Draft November Meeting Minutes were distributed February 2, 2018. Final meeting minutes with incorporated comments will be distributed April 6, 2018.
- Draft Meeting minutes from this meeting will be distributed April 6, 2018.
- MEWG email distribution list: if you would like any recipients added or removed, please advise MLH.

2018 Ice Management Vessels

- MLH spoke about managing the Baffinland shipping schedule during the open-water season, the unpredictable nature of the open-water shipping season, ice management during operations, and finding the right ice management vessel partner for future operations.
 - AHM asked if the plan was to utilize these vessels for the entire season or for just at the beginning and the end.
 - MLH indicated that there are a number of different options that are being considered. One would be to employ a vessel at the beginning of the season and at the end of the season only (deployed twice from the origin) the other would be to have one vessel employed for the entire. From an operational perspective, there are advantages to use the ice management vessel during the shoulder season, and then use this vessel for other ancillary purposes during the mid-season.
 - DQ inquired if Baffinland would contract foreign vessels for ice-management if Canadian Coast Guard was unavailable. How many ship-board observers would Baffinland be employing this year?
 - MLH indicated that the Baffinland shipping personnel are engaging in this discussion presently, and should have a better idea in the next couple of weeks regarding the availability of both Canadian Coast Guard and foreign-flag vessels for ice management in 2018. Baffinland's president will be travelling to Pond Inlet the week of March 21, 2018 to meet with Hamlet Council and HTO to discuss the use of the ice management vessels this year and hopefully more information should be available at that time. In terms of how many ship-board observers, it will be dependent on the type of vessel that will be used.
 - Caleb from HTO indicated that they came to the conference call abruptly and they don't even have the documents that are being presented and there is no translation on these documents. Asked for clarification on what are we trying to achieve here.
 - MLH advised all participants that the presentation was sent in advance to MEWG members by email and that it was also available for viewing on the WebEx screen. MLH also noted that there are new HTO members that are participating in the meeting and she will be happy to provide a follow-up to this call to discuss the purpose of the working group. The purpose of this meeting is to share information about Baffinland's Marine Monitoring Programs, including updates on what Baffinland is looking at in terms of planning for the Marine Environment, presenting results from the 2017 marine monitoring programs, and discussing proposed marine monitoring programs for 2018, including preliminary planning.
 - CS asked if HTO can get a copies of the 2014, 2015 & 2016 Aerial Survey Reports and a summary of these reports. Flagged issues they were having with Baffinland's file transfer system (for downloading these files).
 - EM will follow up with HTO and will make sure all representatives are able to retrieve the documents and will look into implementing a better file transfer system.

Baffinland Phase 2 Expansion Project Proposal Update

- MLH indicated that they are still waiting for the NPC recommendation for the NBRLUP amendment.

Baffinland 2018 Work Plan Marine Update

- MLH indicated that Baffinland has submitted a Fisheries Act Authorization (FAA) application to Fisheries and Oceans Canada (DFO) for a floating cargo dock in Milne Port to aid in offloading sealifts. Target for construction of floating dock is spring/summer 2018.
- MLH indicated that Baffinland will be submitting an application in 2018 to amend the Project Certificate to allow for an increased volume of ore to be trucked and shipped out of Milne Port during the 2018 open-water season. Baffinland's president will be communicating more on this to Hamlet Council and MHTO next week (week of March 21). The proposed increase would add an additional 0.8 million tonnes to the currently approved volume; resulting in approximately 12 additional ore carriers required in 2018. As this develops MLH will continue to share information with MEWG members with regards to any implications for shipping operations over the season.
- KW - How many ships are you anticipating this summer?
- MLH indicated approximately 70 ore carriers in comparison to 56 last year. If the amendment does not proceed, then it would be 58 ore carriers this summer.
- DQ - When would you know if the amendment will be approved or not?
- MLH indicated that the application is still being prepared, so it hasn't been submitted to the NIRB yet and it depends on the level of process that NIRB will require to review the application.

2017 Marine Monitoring Programs Results

- The 2017 programs included:
 - Marine Environmental Effects Monitoring Program (MEEMP)
 - Aquatic Invasive Species (AIS) Monitoring Program
 - Marine Habitat Offset Monitoring Program
 - Tremblay Sound Narwhal Tagging Program
 - Bruce Head Shore-based Monitoring Program

MEEP and AIS Monitoring Program

- PR presented on the 2017 MEEMP and AIS Monitoring Programs results - which included a summary of the 2017 results for water quality, sediment quality, marine habitat surveys (epifauna and epiflora), fish sampling, Aquatic Invasive Species (AIS) sampling, and Marine Habitat Offset Monitoring.
- JH indicated he submitted comments this morning to MLH and EM, and had a few questions on the results, but will wait to receive written responses and then these issues can be discussed further at succeeding MEWG meeting.
- PR indicated he received the comments this morning and he plans to go through the comments in detail and will provide a response as soon as possible.
- EP from HTO indicated that he used to be a participant in the Bruce Head Monitoring Program, and asked if the program is still going to continue.
- PR indicated that he will be presenting the results of the 2017 Bruce Head Monitoring Program in the first part of today's meeting, and will then present what programs are being considered for 2018 in the second part of today's meeting (including a discussion on Bruce Head Program).

- CS indicated that he is very grateful that Baffinland is running the program and it is a good report but how many people have been living there since September. We see it in a different way because we have been staying their day and night. How do you feel that IQ is being incorporated into these reports? How do we know the difference between day time and night time narwhal behavior?
- PR indicated that during 2017 the Bruce Head program observation team mainly focused their observations within a 10-12 hour period – with most of these occurring in the day time. They elected to go with the one team because in year’s previous, LGL had run surveys at Bruce Head throughout the full 24-h cycle, (16 hours of observation through day and night), so they were able to appropriately characterize differences in narwhal abundance and distribution (daytime vs nighttime aspect), and we didn’t expect it would be necessary to do this in 2017 again.
- JT rephrased part of Caleb’s question: there are two camps not far from Bruce Head Inlet, these people are from Pond Inlet and are living there 24 hours a day. They are in a better position to observe wildlife and see things others may not see. Has the project considered using the knowledge of the people living there during the summer?
- MLH indicated that they are going to be thinking more about how better to incorporate IQ into the 2018 monitoring program. Last year, in advance of the marine monitoring programs, they held a workshop in Pond Inlet (invited HTO members) to gain more information about the area in general and the marine mammal and environment monitoring programs. 12 Inuit were hired for the marine programs in 2017 and their feedback and input throughout the program has been incorporated into the reports submitted by Golder. Input provided by the field participants have provided information for planning programs. Baffinland agrees that we can continue to find more ways to integrate IQ into our monitoring programs, and we will continue to seek opportunities to do this in upcoming years.
- CS indicated every summer he goes to a camp near Milne Inlet, usually July to September. Last year in August there were lots of vessels in the area (near Milne Inlet and Ragged Island) and he observed the narwhal did not give birth in that area last year. He inquired whether Baffinland knew where the narwhal calving areas were?
- PR indicated that the few incidences of calving observed by Baffinland during previous monitoring programs occurred in Milne Inlet (near Bruce Head) and Koluktoo Bay, as well as in Tremblay Sound. The calving ground is extensive - hard to know the full spatial extent of this area because the monitoring programs are site-specific (focused on certain areas) - and because narwhal are such transient animals (moving upwards of 60 to 100 km per day). Preferred calving areas are likely a function of prey availability to satisfy foraging requirements, safety considerations (from predators or anthropogenic activities), and social requirements (mating, nursing, etc.).

Tremblay Sound Narwhal Tagging Program

- PR presented the preliminary results from the 2017 Tremblay Sound Narwhal Tagging Program (PowerPoint Presentation) which included animations of narwhal movements in shipping corridor in relation to fine-scale ship movements – also discussed what analyses are in process.
- JH asked when they will see the 2017 Tremblay Sound Tagging Report.
- PR indicated that they are working with University of Windsor to process the dive data. His best is hoping to be able to share a report with the MEWG around late-May. This is what they’re striving for, but it’s a very laborious process due to the large amount of different tagging and ship location (AIS) data collected which requires QA/QC, synchronization, post-processing, interpolation, and creation of an integrated database system for overall management of the data. Golder is also working with researchers at the University of Windsor to develop a specialized dive algorithm to

assist with baseline characterization of narwhal dive behavior (which is still poorly understood based on existing research). The algorithm will allow for decomposing the tag dive data into individual dives (for each tagged animal) that includes information on dive duration, dive depth, maximum and average descent velocity, maximum and average ascent velocity, bottom interval, and surface interval. The data then requires manual processing to ground truth the algorithm and classify each dive type (e.g. by dive shape). So far, we are seeing a high degree of variability in diving behavior between individuals and between study regions (different habitats in Tremblay Sound, Milne Inlet North, Milne Inlet South, and Eclipse Sound). It is critical to first understand what normal dive behavior consists of in each of the different study areas / habitat types, before we can assess how normal dive behavior may change as a result of external factors (such as shipping or hunting).

2016 Aerial Survey

- PR presented the results of Golder’s analysis of a subset of DFO’s 2016 Aerial Survey (corresponding to the Northern Shipping Corridor). Presented abundance estimates for 2016 in comparison to previous surveys.
- JH indicated that no deadline for comments from MEWG on the ‘2016 aerial survey report’ was provided in the list of materials that were submitted to the MEWG members.
- MLH indicated she meant to update the slide, and that Baffinland is welcoming any comments from MEWG on this report. Deadline for comments will be 3 weeks after the report was submitted (i.e. April 3, 2018).

Bruce Head Shore-based Monitoring Program

- PR presented the results of the 2017 Bruce Head Shore-based Monitoring Program, including a comparison of 2017 results to previous years (summary of main findings).
- EP asked if the Bruce Head program will continue in 2018.
- PR indicated that an alternative shore-based monitoring program is being considered for 2018, which would involve acoustic monitoring conducted in concert with visual monitoring (data collected on abundance, distribution and behavior).

2018 Marine Monitoring Program Planning (Baffinland and Golder)

2018 MEEMP and AIS Monitoring Programs

- PR presented an overview of the proposed 2018 MEEMP and AIS Monitoring Program.
- JH indicated that some of the comments they submitted on the 2017 reports is relevant to implementation of the 2018 monitoring program, any other comments the QIA may have moving forward they will submit in writing.
- MLH indicated that a number of parties have provided comments on program design, and these comments will feed into the development of the 2018 program (many of which are already tied to recommendations that Golder has made to Baffinland for 2018).

2018 Tremblay Tagging Program

- PR presented an overview of the proposed 2018 Tremblay Sound Tagging Program.
- JH asked if DFO is switching to using the Fastloc tags as well?
- PR indicated that he’s not sure. Last year DFO was using ARGOS tags that they still had in their inventory.
- JH asked if Fastloc tags have the equivalent battery life as the ARGOS tags.

- PR indicated that they can last up to a year, depending how they are programmed.

Shore-Based Monitoring

- MLH presented on the Bruce Head Monitoring Program. MLH indicated that in the fall of 2017, the observation platform was destroyed in a high wind event, which occurred about a month and a half after the program ended. The blown away platform (i.e. Storm event) triggered an internal investigation. While this investigation is ongoing, Baffinland is not able to run the program as it has been run in the past (with the observation platform on a cliff). During the summer of 2018, Baffinland will be visiting the site to finish the investigation, and looking at options to mitigate flagged safety risks and improving safety aspects of program (such as newly engineered design for platform). Baffinland will need to complete this assessment to make sure that risks are minimized when we run the program in the future. Baffinland is planning to use this as an opportunity to improve the program, refine and enhance the design and to incorporate new study design features. This will be done in conjunction with the MHTO and local Pond Inlet residents and past participants so that we can better integrate IQ into that program. In addition, MEWG members and Golder have provided comments on the Bruce Head report indicating improvements to the design of the program that will be taken into consideration. To supplement shore-based monitoring Baffinland has been working to develop an alternative pilot project for 2018 that will meet our PC objectives and requirements while we complete the incident investigation. Baffinland is committed to finding alternatives to ensure that all employment opportunities for local Pond Inlet residents that have been previously made available through the Bruce Head program will continue in 2018 through program alternatives.
- PR presented on proposed alternative to Bruce Head Program being considered for 2018 –a Vessel-based Monitoring Program. PR indicated that it was Golder’s intention to refine the Bruce Head study design in 2018 to improve ability to detect changes in narwhal behavior, distribution and abundance in relation to shipping and hunting events. Golder is looking at a program that would combine visual monitoring with acoustic monitoring in the same Bruce Head study location, using a live-aboard vessel as a fixed monitoring platform for the observers. Several long-term acoustic recording devices would be deployed to gather complementary acoustic data (ambient noise, ship noise, vocal behavior). Vessel would have ability to move out of the area during bad weather.
- JH asked how high up can the observers get on the vessel.
- PR indicated they could likely be about 6 m above water level. Another idea being considered is to use a smaller tender vessel to deliver observers to shore and base the survey platform on the lower grassy knoll overlooking shipping corridor and Koluktoo Bay. This would provide a higher vantage point. This might be more beneficial then to rely on the anchored vessel to be in the path of the whales and a might be a better alternative if there are concerns with the stationary vessel potential interfering with local hunting activities.
- JH - Do you know if the other platform where observers can get a higher vantage point is the same one that DFO (Marianne Marcoux) used for previous studies?
- PR indicated that there are a couple different options on land, one of them is the site Marianne Marianne Marcoux used for her PhD work on narwhals, and the other one is above the hunting camp but below the original Bruce Head observation platform and not very steep on the walk up.
- JH indicated that if they have any other comments they will put them in writing. JH asked how soon do you anticipate to speak to the community members. This will need to be done early to

make sure we are planning around potential hunting disruptions that this may be caused as a result of the vessel.

- PR indicated that he could make himself available to meet with MHTO and community members and noted that will be in Iqaluit in April (for another event).
- MLH indicated that this is still a conceptual design. To move this program forward, aspects of the program will need to be looked internally first, and any health and safety risks will need to be assessed before a final decision on the program can be made. MLH agreed that consultation with the communities on the proposed program will need to happen sooner rather than later.

2018 Ship-board Wildlife Observer Program

- MLH presented an overview of the 2018 Ship-board Wildlife Observer Program.
- An opportunity has presented itself to have shipboard observers placed on the ice management vessel in 2018. The vessel has been designed with a platform to shelter the observer. The contract secured with the appropriate company will include a provision to ensure the observer program will occur.

Baffinland Aerial Surveys

- PR presented a slide on Baffinland Aerial Survey Program. Discussion of past results, limitations of using aerial surveys to detect low-level effects on animal abundance, options to improve accuracy / reduce variability in survey results.
- MLH indicated that they are currently in discussions with DFO regarding aerial surveys, and that DFO recently reviewed Golder’s analysis of a subset of DFO’s 2016 aerial survey data. In terms of input from MEWG, the aerial survey discussion has been ongoing and all past documents have now been distributed so any input or feedback in terms of design and frequency for running the program is welcomed and appreciated. Time can be put aside at the next face to face meeting to discuss further. Also, to echo PR’s recommendation, it is Baffinland’s intention to carry forward in 2018 with the Narwhal Tagging Program, and to consider feasibility of running the aerial survey in conjunction with DFO or at the completion of the Narwhal Tagging Program.
- PR indicated that this might be the last year that the tagging program is run in Tremblay Sound (to the same level of effort as it has been run in the last several years). There are discussions of DFO moving this program to a different study site in the region, so we want to take advantage of the opportunity to collect two consecutive years of reliable data in the Project area that can be used to support programs moving forward.

Employment and Training Opportunities 2018

- PR indicated that over the next few weeks, they will be looking at identifying options and then communicating this with the communities, similar to last year.

Questions & Discussion

- JH indicated they will continue to engage moving forward.

Next Steps

- MLH indicated that the next face to face meeting will be in Ottawa in late April or Early May. Focus for this meeting will be on 2018 design of monitoring programs. For the Ship-board observer program, a ship-board observer committee meeting will be held once there is confirmation on the use and contracting of the ice management vessels.

- MLH indicated that the MEWG terms of reference is an ongoing priority, MLH is hoping to send out a revised version of the terms of reference in the near future.
- MLH indicated meeting minutes from this meeting will be sent out by April 6th for comment.

	Action Items	Action By	Update
1	Plan next MEWG meeting	Baffinland	Baffinland is proposing to meet in early June and provide program design to MEWG mid-May to allow for input and discussion at next meeting.

Marine Environment Working Group Meeting

Date: June 6, 2018

Location: Ottawa Delta City Centre
101 Lyon Street North, Ottawa, ON, K1R 5T9, Canada

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	I	Parks Canada	Francine Mercier (FM)	I
	Joe Tigullaraq (JT)	I	Makivik	Gregor Gilbert (GG)	N
	Emma Malcolm (EM)	I			
Qikiqtani Inuit Association (QIA) and Consultants	Stephen Williamson Bathory (SB)	N	Mittimatalik Hunters and Trappers Organization (MHTO)	Elijah Panipakoocho (EP)	I
	Sean Joseph (SJ)	N		Phanuel Enooagak (PE)	I
	Fai Ndofor (FN)	N			
	David Qamaniq (DQ)	N			
	Jeff Higdon (JH)	I			
Fisheries and Oceans Canada (DFO)	Kim Howland (KH)	I	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD)	I
	Laura Watkinson (LW)	I		Amanda Main Hanson	P
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG)	I	Oceans North Canada	Erin Abou-Abssi (EAA)	I
	Anne Wilson (AW)	N			
	Loretta Ransom (LR)	N		Kristen Westdal	N
				Chris Debicki	N
Government of Nunavut	Brad Pirie (BP)	I	Baffinland Consultants	Participants	
	Lauren Perrin (LP)	I	Golder	Patrick Abgrall (PA)	I
	Jon Neely (JN)	N	Golder	Erin Linn (EL)	I
	John Ringrose (JR)	N	Golder	Phil Rouget (PR)	N
			EDI	Mike Settingington (MS)	I

P-phone in participation, I – In person, N- Not attending

Discussion and Comments

Baffinland Project Update

6MTPA Application

- Baffinland has applied to the Nunavut Impact Review Board (NIRB) for an amendment to Project Certificate No. 005 to increase the amount of iron ore that the Company can truck and ship. Also included in the 6 Million Tonnes Per Year (MTPA) application is a proposal to build a 380-person camp and increase fuel storage at Milne Port.
- The application proposes that Baffinland Iron Mines (BIM) will truck 5.5 MTPA and ship 5 MTPA in 2018, and increase this to 6 MTPA for both trucking and shipping in 2019.
- AD: How many additional ships does this mean there will be in 2018?
- MLH: It would result in an increase in 12 ships in 2018.
- AD: So in an 80-day season does that mean 2 transits by Pond Inlet every day?
- MLH: Yes
- EAA: Will this mean that there are multiple ships coming through the corridor at once?
- MLH: Vessels will wait at anchor ports before being called into ship by the Port Captain.
- BP: What types of ships will be used for the 6 MTPA operations?
- MLH: Panamax ships will be used within the current shipping season.

Fuel freight dock

- This is an approved activity under the Early Revenue Phase (ERP) Project Certificate, but this year we are seeking our Fisheries Act Authorization (FAA) to construct the freight dock.

Agenda Overview

- EL: The purpose of discussions today will be to review proposed marine programs for 2018. The objectives of the marine monitoring programs are to measure effects of the Project on the marine environment, confirm monitoring of terms and conditions of the project certificate, assess accuracy of predictions in Final Environmental Impact Statement (FEIS), and determine adaptive mitigation measures.

2018 Tremblay Sound Narwhal Tagging Program

- PA: Participation in the Department of Fisheries and Oceans (DFO) Tremblay Sound Narwhal Tagging Program allows us to retrieve better data related to narwhal acoustic sounds/communications, using Acousonde tags, and behaviour patterns (dive + movement). Satellite location tags will provide horizontal data and Pop-up Archival Transmitting (PAT) tags will collect vertical (dive) data. Data from the tags will be sent to satellites and land-based receiving MOTES for data collection and storage.
- This program will help us understand behavioural changes narwhal may be experiencing as a result of shipping activities based on the direction they head in, how close they go to the ship, their distance from the shore, and their rate of travel.
- AD: Have the results from the 2017 narwhal tagging program been shared with the group yet?
- PA: They have not yet been fully shared with the group, although preliminary results were discussed at the March 2018 MEWG meeting. We are expecting final results in Quarter 3 of 2018.
- AD: Does the DFO intend to complete their own analysis outside of the results that Baffinland produces?
- EL: The current focus on behavioural changes from shipping is not the primary focus of DFO. They have their own research priorities to support stock assessment and fisheries management needs.

- EAA: Who are the partners of the program?
- PA: The University of Windsor, Parks Canada, DFO and Golder are involved. Additional veterinary staff and other groups also participate, including the World Wildlife Fund (WWF).
- AD: Discussing this without having DFO in the room has been an ongoing issue with the MEWG. We did say that we were going to try and encourage participation from a marine mammal expert from DFO, but it seems like there is a huge gap without DFO being here.
- KH: I have encouraged marine mammal experts from DFO to participate in the meetings, but perhaps because Golder is here DFO may already feel the consultants have a thorough understanding of the data and program.
- MLH: Baffinland has also tried to request for marine mammal experts from DFO. It would be beneficial if another organization from the MEWG could volunteer to send a letter to DFO and NIRB requesting participation from one of their members. Golder is here, however, and able to present on the data that is relevant to BIM's monitoring for our own objectives. We also have the right information to present on the data that is relevant to BIM.
- PA: This year we will be getting additional information on fine-scale impacts, for example specific information relative to impacts on narwhal from shipping. Baffinland and DFO will be installing 2 new MOTE stations in 2018, for a total of 4 MOTE stations. These stations provide an opportunity to collect enhanced information on positions and movements of the narwhal. Adding 2 more MOTE stations will also give us the opportunity to collect additional fine-scale information across a broader geographical extent.
- EAA: Has behavioural changes been identified in the data – for example, are narwhals diving to avoid the ships? Is this something that's being looked at?
- PA: This will be included in the results if it is relevant.
- KH: With the shore-based land receivers, could a location be put in that would help the communities to understand the effects of other ship traffic (e.g. cruise ships) that could also be affecting the communities of Pond Inlet – or ship traffic near Pond Inlet?
- PA: We will be discussing locations of the shore-based station with MHTO later in consultation with the communities. We will determine a location that is suitable to them, but also allows for maintenance on the MOTE (as required) and will provide the best data relative to understanding interacting with shipping for the Project.
- AD: It is difficult to comment on this program without all of the results or without understanding how the data is going to be used in conjunction with other monitoring programs.
- EL: This is a DFO program so the program is running regardless. We are contributing to this through our tags and logistic support, and we are looking at studying what's happening in terms of relationship with shipping (Baffinland). The other elements of program are up to DFO.
- KH: Marianne Marcoux at DFO has informed me that we can expect DFO's results over the next couple of years.
- GG: It would be beneficial to the group, and likely to the collaborators, if there was a spreadsheet of all the programs/components and researchers, so that we understand which partners in the collaboration are using which data sets, analyzing it, reporting it, etc. Each group may have a different time frame. It would be helpful to know who controls which.
- MLH: That's an excellent suggestion, and Baffinland can have Golder put that together. That is often what happens with government research, but as a proponent we have a responsibility to turn these results around. Given that this is a much larger program, it would be beneficial to share what the group roles and responsibilities are. We are only able to discuss what information is available for Baffinland objectives, and there is still value in us seeking feedback from the MEWG without the results.

- JH: The issue is that we can't discuss how things should be done in 2018 until we see results from 2017.
- PA: We are still going to use this as an opportunity to share what we learned in 2017 to inform changes to the program in 2018.
- AD: Does Golder believe that the 2017 tagging program met the set goals? Was it successful? Did it allow the determination of shipping impacts on narwhal?
- EL: Yes. The DFO has also agreed that it is one of the most successful programs they have ever run and there was consensus that a second year with a finer scale data will be very valuable. This program will allow us to understand potential impacts at far more detail than programs prior to 2017. We really feel this will give us the information we need to make informed decisions, and to assess how narwhal are responding to vessel traffic to make informed decisions.
- AD: Should the MEWG recommend that there not be an increase in shipping until we have those results? We don't know the effect that is occurring, so maybe we should recommend that the Project footprint be frozen until we know the effects.
- EL: We do have an understanding of how narwhal are responding to shipping, but we do not have final results from this tagging program to present at this meeting.
- AD: We need to see results and discuss adaptive management. We don't do this at the MEWG.
- MLH: Full results from the tagging program are not available, but all other results from every other program are and have been discussed on an annual basis. All other monitoring reports are also available. WWF did not participate in the last MEWG meeting where the 2018 results were the focus of discussion – but these results are available and have been distributed to the MEWG. In this case we do not need the complete data set to help inform this year's program. Further, on of the intention of this group is to provide advice and guidance on the design of programs.
- EP: The study with DFO is very useful because at Bruce Head we observed and counted narwhals and estimated of whale numbers. The time to do this study was a long time ago, before you even thought of shipping your ore by boat. We have seen that narwhal behaviour does change when the ships are in the area. We had some video tapes to look at Greenland sharks and narwhals, and we did an estimate of where the ships would be. Nowadays we have cruise ships and so on; in my community they started shipping and using a sealift. When hunting in the spring and fall, the ship comes through then usually we have a school of narwhals. Now that you have a sealift this year, we didn't see any, so we feel shipping has affected narwhals. The tagging program will be useful to tell us if narwhals are fleeing. Seals are smarter than narwhals and will go a distance to get away from noise. Yes, the study is good – but it's too late.
- PE: Our observations of the movements of narwhals in Pond Inlet are similar to what EP is saying. Yes, because we are affected by the activity in our area, we do not want it do any harm to the wildlife in our area. Do it well and do it right.
- PA: Yes, it would have been helpful to have baseline, but we are still getting good information now that can inform decisions later.
- GG: What they are most interested in is in the next meeting seeing a table of topics with all of the topics and persons responsible etc. This could give us a sense of the number of people responsible for managing the data.
- MLH: Golder to provide this in the next meeting.
- FM: We are very impressed you are still looking to improve the data collection for 2018 – not everything is negative about this program. I think it will be very useful for understanding these key issues.

- We have 5 consecutive years of data from Bruce Head. In 2018, we are integrating an acoustic component and running a pilot program from vessel-based observations, rather than from the cliff face at Bruce Head. We are also going to integrate the use of drone video and still photography, which is one of the recommendations that has been made by the MEWG in the past.
- EP: What I saw at Bruce Head is that the narwhals were fleeing when the boat came. Once the boat was gone they will go back to their areas. When a boat is passing by, as long as they are not loading or offloading, if they are just passing through, it is not as scary to them. The boat that you see went to fjord to load or unload this is what upsets the narwhal because the boat travels faster. I think we need to tell the operators that once they are close to the land they need to tell the operators to slow down so it is not as noisy.
- PE: Hunters hunt and travel that route. We used to have narwhals in our ocean and they move away now. When you're a hunter at the fjord there is already a strong current. Once you increase the ship traffic, the hunters will be affected. If the ships were to go another way – not directly by Bruce Head – there should be another travel route.
- AD: Why is this is not at the same location as last year?
- EM: The Bruce Head platform blew off last fall during a high wind storm after the program was over. Baffinland is doing an internal safety audit and the Bruce Head monitoring area cannot be used until this is completed.

Ship-Based Observer Program

- There is an opportunity in 2018 to reinitiate the Ship-Based Observer (SBO) program with the use of an Ice Management Vessel (IMV) to support shipping season for 2018.
- AD: In 2017, did you hire an IMV but end up not needing it?
- MLH: That is correct – in the end it wasn't needed.
- AD: Will they still be running this program even if the IMV isn't needed?
- MLH: The contract with the IMV includes supporting Marine Mammal Observers (MMOs) surveys.
- LW: Will the IMV stay in the area all season, or would it only be present during the shoulder seasons?
- MLH: The vessel will come in to the area for the start and end of the seasons, but will not be in the areas during the open water shipping season.
- AD: A few years ago, part of the ambition around the observer program was that the observers would also help with navigation and give advice to the captain of the ships about observing whale pods or maneuvering around certain areas. This seems like a good opportunity between the IMV and ore carriers and around some of these issues. I think this year there is going to be improved communications between the captains of ships and the communities. There is a good opportunity with this program to put this into practice.
- MLH: Baffinland will be in Pond Inlet tomorrow to talk about vessel traffic management and opportunities for improved communications.
- JH: We had a call a couple of weeks ago and we discussed this program – and we talked whether the MMOs will implement the Canadian Wildlife Service (CWS) protocol – so if I understand correctly that this has been revised and improved since that last call.
- PA: Yes, we were able to confirm with CWS that the program protocol design was appropriate and aligned with CWS.
- JH: Will the same MMOs participate in both the July and October programs, or will 4 separate MMOs participate?

- PA: We are going to consult on the HTO with this to determine what would be best.
- GG: This is a unique opportunity because CWS does not have the resources to conduct ship-based monitoring at this time. The protocol is accessible, and the data collected can be uploaded into a national database, so the research can be easily integrated with other data sets. There may even be an opportunity for Inuit MMOs to learn the protocol and how to upload into the database.
- GG: What have the narwhals been feeding on?
- EP: We look at stomach contents to see what they eat – trout, cod, lake fish, freshwater fish – also deep-water fish like turbot, certain kinds of crabs, and arctic char. Narwhals eat more deep-water fish than belugas.

Discussion on Ship Traffic Concerns

- EP: The hunters are worried about the narwhals. We wish for the ships not to get too close to that hunting area, so the narwhals don't leave. The area near Milne Inlet – there are cabins. People summer there in their cabins – it's a very good hunting area and we also camp along (BH) area towards Koluktoo – there are other hunter cabins along Milne Inlet where people are – it's too close the route.
- PE: The ships are not staying at the docking station; they are drifting. They are being told to stay at their docking stations, but they are still going there.
- MLH: Thanks for the comments. These are concerns that Baffinland has heard before as well. We will be talking in more detail to these concerns at the meeting in Pond this week – and additional management measures that we will be implementing this year to share with HTO in Pond. Input from community members and from the MEWG has shaped some of our operational procedures to date including:
 - All vessels having to follow the 9 knot limit, not just ore carriers.
 - Ensuring vessels stay near anchorage locations –and holding until vessel one coming north/south has passed a certain point.
 - Not having more than 3 vessels at anchorage locations.
 - Update the Standing Instructions to Master (SITM) to support improved vessel management.
- EP: I believe that vessel traffic should be very tightly controlled while one dock is loading, and that once the other boat has left, a few days later the other one can come. You should not have 2 ships loading or unloading at a time. Hunting provides our subsistence. So what we say to you is that you have to respect our food source and our lives. There was a lot of ships parked at Ragged Island last summer, and many of these ships that are supposed to park at Ragged Island drifted off and ended up getting in the way of harvesters. Drifting vessels sitting at anchorage locations are conflicting with harvesters. HTO is suggesting to minimizing the number of ships that are parked at anchorage locations.
- MLH: Baffinland is committed to working with the community to minimize any potential effects to the communities' traditional lifestyle and subsistence – we need to continue to work with the community – to be respectful because we know how important this is for the community.
- EAA: Nunavut Tunngavik Inc. (NTI) is concerned that hunters are losing control of the water and their ability to harvest. NTI is running a program to make sure that guidelines of where ships can go is being followed.
- EP: We can inform you from HTO how it has affected us and the community and environment. QIA should be helping us, and we can use additional support from QIA and we need to have a coordinated approach with them. However, it is very hard to get across to people who don't value Inuit Quajimajatuqangit (IQ) and experience and it is very frustrating. We have a lot of concerns and need to work together and it is

<p>better to be honest with your partners. We need to coordinate to protect the environment and our own lives.</p>
<p>Grant Gilchrist's Presentation: Inuit Science Training Program</p>
<ul style="list-style-type: none"> • JH: This is a fantastic program. • JT: This would be great if your group can present to high schools to inspire students to join this program and hear about these opportunities and opportunities to work in science and environmental studies • KH: Will the program only focus on teaching protocols that are relevant to your studies, or will there be a broader training program as you upscale? • GG: There will be other scientists who have other backgrounds including contaminants, water, vegetation and how local knowledge is complimenting scientific understanding / research occurring in this area. • The first summer will be with individuals from Coral Harbour. As we move our field stations, we will recruit from different communities that are nearby. The goal with the program is long-term mentorship.
<p>Marine Ecological Effects Monitoring Program (MEEMP)</p>
<ul style="list-style-type: none"> • EL: We have had the opportunity to revise and update the 2018 program. Based on our 2017 field season feedback from the Working Group through discussions and comments on the reports, the 2018 MEEMP program has undergone some changes. It is important to note that to date we have not seen any project related effects in the marine environment, or on water quality. • Benthic infauna was added as a study component in 2018, added this so we can also monitor for potential changes in the local infauna community. This will occur while we are completing our sediment samples at the same transects. • KH: I thought we were doing benthic infauna sampling last year? • EL: It is more than just doing the grab samples. Last year focused more on epifauna and epiflora. Some of the updates that have been made to the benthic epifauna and epiflora were based on comments received from MEWG members. This year we are going to be putting out and monitoring 10 rectangular belts (5 in study area / 5 reference points). • KH: Will having similar types of habitat in the reference areas be attempted? I would recommend you find a reference location with similar habitat types – ideally these should be comparable to the impact areas. • EL: These will be set primarily along in the existing transect areas. Exact locations will be set and that similar reference locations will be a consideration/factor.
<p>Marine Fish</p>
<ul style="list-style-type: none"> • Based on feedback received from Inuit technicians, the Working Group, and regulatory comments we are proposing to increase sampling efforts for fish. Last year we added quite a few additional techniques for fish sampling. The sampling program will occur 2 to 3 times over the 6-week program. Previously we have not sacrificed any fish for taxonomic analysis. Last year there were 2 incidental mortalities. HTO members have asked us to send more arctic char to the lab for body burden analysis – so we are going to increase this to 10 in 2018, with the HTO's approval. The Working Group also requested to see shellfish samples for taxonomic analysis so we will be adding this as well.
<p>Aquatic Invasive Species (EIS)</p>
<ul style="list-style-type: none"> • In 2017 we expanded this program to Ragged Island and increased the number of sampling areas at Milne Port. At previous MEWG meetings we discussed improving taxonomic identification, so for 2018 we are

proposing to send for DNA analysis if we are unable to identify through taxonomy. Last year we contemplated running a dive program. Due to health and safety reasons, we could not do this so we have developed solution (similar to 2017) to monitor hull biofouling via Remotely Operated Vehicle (ROV).

- KH: Was there anything mentioned about settlement plates?
- EL: Last year we collected the settlement baskets, they had little colonization, and we redeployed them and new settlement plates. We will be collecting them for analysis this year. The results of these reports were distributed to the MEWG in February of 2018.
- AD: Are ship emissions being monitored? Are there thoughts of doing that?
- MLH: We do monitor all emissions at the site and at the port site. Currently we don't monitor or report on this for vessel transits.
- FM: It was said that tidal gauges will be reinstalled at the dock. We had a conversation about whether the ballast water discharge could affect tidal gauge readings.
- EL: The location of the tidal gauge may still need to be refined and will have to be considered relative to discharge.
- FM: Most of Parks Canada's comments on the annual reports were responded to and have been incorporated into the report / program design.
- EL: I would like to request feedback on the MEEMP program (specifically around catch / kill for fish for taxonomic analysis).
- EP: We have not gotten information about what happened to the fish that died when you were analyzing them. When it comes to tools from when we were working on the dock, the people that were drilling in the ocean, and explosives that you may have used when you were building the dock may have killed them. Maybe metal is also making them die off. We were informed recently that Greenland fish are now making it into our oceans so we may have invasive species from climate change that could affect our wildlife. The Greenland species eat the smaller fish. They are unsafe to eat because they are new to us and we have been informed that they are unsafe to eat. We know that the body burden analysis you did with the incidental mortalities will help us have a better understanding of any effects that are occurring.
- EL: On incidental mortalities – within the monitoring program, we are setting short-duration gill nets; two of the arctic char in the sampling program were not able to be released alive. Through the capture process they were injured and were euthanized. They were sent to the lab for body burden analysis, with weight, age class of the fish determined. Fish ages were 4 and 7, but need to check ages, and body burden analysis did not result in consumption concerns.
- KH: Do we know if the Greenland species is the same species that Baffinland was observing as well?
- EP: On the two invasive species; we are not used to seeing that fish, it is by Ragged Island, it was a small fish, foreign fish, saltwater fish. The man who caught the fish brought it to HTO to see what kind of species it was. It was sent to a lab and they were informed in Greenland they have that fish. This may have come from the ballast water. Our wildlife species are changing a lot.
- KH: Were there species that may have been new?
- EL: None of the fish species we captured last year were deemed to be aquatic invasive species; however a sand lance, was captured for the first time in the sampling program in 2018.
- EP: Could it be a capelin?
- EL: A capelin isn't considered an invasive species in the Canadian Arctic, they are already occurring. If you are seeing more capelin, it is likely due to increased populations or extension of ranges, but not something that was being introduced by ballast water.
- KH: Have new species that were documented been sent for a second lab analysis? Another level of classification would be useful to confirm.

- EL: This year we will complete DNA analysis if there is any uncertainty in the program. Will look into whether lab samples from last year are still available for a third level classification.
- KH: With our invasive species program – we preserve things in 90% ethanol – because it helps preserve some species. Another option is to do one in ethanol and one in formalin.

WWF Eastern Arctic Mariners Guide - Presentation from AD

- Discussed increase in ship traffic over the past couple of years. 11% of all traffic in the Arctic comes from the Mary River Mine.
- One objective of the mariner guide is to operationalize relevant Nunavut Impact Review Board conditions from Mary River Project and the draft Nunavut Land Use plan.
- Baffinland is reducing all vessels (including ore carriers and other vessel types) ship speeds to 9 knots – which is a really good example of adaptive management. Baffinland is also considering incorporating the WWF Guide into the SITM.
- WWF is looking to have these embedded into Canadian Hydrographic Services Charts.
- BP (seconded by MLH): has the WWF analyzed the percentage of the tonnage? AD had said that 11% of the total traffic in Arctic is from Mary River.
- AD: The 11% is the distance travelled in the Arctic based on km travelled by ships, not just ship traffic or number of vessels. We have all the automatic information system ship data from 2016 for the Arctic – which I can happily share with the group.
- MS: Why was Baffinland’s shipping route highlighted on the Eastern Arctic Mariner’s Guide when no other shipping tracks in the area were?
- AD: Because it is the biggest development this region has seen, so we are using this as an education tool. There are other well developed routes, but Baffinland is the only one that has a defined shipping route through the North Baffin Region Land Use Plan.
- EP: One other concern from the HTO is that there are many ways of doing studies and different methods. We don’t mind the audio equipment, but the elders in our community did not like the tidal monitor because the animals can hear the echo and noise. I believe the tidal wave monitor may drive marine life further away from the community
- PA: For the tidal gauge – we are not emitting any sonar – they are strictly collecting passive data and monitoring the tides. For current monitoring, the Doppler does emit a high pitch sound that is well above the range of narwhal auditory range (it’s high frequency, higher than what narwhal are hearing) so narwhal would have to swim directly above it to be influenced by it, although they still shouldn’t be hearing or noticing them.

Thresholds / Early Indicators for Adaptive Management

- MLH: Several comments were submitted to NIRB on Baffinland’s 2017 Annual Report by reviewers of organizations who participate in the MEWG regarding the status of Baffinland’s development of a framework for early warning indicators and thresholds. The MEWG is the forum through which these types of concerns should be raised and discussed, and as indicated in Project Certificate Conditions 110, 111 and 112 this is to be developed in concert with the MEWG. However, while concerns related to the status of compliance with PC Conditions 110, 111 and 112 were raised in comments to NIRB, we are yet to have these types of discussions at the MEWG. We would like to propose to spend time today discussing these, and hearing the group’s recommendations for the development of thresholds and early-warning indicators.

- EP: There is collective concern about the impacts – from hunters especially – those who are not employed with full time jobs. In 2011 when QIA approved going ahead with Baffinland, when we were working on protecting animals and wildlife in the environment, operating safely, and supporting each other and networking. We don't mind the way it is going ahead but if we had prepared ourselves more in the beginning and QIA was operated and managed by Inuit – then we would partner with Baffinland on an equal basis. I believe we need to focus more on listening to IQ because our Inuit values have informed us and kept us alive for so many years. It is very important that we think critically and work together to keep things safe and healthy.
- PA: It is important to collect IQ knowledge, and this is why it is so important for Baffinland to include Inuit in monitoring programs and consult with them on the project and on the monitoring programs.
- AD: Indicators and thresholds mean something different to other people We could develop a process over the next year where would could debate this and come up with collective thoughts. Also, the seals were not around last fall for the hunt – that is probably an indicator that it can be tied to shipping activity, so that's an example of a potential indicator. Noise thresholds; how much ship noise there can be before it affects the narwhal, also one ship at a time is a threshold. Based on community feedback, what is too much shipping – some of them are social values and some of them are scientific values. We could table this for the next call so that people can research and put some ideas together.
- MLH: The takeaway is that individuals who are interested in this conversation can do some research and come to next discussion with ideas of what they would like to see, and Baffinland can try to formalize this process. We do, however, need a better idea of what you are looking for. So when comments have been submitted about indicators and thresholds – what specifically are you looking to see?
- JH: The comments are based on the terms and conditions from NIRB – and so we need their input on this.
- KH: We can comment on whether or not the approach we've used is going to be able to detect changes – e.g. does your data have enough variation for you to detect a change to the level or granularity that you can detect a change for a set threshold.
- MLH: We don't want to lose sight of the fact that these thresholds have already been developed for the approved project – so maybe the question is where do you put your time and resources for best understanding the objectives.
- JH: At a broad level, coming up with these thresholds is fairly simple; for narwhal you can have both scientific and social thresholds. If we can't actually detect a 10% change, then the threshold is relatively useless so we need to give it more thought. I would suggest we go back to looking at Valued Components (VCs) as a guideline to flesh out everything else from there.
- MLH: There doesn't seem to be as much concern in areas where there are already regulatory guidelines; concerns are more where there are less established guidelines (e.g. fish populations / narwhal populations, etc.).
- MS: There are thresholds on both the marine and terrestrial side. In some cases, we have always predicted that narwhals would respond to ships; we expect that 100% of narwhals would swim away from ships but that doesn't mean we are having an effect. It is a fine line between threshold of response and effect at a population level. On the terrestrial side, with power analysis we have been able to understand our detection levels but this still doesn't mean we have a clearly defined threshold per se or an effect. If EP says there were no seals to hunt last year – well that is a big threshold. We cannot wait for NIRB to come up with thresholds – that is what the NIRB has mandated the Working Groups to do.
- EP: The narwhal might get used to the traffic over the years – but animals do not adapt very quickly. Fish numbers are different every year. We eat seals every day so we don't want to lose that food source at all. When they come back, if they are familiar with ship traffic and noise hopefully they will get used to it and

come back. Caribou are our land animals, they can go a long distance, so we believe if they are affected by the mine they will go away and maybe they will never come back. This is the food source we are talking about – both land and sea. From my understanding the shipping does affect the narwhal.

- MLH: I suggest to look at the Final Environmental Impact Statement (FEIS) – indicators for thresholds – and circulate with the group.
- MS: These are geared towards identifying something that is much earlier than a major significant impact.
- KH: If suggestions are made, are they likely to go anywhere? Because I've made suggestions in the past – but then they are not necessarily incorporated into monitoring programs.
- MLH: Baffinland would have to evaluate what the recommendation was – but we have clearly demonstrated that we have taken recommendations into consideration and operationalized them. My question is we are getting comments requesting for development of early warning indicators – so we are still unsure of whether or not your concern is related to fulfilling the question in the terms and conditions – or whether you have an idea of just trigger points. I think one of the benefits of the MEWG is that it can help inform evolving best practices for Baffinland.
- KH: Are thresholds developed? Will we need to develop adaptive mitigations?
- JH: The caribou decision tree that was developed by Baffinland – impact / action, and suggests looking into developing a similar tool for noise related to narwhal, or maybe a cumulative noise budget so that total noise vs behavioural response is looked at.
- PA: This is an example of what we can consider to determine if it is possible to assess this or measure with enough precision, etc. That way we can take this further as a possible threshold.
- EL: This discussion has been spurred on by comments received from MEWG members – and the directions in Project Condition (PC) 110 and PC 111 which say that it is the responsibility of the MEWG to come up with this, so it is important that each party is making real contributions. At the same time, if we can corroborate this with results from the narwhal tagging program, we can have a much more structured and productive conversation.
- JH: When QIA makes comments that Baffinland is out of compliance with PC 110 and 111 – this is the definition of early warning indicators that are being referred to.
- FM: This is why we need a marine mammal expert from DFO, so at the very least they can provide us with input regarding thresholds, as a starting point.
- EL: We can agree that at the next MEWG meeting, each of the working group members will come prepared to discuss thresholds and early indicators for adaptive management.
- MEWG members agreed to have thresholds and early indicators for adaptive management as an action item for the next in-person meeting.

Timing of Meetings: Suggestions

- The floor was opened to anyone with suggestions / recommendations to alter schedule of meetings.
- BP: It was beneficial for them that the meetings for the annual report review had just occurred because it allowed for really productive conversations. It is really difficult to get technical experts in for spring meetings.
- MLH: We can try and keep this in the end of May for next year, or get technical experts at one of the meetings. Is the group OK with still having an August call and then next face-to-face end of November in Iqaluit? Baffinland feels the 4 meetings per year are productive to ensure ongoing communication and allow for full participation.
- MEWG agreed this was a good next step.

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	Action Item	Action By	Update
1	MLH to look back at FEIS indicators for thresholds and circulate with the group.	Baffinland	These were reviewed and considered in development of EWI framework.
2	Golder to support Baffinland in providing some structure in next meeting relative to PC 110 111 and 112 and get confirmation from group on whether or not this should be scoped just to PC 110, 111 and 112.	Baffinland	EWI framework was based on description of objective as outlined in PC 110, 111 and 112.
3	Provide summary of what we heard in this meeting, share with this group, and assign some 'homework' to be done in advance of next meeting.	Baffinland	Partially-Complete on July 11, 2018. MEWG meeting minutes summarize what was discussed at the meeting. Correspondence sent with draft MEWG meeting minutes requesting MEWG participants to provide thoughts regarding framework for early-warning indicators in advance of next MEWG meeting.
4	On MEEMP: This year we will complete DNA analysis if there is any uncertainty in the program and will look into whether lab samples from last year are still available for a third level classification.	Baffinland	
5	On ballast water: MLH to follow up and share information about specific discharge locations.	Baffinland	If ballast water testing is performed while vessel is at Milne anchorage, then ballast water is discharged at Milne anchorage. If ballast water testing occurs when vessel is alongside Panamax Dock, then ballast is discharged alongside.
6	Consider whether or not Desgagnés MMO program has opportunity for cross-collaboration with our own SBO program.	Baffinland	Baffinland seeking more information from Desgagnés Group on the MMO program.
8	On DFO: Request that someone from the MEWG write a letter to Baffinland / DFO writing a letter to request marine mammal expert participation in the Working Group. Jeff to bring this request back to QIA – to see if they will write a letter requesting DFO participation in the group.	QIA	

9	Prepare a tagging table with all of the topics, persons responsible, which partners in the collaboration for the next meeting.	Golder	Golder will provide an update table for the Tremblay Sound Ecosystem Approach 2018 Program including components and contributors for the 4 th MEWG meeting of 2018.
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Marine Environment Working Group Meeting

Date: September 13, 2018

Location: Teleconference

Time: 10:00 am – 12:00 pm (EST)

Call-In Number: +1-416-607-0170 **Access Code:** 990 832 957 #

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	N	Parks Canada	Francine Mercier (FM)	N
	Joe Tigullaraq (JT)	P	Makivik	Gregor Gilbert (GG)	N
	Emma Malcolm (EM)	P			
Qikiqtani Inuit Association (QIA) and Consultants	Stephen Williamson Bathory (SB)	N	Mittimatalik Hunters and Trappers Organization (MHTO)	Elijah Panipakoocho (EP)	P
	Sean Joseph (SJ)	N		Joshua Arreak (JA)	P
	Fai Ndofor (FN)	N		Billy Merkosak (BM)	P
	David Qamaniq (DQ)	P			
	Jeff Higdon (JH)	P	Observer Organization	Participants	
Fisheries and Oceans Canada (DFO)	Kim Howland (KH)	N	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD)	N
	Laura Watkinson (LW)	N		Amanda Main Hanson	P
				Brandon Laforest	P
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG)	N	Oceans North Canada	Kristen Westdal	P
	Anne Wilson (AW)	N		Chris Debicki	N
Government of Nunavut	Brad Pirie (BP)	P	Baffinland Consultants	Participants	
	Lauren Perrin (LP)	N	Golder	Patrick Abgrall (PA)	P
			Golder	Erin Linn (EL)	P
		Golder	Phil Rouget (PR)	N	

P-phone in participation, I – In person, N- Not attending

Discussion and Comments**Baffinland Project Update****Overview of Shipping Season (EM)**

Baffinland's shipping season started on 20 July, with the first ore carrier being loaded on 24 July. The ice management vessel, (Botnica) was active until 10 August. We are expecting the Botnica to return 28 September until approximately 20 October. To date, we have had 41 ore carriers, 3 fuel tankers, 3 resupply vessels called to Port.

AHM: Was the IMV used for wildlife observers as planned?

EM: Yes, there will be a slide later speaking to the SBO program.

Vessel Traffic Management (EM)

Throughout the 2018 season, Baffinland has made an effort to continue to improve shipping practices. To kick-off the season, we held a meeting with the Pond Inlet HTO in July before the start of the shipping season. Both the HTO and Hamlet were notified on July 20 when the Botnica first entered the Inlet. Key mitigations for the 2018 season include:

- Ensure compliance with speed limit (9 knots).
- Ensure vessels follow nominal shipping route.
- Ensure usage of anchorage locations and restriction of drifting is understood.

We also held a site meeting with MHTO members on 30-31 August to discuss their perspectives on efficacy of 2018 vessel traffic management measures to seek feedback on recommendations for further mitigations that could be applied during the latter end of the season and into 2019.

Two avenues were established for tracking and reporting on adherence to the Standing Instructions to Masters, which included development of a community shipping complaint and response mechanism, as well as setting up an AIS monitoring station at Pond Inlet HTO office. Baffinland also used AIS data for compliance monitoring to actively respond to alerts when vessels were not adhering to speed restrictions.

Fuel Spill (EM)

At the beginning of the season, we had a minor fuel spill as a result of one of the tug boats suffering a gearbox failure. Baffinland responded quickly by deploying oil containment booms and sorbents to contain the release. Investigation indicated that approx. 30 L of gear oil had been released, and that is dissipated quickly.

Baffinland confirmed with Canadian Coast Guard (CCG) that additional measures for spill clean-up were not recommended and the tug was cleared by the CCG for operations.

MHTO: Are all the tugs and ore carriers inspected by Transport Canada?

EL: Transport Canada is regularly at site. Our small zodiac MEEMP boat is even reviewed to ensure it meets standards.

MHTO: What spill equipment do the tug boats have on board?

EM: I will reach out to the operators to provide a response.

MHTO: We don't think the fuel spill has been cleaned up yet?

EM: We completed reconnaissance surveys that show the spill has dissipated. There is no visible sheen left, and the CCG recommended that no additional clean-up measures were required. The follow up report has been shared with MHTO, which details information related to this incident.

6MTPA Application (EM)

NIRB recommendation was that Baffinland should not be approved to proceed with proposed activities of increasing hauling and shipping to 6MTPA. Baffinland will be issuing a public response in the coming weeks on how we plan to follow up on this recommendation.

DQ: When does Baffinland expect to hear back from the Minister on a decision?

EM: At this point, we are not sure. Baffinland is planning to issue a response respond in the next 2 weeks or so.

JT: As a clarification, the Minister has 90 days to issue a decision, but we are not sure when a decision will come within this timeframe.

Phase 2 EIS (EM)

Baffinland submitted our Phase 2 EIS on 15 August to NIRB. We are expecting to hear a response from NIRB on conformity with the EIS Guidelines by 14 September.

2018 Marine Monitoring Program Overview

Narwhal Tagging Program

Golder presented an overview of the marine monitoring programs and preliminary results to date

JH: What were the age and sex of the narwhal tagged with the MiniPat tags?

PA: They were females. Both the Acousonde and MiniPat tags that were deployed were recovered. We are expecting some interesting data as the two tagged narwhals appeared to have stayed in the Project area.

Post-Meeting Note: At the time of the call, Golder was unable to recall the sex of the whales that were tagged. The meeting minutes have been updated to reflect the confirmed sex of narwhals tagged with MiniPat tags.

DQ: Were you able to recover all of the tags?

PA: Yes, at one point we thought we may lose one of the tags when the narwhal entered Lancaster Sound, but we were able to retrieve.

DQ: I heard at the co-op that we could earn \$200 if we recovered the tags.

EM: Baffinland was not part of this program, although DFO could have led that initiative. However, we do hire local boat operators to help retrieve the tags.

PA: There were 4 whales tagged in total during 2018: 2 with GPS tags positioning and 2 with Acousondes only.

MHTO: Where were the acoustic recorders deployed?

PA: We will present a map at the next MEWG meeting illustrating where the recorders were deployed.

Bruce Head Vessel-Based Program

DQ: Is Baffinland going to run the vessel-based program again next year, or will you reinstate the shore-based program from Bruce Head?

MHTO: The observation station at Bruce Head is much better than the vessel-based program, because there is no additional noise created by the vessel when conducting shore-based monitoring.

PA: We are exploring options for the program next year. We should note however, that the vessel used for the Bruce Head program was anchored, and therefore was not producing noise during the observation period.

JH: Were drones used as part of this program?

PA: Yes, but as there was no narwhal spotted during this time, we were not able to complete counts as part of this program in the same way we have done in the past.

EM: Baffinland acknowledges that the Bruce Head shore-based observation program is important to the community of Pond Inlet. We will continue to investigate ways to revitalize the program in future years, depending on the enhancement of safety features for the program.

Marine Environmental Effects Monitoring and Aquatic Invasive Species Program

MHTO: We have seen some new species of fish in the area this year. We are not sure what they are called, but we are looking to see what the results of the program will be.

PA: Once we have results we can discuss at upcoming MEWG meetings.

DQ: Did you fish in any of the areas where we wanted to see if fish were being contaminated?

EL: yes, we fished in the DFO permitted areas around Milne Port and Inlet as permitted and planned for 2018.

Mortalities from those efforts are being analyzed for body burden analysis. We were not able to add extra areas in the field as we didn't have the permits needed to sample fish in other locations. We can discuss expanding the Arctic Char monitoring program or areas at upcoming MEWG meetings.

Early Warning Indicators

In advance of the meeting, Baffinland provided MEWG participants with an Early Warning Indicator (EWI) submission form template in both English and Inuktitut.

Golder presented on the proposed timelines for developing EWIs to meet Project Certificate Conditions No. 110-112, and provided guidance on the development of indicators to be proposed by MEWG participants.

	Action Item	Action By	Update
1	EM to retrieve list of spill response equipment on tug boats.	Baffinland	
2	Golder to include map identifying where acoustic recorders were deployed at the December MEWG meeting	Golder	
3	MEWG participants to submit EWI comment forms to Baffinland by	MEWG Members / Baffinland	Baffinland received comments from Parks Canada and DFO. Oceans North indicated that they were not able to provide comments without first hearing input from QIA and MHTO. No other comments from MEWG members were received. Separate consultation with MHTO members on the EWIs is scheduled for November 28, 2018.

Marine Environment Working Group Meeting

Date: December 10, 2018

9:00 am – 5:00 pm (EST)

Location: Delta Hotel Ottawa, 101 Lyon St. N, Ottawa ON

Call in #: +1-416-607-0170 **Access Code:** 993 649 525

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	I	Parks Canada	Francine Mercier (FM)	I
				Chantal Vis (CV)	
	Joe Tigullaraq (JT)	N	Makivik	Gregor Gilbert (GG)	N
	Emma Malcolm (EM)	I			
Qikiqtani Inuit Association (QIA) and Consultants	Stephen Williamson Bathory (SB)	N	Mittimatalik Hunters and Trappers Organization (MHTO)	Enookie Inuarak (EI)	I
	Sean Joseph (SJ)	I		Phaniel Enoogak (PE)	I
	Fai Ndofofor (FN)	I			
	David Qamaniq (DQ)	I			
	Jeff Higdon (JH)	I	Observer Organization	Participants	
Fisheries and Oceans Canada (DFO)	Kim Howland (KH)	I	World Wildlife Fund – Canada (WWF)	Andrew Dumbrille (AD)	I
	Laura Watkinson (LW)	I		Amanda Main Hanson (AMH)	N
	Steve Ferguson	I			
Environment and Climate Change Canada (ECCC)	Grant Gilchrist (GG)	I	Oceans North Canada	Kristen Westdal (KW)	I
	Anne Wilson (AW)	I			
	Loretta Ransom (LR)	N		Chris Debicki (CD)	N
Government of Nunavut	Brad Pirie (BP)	I	Baffinland Consultants	Participants	
	Alexander Kelly (AK)	I	Golder	Patrick Abgrall (PA)	I
	John Ringrose (JR)	I		Phil Rouget (PR)	I
			EDI	Mike Settingington (MS)	I
				Allison Patterson (AP)	

P-phone in participation, I – In person, N- Not attending

Discussion and Comments

Baffinland Project Update

6 Million Tonnes Per Annum (mtpa) Application:

MLH: Baffinland submitted an application to NIRB in April and it was approved by the Minister in October. Application proposed increasing hauling and shipping from 4.2mtpa to 6mtpa, the addition of a 15ML fuel tank and a new 380-person camp at Milne Port. Amendment to increase hauling and shipping rate is conditional until December 31, 2019, which corresponds with our anticipated timeline for approvals on our Phase 2 Project. There was a public meeting held in Pond Inlet to discuss this proposal, in addition to several meetings with regulators. Several commitments for vessel traffic management came out of these meetings and we will review these today.

Phase 2:

MLH: BIM received concordance from NIRB on the Final Environmental Impact Statement (FEIS) addendum in October. Information Requests (IRs) were submitted by reviewers, and Baffinland will be providing responses to those IRs in the coming weeks. This submission is being done as a coordinated process for a Water License Amendment with the NWB.

As the purpose of these Working Groups is to focus on environmental monitoring for our currently approved Project, I am suggesting we hold two MEWG meetings throughout the Phase 2 regulatory review process; one the first week of February and one the second week of April [*Post-meeting note – the second meeting date will be revised as a result of the NIRB process released in January 2019*]. The intent would be to include both regularly attending members of the Working Groups, as well as Phase 2 focused representatives from regulatory agencies who have a jurisdictional interest in the Project. I am asking that you coordinate internally to identify the appropriate representatives.

2018 Shipping Season Overview

Shipping season began on July 24 through to October 18, and we shipped a total of 5.1mtpa

AD: Why did you stop shipping on October 18? As opposed to continuing to ship until 6mtpa?

MLH: Our plan was to ship 5mtpa, so we actually exceeded our goals.

KH: What will need to change in your operations to increase shipping to 6mtpa?

MLH: Nothing will change in terms of operations. In 2019, we will procure in advance of the season enough vessels to ship 6mtpa, and we will be targeting to haul and stockpile ore to allow us to ship 6mtpa.

SF: Did you encounter heavy ice conditions in the shoulder seasons? Was there an ice breaker, and were there ice breaking activities?

MLH: Yes, we procured the Botnica, which is an Ice Management Vessel to escort ore carriers to navigate floe ice. This also provided us an opportunity to run our Ship-Board Observer program.

DQ: It says you delivered 70,000 ML of fuel in 2018. Does this include gas, diesel, Jet A Fuel?

MLH: Yes, that represents a complete inventory of our fuel resupply for the year.

DQ: Where did the ship-to-ship (STS) fuel transfers occur?

MLH: At Milne Port.

PE: There was a fuel transfer that created a spill – can you explain that?

MLH: The spill that occurred was not a result of STS operations. This occurred at the start of the season when one of the tugs had a gearbox failure. Approximately 30L of gear oil had spilled. Emergency response and spill clean-up methods were deployed immediately. Transport Canada indicated following deployment of mitigation methods that Baffinland had completed all recommended steps. MHTO and other agencies were notified of event and clean-up efforts.

EI: Regarding the oil spill, I know that it was a small tug? But was it because of ice conditions that we had a gearbox failure? There was a lot of ice during that time.

MLH: Yes, there was a lot of ice at that time. We suspected that it was a result of ice coming into contact with the gear box.

2018 Shipping Season Conditions:

MLH: At the beginning of season, convoy operations were required because of heavy ice conditions. In 2018, we committed to further reducing speeds of Project-related vessels in the corridor. We saw improvements, however in some cases, we still had events where Project vessels did not adhere to the speed restrictions through the Inlet.

JH: Can you elaborate on why ship speeds are not always followed? Do the operators just not want to follow the speed limits? Or are there operational reasons why this is occurring?

MLH: A bit of both, in some cases there was an operational reason (e.g. ice conditions, escort for the Botnica, etc). However, in some cases we also think that owners did not adequately share the Standing Instructions to Masters (SITM) with vessel operators, which also created challenges. This will be further reiterated in 2019.

Ice Management Vessel (IMV) Operations:

MLH: IMVs are used when ore carriers or other vessels would not be able to travel through the Inlet without an escort. It is noted that while we use the IMV during shoulder seasons, the IMV does not engage landfast ice. We also used the IMV to run an SBO program. We are intending to continue implementing this in 2019.

Vessel Traffic Management:

MLH: Several new vessel traffic management measures were implemented for 2018. In some cases, however, not all vessel management practices can be followed without exception. Changing weather conditions for example do require that we have an established, safe refuge area for drifting areas. We will continue to work with MHTO as necessary to establish a place that minimizes disturbance to local land users.

SF: The Canadian Coast Guard (CCG) ice conditions report for July 18 indicates that there was still landfast ice present in the area at the start of the shipping season? What analysis do you use to ensure there is no landfast ice being engaged?

MLH: We use mostly satellite imagery, although we will conduct a helicopter reconnaissance if weather conditions allow. We also maintain frequent communications with Transport Canada and CCG before vessel operators are informed they can enter the Inlet. We also participate in the regional ice conditions call run by the Canadian Coast Guard where updated ice conditions for the full Northern Route and other waterways are reported.

KH: How long are vessels drifting at Ragged?

MLH: Could be up to one day. Depends on rate at which ships at Port are being loaded.

AD: Where is ballast water discharge occurring?

MLH: It is occurring at Port. Prior to discharge, we conduct salinity testing, as previously discussed with the MEWG.

AD: At one point we discussed limiting one vessel to transiting through Milne Inlet from Ragged Island to Port.

MLH: We realized this was not practical, and in some cases it was not the safest option for operating in different conditions, which is why we deployed convoy operations as needed.

KW: Will there be a limit set on the number of vessels that are allowed to transit through the Inlet at one time?

MLH: These decisions will inevitably be made based on what is practical and safest for the operations. We do not have a set limit at this time.

EI: This year and in 2017, I have seen ships going into the harbor. Why do they get so close to Pond Inlet and then turn around and head to the fjord? Why do they take a detour towards Pond Inlet?

MLH: If this occurred it is likely a result of weather conditions. However, by more actively monitoring this through AIS this year, we are able to better understand when the deviations occur, and why.

DQ: Will you make the AIS monitoring available in Inuktitut?

MLH: The software is not available in Inuktitut, but we can investigate alternatives for translating a guide to help individuals better understand how to use the software and how to read the information that is being presented.

JH: Does the term 'Project-related vessels' include all resupply vessels, fuel tankers, and ore carriers?

MLH: Yes.

CV: Can you confirm that in 2018 a commitment was made to have no more than three Project-vessels drifting or anchored at Ragged Island at one time?

MLH: Yes. This commitment was made directly with the MHTO. These commitments may be re-visited and revised if and as needed in our consultation with the community.

KH: Can you show us where the actual anchorages at Ragged Island are.

PR: {identified these locations on a map from PowerPoint slides.}

EI: Is there a plan to mitigate additional gear spills in the future?

MLH: The benefit of using an ice escort is to support vessels through heavier ice conditions, which inevitably avoids interactions that could cause these encounters. We also conduct annual spill response training to ensure we are fully prepared to respond should an incident occur.

DQ: Will additional measures be made for the tugs to follow the IMV next year to prevent spills.

MLH: This is an on-going discussion between our head of shipping and the vessel operators. At this time, I am not sure what or if any additional measures will be used other than continued use of the IMV.

AD: Process question related to NIRB's participation in the working group. Does everything stay the same?

MLH: As part of our positive decision on the 6mtpa application, the Minister asked NIRB to participate in the MEWG as an observer. Everything we discuss here becomes part of the public record through the Annual Report. Draft reports or some presentations are asked to be confidential while we finalize them. This also presents a good opportunity to further discuss how this group is functioning, as some Working Group parties have previously submitted comments to the NIRB that this group does not function effectively.

BP: Will NIRB be attending TEWG meetings as well, or just MEWG?

MLH: Minister direction is only for participation in the MEWG, but I believe NIRB will try and attend both meetings, as possible.

2017 and 2018 Tremblay Sound Narwhal Tagging Program

2018 Tremblay Program:

- Improved satellite coverage in 2018
- Heavy ice on shoreline delayed net deployment
- First narwhals tagged mid-August, about a month into the tagging program

2017 Tremblay Program:

- Multi-partner collaborative program with DFO and others
- Live capture tagging program
- Tags can record satellite location, dive behaviour (depth, temperature, pitch, roll, orientation), vocal behaviour, ambient noise
- We tracked position of animals both vertically and horizontally as they traveled through Milne Inlet and Eclipse Sound, and compared this in relation to ship movements available through satellite and shore-based AIS data.

DQ: Is the tag placed permanently on the narwhal?

PR: The Acousonde tags are attached via suction cup – so they don't last long, up to about 2 days. In one case it stayed on for up to 4 days. The satellite backpack tag is installed to the animal using three subdermal nylon pins (intended for long-term deployment). Tags typically stayed on the animals for 3 to 4 months. An additional high-resolution dive tag was clipped into the backpack tag and towed behind the animal for a set period (it has an automatic release – pre-programmed for Sept 09 – at which point it released off the animal and was recovered by a boat-based team).

PR: In 2017, 8 of the 12 narwhal were captured in the first 2 weeks of August. The narwhal typically only spent a bit of time in Tremblay before heading into Milne Inlet and Eclipse. Several of the tagged whales transited up Navy Board Inlet and around to Arctic Bay, where they stayed in Admiralty Inlet for the rest of the open-water season. A total of 18 narwhal were captured and tagged in 2017. This year (2018), only 4 whales were captured and tags were only deployed on 2 animals (others were too small to tag).

Analysis of 2017 tag data in progress (presented slides showing some of the preliminary data). Looked at changes in narwhal behaviour between 'vessel exposure' and 'non vessel exposure' periods. Needed to select a threshold for non-vessel exposure – this was set as 10km for large vessels (those with AIS data). This was considered a reasonable distance to capture the extent of ship noise. A large proportion of the available data fell within the 'non-exposure' period. Most narwhal-ship interactions occurred near Bruce Head, Koluktoo Bay and in south Milne Inlet – this is also influenced by the fact that animals have high use of this area and the shipping corridor is less than 10km wide, so interactions are inevitably more likely to occur. Initial data from analysis of narwhal turning angle indicates that narwhal are more likely to change direction in the presence of vessels (response typically observed within several km of the ship).

SF: Did any of the tagged narwhal go within 300m of the vessels.

PR: Yes – you will see in a later slide that there are some displacement effects immediately around the vessel during an approach. The displacement is expressed as an apparent gap without narwhal GPS locations around the immediate vicinity of the vessel. Further analysis is still required to understand this response and evaluate time elapsed until narwhal return to immediate shipping lane area (on the order of several minutes).

KW: When we're talking about disturbance from the vessels, are we only taking about the percent of animals that were in the shipping area?

PR: Yes – still looking at the 10km area. The takeaway from analysis is that narwhal do experience displacement near vessels, current tagging data suggests the effect is temporary and localized.

AP: Based on the 3% within a 10km scale – and you're seeing this at this scale, couldn't this indicate that this is actually happening at much larger scale and in a much bigger way?

PR: Yes – it could – but if you increase the scale too much, you can also wash out patterns in the data (loss of resolution) – so we are playing with different inputs in the model and ways of looking at the data (across several different spatial scales) so that we do not overlook any near-field or far-field effects.

SJ: Was there an average vessel speed that was looked at? Did you study how different speeds affect the narwhal?

PR: Most of the exposure events occurred with ore carriers. The ore carriers are generally following the 9 knot speed limit, so this is what we used as a variable in the model – but you're right that this could change depending on different ship speeds (which would have different acoustic signatures). There was only a limited number of 'fast vessel' occurrences when narwhal were near the shipping route - so this has implications on sample size.

CV: Is there nothing in the literature that would be helpful to better understand response and set the scale for the model.

PR: There is conflicting information in the literature. In some cases, it is suggested that narwhal exhibit a freeze response during close ship approaches. In other cases, narwhal are reported to swim away from close ship approaches. IQ information suggests that the degree of narwhal response has changed significantly in recent years compared to how narwhal initially reacted to ships. Beluga are often used as a proxy for narwhal given the paucity of narwhal-specific behavioural studies available. For instance, researchers often defer to literature on

how beluga response to vessel noise, seismic surveys, ice breaking to inform study design. This is part of the reason why we are running the Tremblay Program – to fill this information gap for narwhal.

PR: Over the course of the season we saw that the mean distance of how far the narwhals were away from the vessels decreased.

JH: Did you correlate the data with the number of vessels in the region. In other words, the distance between narwhal and vessels would decrease if the number of vessels in the region is also higher.

PR: Yes, that is being considered in our analyses.

JR: What is the likelihood that there are more vessels in the area in the timeframe that you are presenting data for.

PR: Yes – it’s a good point. There is really no way for us to account for small boats, like hunting boats.

SF: You may not see the same pattern suggesting habituation when you look at the closer distance.

PR: That’s a good point, and this will be looked at - this is a pattern that the model pulled out at the 10 km exposure zone scale – which was chosen in consideration of several different variables.

PR: We did see that there was a significant decrease in narwhal travelling speed during ship exposure, however the overall effect was marginal and the effect of the distance from the vessel was not significant.

PR: We wanted to study if and to what extent narwhal are changing their dive patterns in the presence of ships.

JH: Do you know what the age and sex was for narwhal in the presentations of the dive data?

PR: What we are seeing is that between narwhal individuals, each of the narwhal responds and behaves differently, both in exposure and non-exposure periods. Generally, what we can extrapolate is they all respond to some degree to the presence of vessels and that the response is temporary. Dive data is showing preliminary results that narwhal have a lower probability of conducting deep dives during ship exposure. Similarly, narwhal was shown to spend less time at the surface during ship exposure in shallow water, but more time at the surface during ship exposure in deep water. When narwhal were staying close to the surface, we don’t know yet if this is indicative of a recovery mechanism, or if it is a sign of vigilance.

JH: For narwhal 1, 2 and 4 – it appears that there is significant “Mobile” pattern. Do you know what occurred (what other factors were occurring) during that time (e.g. mid to end of October)? Would be good to know what the other contributing factors at play were.

PR: Yes – that’s a good point. Although our AIS data has improved, we do not have details about all the other contributing factors that could be at play (e.g. increased hunting, killer whales). We discussed this, but we could take additional feedback on this analysis on the report.

SF: We have found that narwhal exhibit several different responses to the presence of killer whales. One thing we looked at is the behavioural state (resident mode or transit mode). You could also consider looking at the distance to shoreline.

PR: Good idea – we can discuss further offline.

DQ: Maybe you can better integrate IQ into the monitoring programs and that is where you can start getting some answers on the data.

PR: Yes – we agree. It would have been good if we could have started gathering this data during the first year of the program. We have already heard from Pond Inlet residents that they believe that narwhal behaviour has already changed as they have gotten more and more used to the presence of ships in the region.

PR: Results so far indicate that there is evidence of temporary displacement from the vessel track; evidence for temporary changes in dive behaviour; and potential evidence of narwhal habituation to vessel presence. Additional analyses will attempt to determine an estimated distance and time at which narwhal alter their behaviour in relation to vessels.

AD: We were discussing at last meeting the timing and why it took so long for us to get these results. Is this timeframe that we can expect to see the 2018 tagging program in?

PR: There is a significant amount of efforts that goes into this data, this is also a significant amount of data to go through. We also have a number of partners – so there is that to work through as well.

AD: In terms of establishing management measures that could come out of this data, should we not expect to see this for years.

PR: I guess it depends on what patterns we are seeing in the data. We have monitoring programs with the intent of confirming or verifying the predictions that were in the impact predictions of the environmental assessment. Based on what we have seen right now – there is no need to include additional management measures.

MLH: Given the amount of data here, we actually think that the timelines here are quite adequate. It is also important to note that based on our monitoring data – marine mammals are responding as predicted in the environmental assessment. Although our monitoring data has indicated that we don't need them, we still have put in management measures to respond to other factors (such as community preferences).

AD: As you know, based on timelines for monitoring results, and the current programs that we have in place – that we don't feel the programs are comprehensive enough to really have any information to make conclusions. Our position will be that until we see more valuable data that we can actually base decisions on, we shouldn't increase shipping.

MLH: We can discuss this further – but respectfully we disagree.

PR: Do you have suggestions on how we can make our programs more comprehensive.

AD: Yes, we need more data integration. This could be achieved by conducting more aerial survey programs again this year.

PR: We are considering an aerial program for 2019. It is not that we have a preference for tagging programs. We are using a range of monitoring programs in order to determine how vessels could affect narwhal.

Bruce Head Program

DQ: Were acoustic recorders removed when the season was over?

PA: Yes – they were deployed on August 4, and removed in September.

JH: Are the AIS tracks only showing Project vessels – or is this all vessels in the area?

PA: Yes – this shows all vessels in the area.

CV: Can you describe the acoustic recorders? Are they moorings?

PA: Yes – they are anchored to the ocean floor and tethered so they can be retrieved at the end of the season.

2014 to 2017 Bruce Head Integration Report:

PR: One of the challenges with this data set is that there are so many variables and factors at play, and there are limited opportunities to repeat scenarios or verify the data but looking at it in a duplicated way. We crossed the Bruce Head data and the Tremblay Sound tagging data to see what part of the substrata the narwhals tended to have a preference to stay within. The tagging data seems to mirror what we are seeing in our counts during the Bruce Head program.

SF: A recommendation would be to have two independent observers to try and better assess your correction factor.

PA: That is a good idea, but we are also still trying to improve the detectability. The distance is always going to be an issue in terms of detectability.

KW: This would be very interesting to see the acoustic data integrated into this report. Maybe the sound signature of the vessels when they're moving in different directions – this could be influential. It will be interesting to see all the data together.

PA: Yes – agreed. Our plan is to integrate the acoustic data and tagging data in with the BH data to start trying to better understand how other variables factor in and influence narwhal behaviour. Overall what we're seeing is a temporary displacement of narwhals – but that they do recover.

KW: One thing that keeps getting missed – with short term disturbance – we need to look at what are the long term disturbances of continued short-term displacement.

PA: Overall the data integration had the following conclusions related to how narwhal behave in relation to large vessels:

Statistically significant distance on:

- Group spread

- Group direction
- Travel speed
- Distance from shore

CV: Do we know why specifically the narwhal use Milne Inlet.

PA: The area is known to be used for activities such as calving and mating. Our members from the HTO may want to provide some more insight into this.

PE: It is both a birthing place and a feeding place at least before development came along, because there is plenty of cod along the shore where they feed. If they run into danger they'll go further towards shore or off shore where it's safe. For the past 2 years though, we have had much less narwhal in that area. Before that it was an important area for narwhal – but now it seems to be changing with a decrease of narwhals in the area since development.

Ship-Based Observer Program

PA: A total of 2,767 marine mammals were observed during the SBO program. Ringed seals were the most frequently spotted animal in the Project area from the Botnica.

13 different seabird species were spotted, with the Northern fulmar most commonly spotted. During the second leg of the program, the most common was the glaucous gull – with 10 different species being spotted. All the seabird survey data will be shared with CWS to be included in their database.

JH: When will a draft report be available?

PA: We are aiming to have this out to the MEWG in approximately mid-February.

MS: Why were no murrelets spotted?

GG: They were most likely picked up, as they are seen in that Project area – we will probably see that in the final report – but they were just not one of the most common so they weren't presented in three most recorded species listed here.

Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species (AIS)

PR: The MEEMP commenced in early July. Comments from discussions with the MEWG and those received on the Annual Report last year suggested that the program should begin in concert with the start of the shipping season, so we initiated the program earlier this year to respond to this.

Another change in the program this year, was replacing video survey transects with the belt transect approach and using the Remote Operated Vehicle (ROV).

The Draft MEEMP report will be shared with MEWG around mid-February.

We also added in new transects to accommodate for the new proposed Phase 2 Ore Dock.

As part of the AIS program, we introduced the ROV for biofoul hull monitoring. We used the ROV for almost all sampling this year. This allows us at the post-processing stage to actually get much better species identification.

AW: How did the plastic lids in settlement baskets work out?

PR: Encrusting epifauna samples from settlement baskets were collected for the first time in 2018, since their installment in 2018. No non-native taxa were detected in encrusting epifauna samples.

PR: We completed hull biofouling using the ROV. No epifaunal growth was found for sample collection. We completed vertical scans and checked areas where we expected to see growth. For the most part they were fairly clean, although a small amount of potential biofouling at the stern of the ship near the propeller was seen on two of the ore carriers. We couldn't access this however, as the biofouling was observed at a level that was too deep to use the planned hull scraping methods. We did talk about doing dive investigation at one point, but this remains inaccessible from a safety standpoint.

KH: How good is the taxonomic resolution with the ROV? What level of taxa are you able to get down to with the ROV?

PR: We are not sure at this point, but that information will be noted in the draft and final reports.

KH: Are sampling locations the same for AIS as it is for the MEEMP?

PR: No, but if we do see anything AIS related in the MEEMP program, it will be noted and investigated.

PR: I should also note that we did not have as much success with the Ragged Island program this year because of weather conditions. We also couldn't do any ROV monitoring at Ragged, because there were none there anchored at the time, however we still did conduct our sampling program there.

KH: Can we get a list of the specific areas you sampled, including sea chests?

PR: A list will be provided in the 2018 MEEMP/AIS Report.

JR: If you are moving anchorage locations at Ragged Island, will you change the program to reflect that?

MLH: For clarity, we are not moving the anchorage locations. The Ragged Island program was added to respond to community concerns.

CV: Do you have any reference sampling areas for the AIS?

PR: No, we only have a reference location for the belt transects, following guidance from our 2014 radial plan.

PR: Fishing efforts were also increased in 2018 to a weekly effort based on recommendations from MEWG. We caught a lot more fish this year and sent more samples than previous years to the lab for body burden analysis. The analysis is still ongoing and results will be provided in the draft report. We also note that to date we have not seen any AIS.

KH: I thought previous years of sampling identified one AIS that is associated with ship movement?

PR: Is there additional information on this species that has become available in the last year?

KH: We can conduct this sampling at our lab. Just need to coordinate.

PR: Ore dock offset monitoring continued in 2018. Based on preliminary findings, the offset habitat is successfully functioning as designed. Report will be submitted to DFO by December 31, 2018, as per regulatory requirements.

PR: We also continued with the physical oceanography program this summer. There were three moorings deployed, one at Bruce Head and two at Milne Port. The moorings monitor speeds of currents throughout the water column, and through the tide gauge we can also measure salinity and temperature. The physical oceanography data will be integrated into the MEEMP and AIS report, and will also be used to ground truth the ballast water modelling predictions.

DQ: You mentioned you were checking the temperature in the ocean with the tidal gauge? Have you done that in the previous years?

PR: Yes, it measures temperature and salinity. In the past we have done some vertical sampling throughout Milne Port. The program this year is improved because it will provide a continuous data set over several months (essentially the whole shipping season).

DQ: In the future we will be interested to see if over time the temperature is increasing in the water.

CV: Have you thought about deploying acoustic moorings alongside the tidal gauge?

PR: Where we put our acoustic moorings did not match with where we put our physical oceanography moorings as they have different objectives. We also have to consider where we can deploy the oceanography moorings to minimize potential interactions with ships. We did indeed deploy 5 acoustic moorings this summer, but these were closer to the shipping lane, and mirrored the data set that was collected in 2014 and 2015, and to see where and when received levels would be picked up and at what amplitude.

MS: The drive for the physical oceanography program back in the original hearings was to support datasets for the ballast water program.

PR: This is our first year collecting this data. We did have a salinity probe on a mooring in previous years, and we have seen some spikes in salinity freshwater, but we will need longer term datasets to understand if this is occurring as a result of freshet and land-based water influences or ballast release. We don't know when all the ships release ballast and there are two locations in Port for release.

KH: It could also be a result of tidal change and wind shoring. DFO has seen this cause freshwater spikes in other regions as well.

Early Warning Indicators (EWI)

PA: {provided a refresher on what was sent out to the MEWG in September on the guidance template for the EWI framework.}

PA: We appreciate the information that was provided by DFO, Parks Canada and the MHTO on the EWI framework development.

Through EWI submissions, the MEWG proposed the following indicators:

- Decrease in regional abundance
- Change in calving rate
- Ship avoidance behavior
- Change in diving and surface behavior
- Change in vocalization characteristics
- Increase in stress hormones
- Change in body condition
- Change in harvest data (age and sex)
- Injury / mortality occurrence

PA: The MEWG indicated that we looked at this for all marine mammal species, while the FEIS highlighted certain species only.

DQ: Will you be incorporating IQ into the EWI?

MLH: We held a specific workshop with the MHTO on EWI to get their feedback on the development of indicators. It was agreed at that meeting that this would also be further discussed with MHTO representatives during the MEWG meetings.

PA: We also considered various frameworks for establishing quantitative thresholds – reviewing what was put forth in the FEIS 2012 Evaluation Criteria, while DFO had suggested statistical significance may be an appropriate level to consider for the EWI threshold.

PE: Narwhal and seals are the most important species to study. Beluga whales don't come into that area. We don't really ever see them – you do not need to study this – but narwhal and ringed seals we need to study.

PA: Do we have agreement that these should be the two primary indicator species?

JH: I agree that narwhal and ringed seals should be included, but I would also include bowhead – because then we have the all three auditory groups included. Are we looking at this specifically for the Northern route or Southern route?

MLH: This is for northern route now, and southern route may have different species.

DQ: I would also think that killer whales will need to be included?

PA: What we would suggest is that could be considered because the presence of killer whales is an influencing factor to population levels for narwhal. However, based on past monitoring data, we haven't seen enough killer whales in the area to necessarily run a monitoring program that would allow us to detect and track thresholds.

MLH: We also want to note that the point of the EWI development is not to provide new monitoring programs – we have a long-term dataset. We would also like to ask the Working Group if we all have consensus on what an "EWI" is?

AW: My question is with respect to the variability we have seen today in the results. For a lot of the indicators here, we do not have a baseline to look at this level of change. That also ties into a question about the Southern route and whether or not we should be doing baseline research on the southern route so that we are ready to do this exercise when the southern route is developed.

GG: It is worth noting that we have seabird baseline for both the southern and northern shipping route.

KW: Are we only looking at upper levels of the food chain? We also need to be looking at introduction of AIS?

MLH: That is a good point, but it is not linked to vessel noise. We are specifically looking to develop EWIs related to marine mammals and how they could be affected by noise.

AD: We shouldn't limit what indicators we select based on the monitoring programs we are currently running.
SF: We do need some indicators of some harvested individuals (e.g. stress and body conditions).

GG: It seems like we are in agreement that narwhal are a key indicator species. We may need to also set up a framework to understand what our indicator species could be, the type of monitoring, who could we do this monitoring.

MLH: We also need to make sure that these can be directly linked to vessel noise. So for example, something like increase in stress hormones cannot be easily linked to effects from vessel noise.

KW: We need to look at more than just acoustics.

CV: We could look at what the baseline noise level is and setting a threshold for how much noise can be produced.

DQ: We saw a narwhal that was tagged travelled to Bylot Island – maybe we should consider a twin otter aerial survey for counting narwhals in a larger area.

PA: Yes – we are looking at running an aerial survey in 2019 to look at a broader area.

PA: I think we have agreement that we are moving ahead with narwhal and ringed seal as our two indicator species. Golder had begun an exercise identifying which monitoring programs may work for each indicator, who the responsible parties could be, etc. We will produce an updated version of this and share with the group for feedback. At this point we feel like “changed in RAD, change in calving rate (group composition), ship avoidance behaviour (e.g. are they being excluded from important areas – such as Koluktoo Bay, and are they recovering quickly when this is occurring?), not sure if vocalization characteristics and increase in stress hormones can be as easily used as an EWI – but we can discuss further.

SF: there are a number of ways of monitoring stress hormone changes which would show a temporal record (e.g. when stress occurs both seasonally and annually) – so in other words that it could be correlated with shipping activities or vessel events.

KW: I'm wondering if we could start a spreadsheet where we can start providing comments – for example I see a change in calving as being an indicator of RAD, and I see change in vocalization as being an EWI.

MLH: Agreed. We can develop this as a takeaway action item, so MEWG participants have a table to comment on.

AD: I would include everything except injury / mortality – but I think those are all relevant except for injury and mortality

SF: I agree with Andrew, except change in calving rate should be more specific indices.

MS: I would like to hear from MHTO what you hunters are really concerned about?

PE: narwhal and ringed seal are the priority. Seabirds are also a priority – we have a bird sanctuary nearby – the ships go right through the path of narwhals. Other marine mammals use that same route – I doubt the marine mammals will always continue to use that route. I believe you will monitor closely, because you know that Inuit rely on marine mammals for our sustenance, and you are aware that if you deplete the resources you will see poverty. We were able to catch enough to feed a family, but it is getting harder and harder to do this and we have to spend more on fuel and time. Our marine mammals are also being impacted by climate change. Inuit believe that narwhal may take one year off, and then they will eventually come back to the area – but sometimes if we see a change – we need to be mindful of all the other factors that could have caused a change.

EI: To add to that, we who live in the North are looking at the monitoring programs. You work with the MHTO which is very important to us. We could have a better working relationship – not just BIM, also DFO and ECCC. These other agencies should take the example of Baffinland and work with the communities.

DQ: In Resolute Bay – the representatives from Pond Inlet used to go on the radio, they said after many years the narwhal were finally coming back to the region – so development has a lot of effect on the marine wildlife.

FM: Right now how well are you monitoring vessel noise (in terms of frequency, volume, etc.) – there are already studies available of how noise volumes and frequency can create an effect.

PA: This year we did deploy the 5 acoustic moorings, so we are able to assess noise at different locations along the shipping route. We also have Greeneridge data and data from the Acousonde tags to support that.

AP: With the acoustic monitoring, can you hear narwhal acoustics? It will be very hard with these indicators to link these directly to vessel noise. If you can use narwhal vocalization acoustics and directly relate this to volume of vessel noise – this will most closely give you information needed to answer this questions.

KW: Oceans North has been collecting acoustic monitoring in the region for about 5 years – we will be ready to share these for the technical meetings for Phase 2 in March.

Wrap-Up

MLH: As mentioned throughout the day, MEWG participants can expect to see several draft monitoring reports distributed to the Group for review and comment between January to March. We will also be reaching out to follow up with proposed dates for a Phase 2 Specific Working Group meeting.

	Action Item	Action By	Update
1	Golder / Baffinland to develop an EWI screening table for future discussions regarding selection of indicators.	Baffinland / Golder	Provided alongside draft December 10 MEWG Meeting Minutes.
2	Propose dates for Phase 2 Working Group meetings – 1 st week of February and 2 nd week of April. Proposing that these be face-to-face meetings.	Baffinland	Phase 2 MEWG Meeting was held on February 7 in Ottawa. Dates for second Phase 2 MEWG meeting have not yet been determined.
3	Provide Working Groups with dates we can expect to receive SBO, MEEMP / AIS Report and Bruce Head Report. DFO Offset report is due on December 31.	Baffinland	Drafts of the 2018 SBO and Bruce Head Reports, and the 2017 Narwhal Tagging Report were shared with the MEWG on February 19. A report schedule for remaining deliverables was shared on February 20, 2019.
4	Investigate ways to increase accessibility and/or use of Inuktitut for AIS monitor at MHTO office.	Baffinland	N/A
5	Golder and DFO to coordinate additional analysis of 2017 AIS program samples.	Golder	Samples have been shared with DFO. Further coordination on AIS program to occur as needed.

	Outstanding Action Item from September MEWG Meeting	Action By	Update
1	EM to retrieve list of spill response equipment on tug boats.	Baffinland	All vessels are required to have onboard spill cleanup equipment and material. These are detailed in each vessel's individual Shipboard Oil Pollution Emergency Plan (SOPEP), in accordance with Transport Canada Requirements. Additional details regarding onboard equipment can be found in Baffinland's Spill at Sea Response Management Plan (sec. 10).

2	Golder to include map identifying where acoustic recorders were deployed at the December MEWG meeting	Golder	Complete. Map showing acoustic recorder locations was included on Slide 26 of Golder MEWG presentations.
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APPENDIX C2
TEWG MEETING RECORDS

Terrestrial Environment Working Group (TWEG) Meeting

Thursday March 22, 2018

1:00 pm – 4:00 pm

Conference Call-In Details: 1-416-607-0170 ID: 995 283 775#

Member Organization	Participants		Member Organization	Participants	
Baffinland	Megan Lord-Hoyle	P	Mittimatalik Hunters and Trappers Organization	Mathias Qaunaq	N
	Joe Tigullaraq	N		Elijah Panipakoocho	N
	Emma Malcolm	P		Daisy Koono	N
Qikiqtani Inuit Association	Stephen Williamson Bathory	N			
	David Qamaniq	N			
	Fai Ndofor	P			
Environment and Climate Change Canada	Jean Francois Dufour	N	Observer Organization	Participants	
	Paul Smith	N			
Government of Nunavut	Brad Pirie	P			
	Lauren Perrin	N			
	Amy Robinson	N			
	John Ringrose	P			
Baffinland Consultants	Participants		Amanda Hanson Main	P	
Environmental Dynamics Inc.	Mike Settington	P			

P-phone in participation, I – In person, N- Not attending

Agenda
Welcome and introductions (Baffinland)
Baffinland Project Update (Baffinland)
<ul style="list-style-type: none"> • Report Distribution and Comment Form • Phase 2 Approvals Process • ECCC PRISM • Rabid Fox Investigation • Raccoon Investigation <ul style="list-style-type: none"> a. Overview of 2017 Environmental Incidents
2017 Field Monitoring Programs Final Results and Annual Trends (EDI)
Health Break
2018 Field Monitoring Programs Overview (EDI)

Discussion and Comments
Welcome and Introductions

MLH: The final 2017 Terrestrial Environment Annual Monitoring Report was distributed to TEWG members March 12, 2018. Comments provided on November draft were incorporated into the final. Any comments on 2017 final report can be addressed in 2018 reporting.

MLH: A Working Group Comment and Response form was circulated to the TEWG so that they can provide any comments on reports. All comments will receive a response showing how they have been addressed in reports, or a rationale to explain why, if not. Comment and response forms will be appended to meeting notes or reports, whatever is more relevant.

Baffinland Project Update

MLH: Baffinland has received a positive recommendation from the Nunavut Planning Commission (NPC) on late Monday March 19 2018 on the amendment to the North Baffin Region Land Use Plan. Baffinland will continue to develop the EIS in preparation.

MLH: There was a request at last TEWG meeting to share more information with TEWG members about environmental incidents that occur on-site. There was also a request to provide an update on two items that occurred on site in 2017 – 1) rabid fox on site 2) raccoon on-site.

- With respect to the raccoon, there was a visual observation reported by ship-loader staff. The site environment team went to investigate – but no additional sightings / tracks or scats were observed. The team set up a live trap for raccoon for three days, but the raccoon was not recovered. Follow-up from that is still outstanding to find out if anything else happened as a result.
- As per standard protocol, a fox showing odd and habituated behaviour at site was dispatched in January 2017 – and as per GN request, the head was sent to the GN for rabies testing, and was shown to be rabid. Since the incident we have sent out request to the GN to see if there was any follow-up required, but to-date we have not received a response from the GN on this.

MLH: Baffinland has submitted an application for a DFO authorization for a floating cargo dock – targeting construction in spring/summer 2018. Baffinland is also submitting an application to amend Project Certificate to increase volume of ore to be shipped and trucked in 2018. 2017 was a record-breaking year for BIM in terms of trucking and shipping. We are currently expecting that in 2018 we will exceed the 4.5 (trucked) and 4.05 (shipping) in 2017, and therefore we are submitting application to NPC and NIRB to get approval to increase volume for 2018.

2017 Field Monitoring Programs Final Results and Annual Trends

MS: This is now our 14th TEWG meeting since Baffinland received approval on the Project certificate in 2012. This teleconference is an interim touch-point between the face-to-face meetings.

Today we will provide an overview of monitoring results from 2017 on dust fall, vegetation, terrestrial mammals and birds – a review of the changes made from the November Draft to the March Final Report.

Dust Fall –

- We are still having challenges with dust fall and dust control, compared to what was predicted in the original EIS. In November, we had an issue with dust coming off the ore stockpile at Milne Port because of high winds.
- We were not originally planning to monitor traffic, but the QIA requested we incorporate traffic monitoring into our dust monitoring program, because, as predicted in the FEIS, traffic creates a substantial amount of dust along the Tote Road. There are still challenges with the database, because some trucks are only travelling along the road for road maintenance – but overall the data still presents a general picture of daily, monthly and average annual transits. This is very innovative monitoring, and very useful for helping us understand potential impacts of traffic, none of which have been observed (discussed later).

- At the mine site we are seeing that overall the dust fall has been within predicted levels (from original FEIS in 2012). In 2017, dust fall has been less than predicted levels, except at the crusher where it tends to be higher than predicted levels. 2017 dust fall levels at Mine site lower than in 2016.
- At the Tote Road we put in North and South monitoring. We are seeing that dust fall right near the road is a little bit higher than what was predicted, but outside of the 1 km range, we are below predicted limits and thresholds, showing that dust tends to remain concentrated along the Tote Road.
- Overall dust fall was lower in 2017 than 2016, which can be attributed to either improvement in dust suppression mitigation measures – or the weather – but overall weather trends were the same in 2016 and 2017, so it is likely a result of the former.
- Calcium chloride was used along the Tote Road for dust suppression. Up near Milne Port is where a lot of the Calcium chloride is being put down in those areas because they tend to be dustier than other parts along the road. Site team has adjusted amount of calcium chloride used along the Tote Road based on what are high traffic areas, or based on where there has been consistently heavier dust fall along the road.
- Near the ore stockpile they are very careful where they place calcium chloride – because they don't want this mixing with the iron ore, so this can be a challenge for dust suppression in Milne Port.
- We don't have any PC conditions related to monitoring traffic – when we talk about exceedances for dust fall – they are exceedances from predicted impacts (as outlined in the EIS) – but do not pertain to exceedances of a regulatory threshold. From an operational perspective we have an interest in reducing dust fall as a component of the Project's footprint on the environment, but also from an occupation health and safety perspective.

Vegetation –

- The question our monitoring program is trying to answer is: Is vegetation responding to the Project-related dust?
- The NIRB conditions on vegetation monitoring is very broad, so through work with the TEWG over the years we have defined a reasonable scope for the vegetation abundance monitoring program. We have a number of vegetation plots – all of the methodology is detailed in the Annual Monitoring Report and the TEEMP.
- What we have observed is that we see changes in vegetation abundance between years. Dominant cover also change from year-to-year, however, we have identified that this is not a Project-related effect, because our control plots are showing the same trends.
- We were directed by NIRB to monitor for base metals and soil / vegetation. Over the initial years of Project monitoring we have seen some peaks and exceedances – but when we have gone back to resample these sites, they have generally shown to just be sampling or lab errors. Otherwise all the metal levels are below Project thresholds. To-date there is no suggestion of a Project-related effect of metals uptake on plants.
- We have been completing invasive plant surveys opportunistically. We have not found any invasive plants, and we have yet to determine a required frequency of these surveys with the TEWG.

Mammal monitoring –

- We know from IQ engagement that we are not in the peak of caribou 70 yr cycle. So we complete Height-of-land (HOL) surveys twice per year – for site-based observation – we are looking for calving caribou – last time we observed caribou on site was in 2013. There is a PC condition to monitor this.

- We also complete Snow Bank Height monitoring – so that we know the snowbanks are not inhibiting caribou movement along the Tote Road. In 2018 we will be changing the way we do snow-bank monitoring, we are going to do it more frequently, because only doing it once per year it is too influenced by weather events.
- We also monitor for frequent breaks in the snow banks to make sure that no caribou would get trapped along the Tote Road and they have somewhere to break through, as needed.
- We survey for all animal tracks – No caribou, wolf or other large mammal tracks were observed, but arctic fox and arctic hare tracks were observed in 2017.
- In addition to the surveying that EDI completes, the site environment team also have systems in place for wildlife sightings. So we do know that there have been observations of caribou / and hunter-sightings in the larger regional area – but not directly in PDA. There haven't been any Project interactions.
- We log wildlife sightings all over camp. Hunting tends to be happening south of site.
- There was a question from the Government of Nunavut of whether Baffinland thinks there is hesitation for people to report caribou, because they are worried that if they report them they will be harvested.
 - Yes – that is why we turned the wildlife log confidential – because we were worried that they would be harvested.
- Most of the caribou being sighted is far south by exploration team.

Birds –

- Active Migratory Bird Nest Surveys were conducted, but no nests were found in 2017. In 2017, Baffinland had to disturb 16 new hectares of land, so we did a survey to make sure that no nests were within the new land clearing area. We haven't seen any Project-related effects on raptors in terms of occupancy and productivity.
- Helicopter Overflight -
 - Helicopter flight height monitoring is not a requirement of the PC – but we do have a requirement to fly above 1100m, subject to safety requirements. Overall, we are finding that we have high-compliance with flight heights.
 - The flight height log requires pilots to describe the purpose of their flight, the weather conditions, safety reasons for going below 1100m, etc. If there is a justifiable explanation why the pilot had to go below the 1100 m mark, then we would consider that to be in-compliance. If no reason was provided, then it would be considered non-compliant if they fly below 1100m. We haven't seen any evidence yet that these low level flights resulted in any disturbance to birds or other animals, nor do we intend to have any studies to determine this.
 - To expand on this program in 2018, site environment is going to complete daily checks with pilots to make sure that a rationale is always provided – rather than completing weekly or bi-weekly checks, where follow-up with pilots is more difficult – and also to collect data on what program the flight correlates with (e.g. is it monitoring / slinging, etc.)

2018 Field Monitoring Program Overview

- In 2018 we will continue with HOL surveys at least the same effort. We will continue to request HTO participation as the members have provided very valuable input to-date.
- Snowbank monitoring in 2018 – As suggested by the TEWG, frequency is going to increase and be conducted by Site environment team. This will continue until snow bank characteristics and management are well defined.

- Vegetation – we are going to do our 3rd year replicate of the monitoring program. Once we have a 3rd year replicate and analyze the results we are going to come back to the TEWG to get feedback on frequency for that monitoring program.
- PC 39 is related to reclamation planning. We are trying to consider different options for reclamation plot and surveys. We will likely discuss the plan for this at the 2018 TEWG November face-to-face meeting.
- In 2018 we will be collaborating with Environment and Climate Change Canada/Canadian Wildlife Service to complete PRISM plots surveys. ECCC will include some plots and automated recording systems in North Baffin Island within the broader project area.

Next Steps – Planning for next MEWG meeting

- For the raptor program, we are entering into the next phase, and we are looking at a new design phase for the program, so we can look at having ArcticRaptors Inc. come in to discuss the next phase / design program. We could consider discussing small mammals and lemmings and what is driving the population cycles within the regional area and Project area.
- For PRISM work – ECCC will either call-in or join at next face-to-face meeting to provide an overview of what is planned for PRISM work.
- Baffinland is still supporting the Government of Nunavut regional caribou monitoring programs.
- At the next TEWG meeting we will go through what we are proposing for 2018 in more detail. Generally, the design of monitoring programs hasn't changed significantly over the years – but we can start including a discussion on annual trends and have a conversation regarding whether or not we should redesign any programs based on trends.
- BIM would like to get some understanding on the strategy of the GN caribou monitoring surveys / programs. We want to know how these programs are going to inform questions pertinent to the TEWG? Pertinent to the program for monitoring Project-related effects?
- BP and JR will provide a discussion at the next face-to-face meeting to discuss the methodology and relevancy of the GN caribou monitoring program in relation to Baffinland and Project-related effects.
- From Baffinland's perspective, we want to be able to best use our resources (financial and in-kind) based on what programs are going to provide us with the most valuable types of information – or trying pilot projects – or to execute new surveys that will better help us answer our questions related to Project effects.

Proposed timeframe for next face-to-face meeting is the end of April / early May. Baffinland will follow up with a confirmed date for the next TEWG meeting. Post-call update – Face to Face meeting to be held the week of June 4th, 2018.

	Action Items	Action By	Update
	Provide TEWG with an overview of north Baffin Island caribou monitoring and research strategy – at next face-to-face meeting	GN	

Terrestrial Environment Working Group (TEWG) Meeting

Date: June 5, 2018

Time: 8:30-4:30

Place: Delta Hotel Downtown, Ottawa

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	I	Mittimatalik Hunters and Trappers Organization (MHTO)	Phanuel Enoogak (PE)	I
	Joe Tigullaraq (JT)	I		Elijah Panipakoocho (EP)	I
	Emma Malcolm (EM)	I	Observer Organization	Participants	
Qikiqtani Inuit Association (QIA) and Consultants	Jeff Higdon (JH)	I	World Wildlife Fund – Canada (WWF)	Amanda Hanson Main (AHM)	I
Environment and Climate Change Canada (ECCC)	JF Dufour (JD)	N	EDI	Mike Settingington (MS)	I
Government of Nunavut	Brad Pirie (BP)	I			
	Lauren Perrin (LP)	I			

P-phone in participation, I – In person, N- Not attending

Discussion and Comments
<p>MLH – Baffinland Project Update</p> <p>Welcome and Introductions from the Group</p> <ul style="list-style-type: none"> • Baffinland is seeking a number of different approvals for various aspects of the Project. • BIM submitted an application to the NPC in 2018 to increase ore hauling from 4.2 to 5.5 in 2018 up to 6M in 2019. To coordinate this, we will be looking to increase shipping from 4.2 to 5 in 2018 – and then 6M in 2019 as well. • BIM has received a positive conformity decision from NPC – now before NIRB for EA process. • Associated with this application is an application to upgrade and increase accommodations at Milne Port with the addition of 227 beds. • BIM is also looking to build additional 15ML fuel storage at Milne Port to support 6Mtpa application, and to support fuel needs for current operations. Based on current operations and scaling up to an 800-person camp, we need more fuel beyond what we can currently store. • Application with DFO for floating freight dock – this was proposed during ERP, but we are now to construct. This will be used to unload and load supplies. • The objective of this meeting is to discuss environmental monitoring for our current operations. • Something we started in 2016 was to begin reporting on trends. We now have enough data to begin reporting on trends. • We will go through the proposed monitoring programs for 2018.

Discussion and Comments
<ul style="list-style-type: none"> • Proposition to discuss comments that were submitted by the member organizations of the Working Group to the NIRB on the 2017 Annual Report.
<p>Dust Fall</p> <ul style="list-style-type: none"> • Dust has remained a key issue since the beginning of the project and is a very common issue for mines and communities across Nunavut, especially dust coming from the gravel (Tote) road. • Several terms and conditions exist that require mitigations for managing Project-related dust. • Dust fall jar collection has been occurring monthly at most sites for several years now. Our dust fall monitoring assesses how closely actual dust fall levels are relative to EIS predictions. We then assess the effect this is having on the environment. • We have seen exceedances relative to EIS predictions at some of our dust fall collectors. • Figures are shared that show how dust fall thresholds were defined for Milne Port, the Tote Road and Mine Site. We expect most of the dust to fall within the footprint, right at the road, where the laydown areas and stock piles are. You can expect that there will be high amounts of dust. We predicted the dust thresholds, based on our predictions of what might affect vegetation, and metals within the vegetation. Reference sites are used to understand what background levels are. Dust fall jars that are close to the project footprint will have dust in them all year long and to measure the effectiveness of dust suppression efforts. • It is only possible to collect reference area dust fall jars during the summer months as they are not accessible during winter months. <p>MLH</p> <ul style="list-style-type: none"> • Over the last three years of operations, reducing dust from the project has been a priority of Baffinland. Along the Tote Road, vehicle transits can create clouds of dust so even from a safety perspective, we have been trying to reduce dust. • There are various sources of dust from the Project – tote road, laydown areas, crusher, and construction activities. Our major source of dust at the Mine site is from the crusher areas. When rocks are being crushed and transferred through the process, dust is released. One of the mitigations we have put in is to shroud the transfer points throughout the crushing process. This stops dust from being carried with the wind and spread across the PDA. This has proven to be a very effective method, however, there are transfer points that need to be accessed regularly, and dust is still getting released as a result. Subsequently, our mining engineers have been trying to design a system to minimize how much dust is released from these transfer points. • Using calcium chloride along the Tote Road in 2017 has been shown to reduce dust, but we are still continuing to investigate alternate mitigation (other solutions) to further reduce dust. • Dust at Milne Port continues to present a challenge. We haven't found a solution yet to reduce dust from the stockpiles, but we are continuing to investigate solutions. We don't want to use water or calcium chloride near the stockpiles, because we don't want it to mix with the iron ore. • In 2018 we will be piloting a product called Road Warrior, an acutely non-toxic substance which has shown positive results in other areas. <p>MS</p> <ul style="list-style-type: none"> • Following feedback on the TEWG, BIM began reporting on areas where dust suppression methods are being applied along the Tote Road to show where our methods are being applied and to understand how effective they

Discussion and Comments

are relative to dust fall jar collection. Calcium chloride is applied more regularly where it is difficult to get water to those sites or in particularly dusty areas.

- Dust Fall trends – Overall, compared to 2016: dust fall has gone down, but in some areas, it was higher in 2017.
- Continue with dust fall program in 2018 as it has been run previously, we do have to do maintenance on some of the dust fall collectors.
- One dust fall jar from km 28 will be moved as it ends up being buried on the lee side of a slope in winter. A comparable site in the Moderate dust fall isopleth will be identified.

Comments from group

- BP noted GN has concerns related to dust fall exceedances, specifically along the Tote Road. There were 2 sites where dust fall was 800% higher than FEIS predictions. Overall we are of the opinion that dust fall mitigations are not working along the Tote Road, meaning Baffinland is not able to manage dust fall at the site and should implement additional adaptive management measures.
- MS replied that we will be doing updated modelling for Phase 2 to revise our predictions / the isopleth model / to better accurately reflect what is realistic for dust falls. *[Post-meeting note: GN was comparing dust fall results to identified vegetation effects thresholds, not FEIS predictions. BIM can generate spot-specific FEIS thresholds which are likely closer to 200 g/m²/year, higher than the 50 g/m²/year threshold].*
- BP clarifies that the exceedances are on the Tote Road south.
- MLH expresses that BIM acknowledges that we have been exceeding the predicted levels for dust fall in the ERP. One of the reasons may be because our modelling for ERP used different trucks than what we are using in our current operations. This was an operational decision because the trucks modelled in the ERP were not able to carry the heavy iron ore.
- BP replies that if BIM had to make these operational changes, why not update the model in the four-year period since hauling along the Tote Road started?
- MLH answers that we haven't updated the model because we have been planning for the Phase 2 expansion. With the changes in Phase 2 proposal, we didn't anticipate there would be such a lag between the time modelling for Phase 2 occurred and operations along the Tote Road.

While we are seeing dust fall that exceeds predictions – and there are a number of tools that Baffinland has to reduce dust – we are also monitoring effects to understand whether the dust fall exceedances are actually having an effect on the environment. We believe those things need to be looked at in concert – looking at dust fall levels in isolation doesn't give us information about whether or not there is a significant effect on the environment. We are also open to suggestions from the WG.

- BP points out that 400 mg over the past four years is burying the plants.
- MS agrees that yes, this is occurring near the Tote road, or at the mine site, which is to be expected because it falls directly within the PDA, where we predicted that there would be a complete loss of vegetation. Baffinland monitors dust along the Tote Road. We are not seeing this amount of dust on the plants, though, which makes us question if these are the right thresholds. We are seeing exceedances, which trigger mitigation, which is why we applied it. We do think these mitigation measures are working.
- JH notes that QIA is looking for direction from NIRB on how issues like this are managed moving forward. There are similar concerns around exceedances.
- BP clarifies that our concern is not whether or not the dust levels are reduced one year to next year – it is that every year there are exceedances.

Discussion and Comments

- MLH asks whether the GN has any suggestions on what types of adaptive management could be used.
- BP replies that we need to see significantly more robust application of dust suppression mitigation measures, but the GN does not have an alternative to recommend and leaves this to the discretion of the Baffinland team to determine the most effective methods for dust mitigation.
- EP elaborates that when you talk about dust, it is a concern in Pond Inlet because we go caribou hunting in that area, and travel that route to Igloolik during the springtime. On top of the ice, you can see dust for miles. The wind blows it further from the mine, so it travels quite a distance. I think you need to have more preventative measures in place so that people who hunt and live in that area and travel route are not as affected by your project. We are also worried about people who go caribou hunting in that area.
 BIM had told Pond Inlet that ore trucks would be covered to prevent iron ore from flying out of the trucks – but that has not been the case. When the project started we were told that there would be no restrictions on caribou hunting, but nowadays, we are told that we have to request this in writing and have it approved. This is a concern coming from the HTO in Pond Inlet.
 Building a travel road for hunters was spoken about (a bypass or something), but this hasn't happened yet. I believe this was promised in the beginning. There is now a policy which means hunters aren't allowed to use the road.
 These are the concerns coming from HTO regarding dust and long held promises.
- PE expresses that at the Bay there is a lot of dust coming from the little stream – it's basically red dust – we could not drink the water from the ice we melted, it would be covered in dust. We can no longer drink the snow from the dust, so we had to get water from a river. We can no longer use the melted ice for tea and foxes are also dusty they are pink to rose coloured from the dust.
- JT notes the current policy on the use of the Tote Road is that you do not need written permission to use it. You can just make a phone call to security, or inform the HTO, or BCLO, to let them know for safety.
- BP adds that for winter with dust on the ice and snow, I imagine from the wind dust will travel with the snow, for Phase 2 I expect that drifting ice and snow be incorporated into the new modelling.
- MLH: this a really productive conversation. We fully understand dust is a concern for the GN, QIA and community members, so we will continue to make all efforts where practicable to reduce dust.

Vegetation – Diversity and Abundance

- The objective of our vegetation monitoring program is to understand what effect the project is having on vegetation near the mine site and determine project-related versus naturally occurring changes. This monitoring program has been largely influenced by contributions from the Working Group.
- We expect vegetation alongside the road or around the buffer or the project footprint to be disturbed. We also have reference sites (about 20km out) so that we understand what is happening within the North Baffin region, and vegetation more generally.
- AMH asked whether, in years of project closure, there is confidence in what types of vegetation there are each year, to inform later stages of restoration.
- MS responded that in addition to our monitoring program, we have baseline studies going back to 2010 from North towards Milne. We did a fairly intensive baseline study of vegetation and soil types and it is not a very diverse landscape, so yes, we feel it is fairly well characterized for closure planning. I will also talk later about what our plans are in 2018 to prepare for conceptual closure planning.

Discussion and Comments

- We sample from the canopy cover to soils – this is a very repeatable sampling program, and this will be our fourth year running it. Overall, we have been seeing minor trends year-to-year. Our greatest cover is standing dead grasses, this is why we have our reference plots, so that we can understand if changes in the vegetation from year-to-year are a result of the project – or just a naturally occurring process.
- In 2018, we will have the 3rd year of full replicates of all of the sample plots, and our fourth year in total. We are not planning any changes to the program, but the GN and QIA have submitted comments which we would like to discuss.
- BP expressed concerns about the study’s ability to detect changes and the robustness of the study, specifically for understanding medium to large changes in vegetation over time. The program currently uses 66 sites, with only 20 sites along a 100 km tote road, compared to other mining monitoring programs on roads in the Arctic, this is quite small. We also have issues with where the sample plots are located. Our recommendations would be to have an increased number of transects to improve the ability to detect project-related effects, and an additional number of transects where the dust fall has been the greatest (e.g. RS-04- RN 04 - 800% predicted exceeded dust fall sites).
- MS responds that our closest sampling location is about 15-30 m, which is essentially the closest we can get to the project areas. The best report for the power analysis was in 2014, 83% power to detect a 50% decline in lichen cover, we use lichen as representative vegetation species for caribou foraging. Because we can detect changes that small – we feel very confident. As a result, I disagree with the GNs comments that we don’t have a monitoring program that is robust enough. We do match the dust fall with the sample plots – so we can understand the relationship.
- BP replies that the distance from the road is not the issue. We are concerned that the areas that are showing the greatest dust fall should be the areas that are sampled.
- MLH answers that we already have data collected for RN-08 and RS-8 so we are unsure what the questions is.
- BP clarifies that the GN would like to see more sample sites in the areas where the greatest areas of dust fall are. Maybe we can set up a time to discuss that further with our technical experts to discuss re-engineering a study design. It is difficult for the GN to have technical presence when meetings are scheduled during field activities.
- MS reiterates that the terrestrial environment working group is established specifically to have these technical discussions, so any required actions may be taken sooner than later. It is important to have technical people from each agency at the Working Group meetings. We want to have this function effectively, but if we don’t have the right people and are only receiving comments later, management responses or changes in study design could be delayed when not necessary.
- BP states that Baffinland is aware of the GN’s field season for the Arctic – but that these meetings are routinely scheduled during this time and arranged before hand with dates discussed at each meeting.
- MLH notes a few administrative items —the GN has never expressed concern about the time of year that these meetings are. We are also having 4 meetings throughout the year, so technical personnel conflicts can can’t overlap with all the TEWG meetings. Many of the comments we received from the GN on the 2017 NIRB Annual Report were new, and the GN has reviewed these programs previously, and had a draft of the Terrestrial Annual Monitoring Report since November 2017. It is discouraging that the comments could not be addressed within the TEWG instead of part of 300 comments on the overall NIRB report, especially when we already have the Working Groups as a forum for discussing these issues at the working group meetings.
- Agreement to schedule a meeting to discuss GN comments.

Vegetation – Metal Monitoring

Discussion and Comments

- Project certificate conditions outline several objectives for vegetation metal monitoring. There are also project commitments related to metal monitoring.
- Objectives are to determine if metal concentrations in soil and vegetation are exceeding the Canadian Councils of Ministers of the Environment (CCME) relevant thresholds. We monitor from varying distances to the project footprint. There is overall very low lichen coverage in the region. Compared to other regions in Nunavut, there is much less lichen in the area. It grows on a 70-year cycle that coincides with why there are not many caribou in the region right now.
- We do not have metal limits for iron from CCME because it is not considered a contaminant of concern, so we have to ask labs specially to account for iron.
- To date, we are not seeing a huge amount of variability between our samples, which is why we do not feel we need to add more transects. The statistics seemingly prove the robustness of the sampling program.
- In 2018, we are not planning on sampling for metals. It is likely we will reinstate the program in 2019, but at a minimum we are committed to running this from 2021 – 2023.

Discussion on the NIRB report comments from GN and QIA:

- JH noted that QIA's comments regarding the metals monitoring is pretty similar to GN comments. QIA feels that current sampling design does not adequately capture all of the potential effects across the project. They have recommended a new power analysis be conducted, and that this be better aligned with areas where dust fall is high. They also recommend that metal monitoring be conducted, and vegetation surveys both occur again this summer. MS responds that we have been pushed by TEWG in the past to complete the power analysis, the analysis was completed, and the program is supported by the results -- yet regardless of those results, we now get requests for more samples even though the power analysis shows that the sampling program is currently robust enough to understand any project related changes. We need more information from GN and QIA, for example a review of the statistics, to show why they believe more analysis / samples are required.
- MS: Power analyses were conducted for most our programs before finalizing monitoring program design. We adjusted from 2013 to 2014 after conducting the power analysis because we realized we needed to for sampling.
- BP added that the increase in dust fall exceedances was unexpected, so now seeing how much more dust fall there is, we are asking for this power analysis to be done because the environmental conditions have changed so much since that time.
- MS said that yes – the dust fall predictions have been inaccurate in the close distance sites, however, irrespective of whether the magnitude of dust fall has increased this alone doesn't inherently necessitate a change in the vegetation metal monitoring program.
- BP continued that even though the distance from the road is the same, at various points along the tote road, some areas are dustier than others. That is where there is a need for more sampling points. GN and QIA had the same technical consultant prepare comments on the NIRB report, so we think it would be valuable to have a discussion so that we better understand the issues around statistical analysis.
- MLH understands now the GN concern is looking for more sampling locations along the Tote Road, but we are seeing the same levels of dust fall at both transects at 30km (North and South) because vegetation plots are aligned with our dust fall locations. We are also seeing the same levels of dust fall at north and south, but right now we are seeing similar results at both sites.
- MS expressed that there will be updated modelling for Phase 2 – we are seeing that the magnitude of dust fall is higher than we predicted – but adding more sample locations in high areas will not tell us more than we know right now about dust fall characteristics.

Discussion and Comments

- EP asked what percentage of metal is expected to be found in the dust before you determine it is harmful for wildlife? What is safe? What are the thresholds? Also, when looking at the map, the fjord right to Bruce Head is important to monitor. We get south easterly winds a lot. There are lots of fish, (arctic char, trout, etc.) people fish there throughout the year, and the snow blows from one direction. The snow formation is different because of the winds, some are pure white, some are red. So what percentage is considered dangerous for wildlife consumption? There are also sandstorms near Kuluktoo Bay – and the snow is usually yellow and discoloured from the mine. We go seal hunting in the spring time. It is our food source, just before the fjord, and is where we traditionally hunt baby seal and seals. This area has also been affected as we look at the colour of the snow. The hunters also notice that the snow is discoloured. We need to know if this is having metals in it – pink snow is blowing from the mine.

We know in the extreme cold, metal can also be released in the air, so that will affect the snow in the cold. In the wintertime the snow blows very far, much farther than the project area. We fish over in the fjord and also close to our community. We are beginning to find that we don't have the same fish we used to, they are getting fewer and fewer.

Naturally occurring sand will produce yellowish coloured dust but dust from iron ore is the pink or reddish dust that hunters are seeing. Hunters that use the project area are uncomfortable not knowing how the dust from iron ore will affect them and the fish they are consuming.
- MLH acknowledges that this is a very important question. We are hearing that you are concerned, and that people using the area do not know if the iron ore is going to harm them. We agree that this is a very important point that Baffinland needs do more to share information to explain if this is having an effect. The CCME guidelines are the first values that are used to determine whether or not any of the metals that are in the vegetation, soil, fish, water are potentially going to have any harm to people or to these species. CCME guidelines are very conservative, these are used as a trigger point, so even if we exceed these values it does not necessarily mean that we are creating harm. However, we use it to determine whether we need to investigate further. To-date, Baffinland has not exceeded the CCME guidelines, so we know that this is not creating harmful effects. But we are still concerned about making sure people who live in this area really understand what effect these metals in the environment have or what percentage of these metals could create harm. We are planning to conduct community workshops in the summer and/or in the fall to discuss these concerns with the community in greater detail.
- MS added that because yellow and red dust is so apparent in the snow-covered environment it is very important that we clearly explain to communities the effects / the guidelines for triggering concerns / and how we monitor this.
- JH recognizes that winter is quite difficult, and asks whether there is any way to monitor dust on snow from aerial photos etc. to see the extent of the dust fall.
- MLH answered that if we took photos to see the extent of the dust fall in the winter, it wouldn't necessarily speak to dust loading in the further site areas. We are not sure how practical this would be. It is something that we're looking into right now to figure that out in terms of dust mitigation and management. In the winter we are piling up the snow along the road, and that snow goes to a specific area to reduce the amount of dust loading in the streams and into the area.
- BP requests that, with the new dust fall modelling, we also take a look at the dust fall drifting in the snow during winter to understand how far the dust is moving in the winter.
- MS responds that the first aerial survey we do is in June during the raptor survey, and that you can see it in the snow. Aerial photos would tell us about extent of dust but not about loading, or the effects of the dust in the environment.

Discussion and Comments

- JH adds that one of the conditions around metal monitoring speaks to berry producing areas. What type of monitoring is being done for berry harvesting areas?
- MS replies that concerns about dust settling on blueberries was a focus of our original metal sampling, but there was not enough baseline information to develop a full sampling program for metal monitoring on berries. After discussions with the TEWG, that part of the program was removed in 2013.

Helicopter Overflight

- MLH: Between 2017 and 2018, we will be continuing mitigations applied in years-previous, and we will also increase strictness with analysis on flight logs with the on-site team doing more regular check-ins and discussion with pilots. Last year, the pilots were doing this, but our site team wasn't checking this information as regularly. In 2018, we are going to review these flight logs more consistently so that we can go back to the pilots to better understand what types of reasons pilots have given.
- MS adds that we are looking for more detailed reasons to be supplied by pilots because we are keen to better understand the reasons, and comply with project certificate conditions. So while it looks like our compliance has improved, it is not necessarily more compliance with the height of flights, but with the reporting structure for this.
- BP provides input that they think Baffinland is making great progress w/respect to compliance with the terms and conditions. Really our concerns on the annual report was we just want more detail to better understand reasons so that we can understand disturbance. We would prefer if there were categories set out so that if there was below flying (w/reason), above flight level, below flying (w/out reason) – it would be more indicative of effects.
- MLH agrees this is a really good suggestion, and operationally this will allow us to investigate even further to really understand if low-level flights are occurring (what is happening and why). We can start implementing this year, and incorporating into our annual reporting.
- EP asked, regarding caribou count: I have participated in this as well as count for other animals. If I were to ask a helicopter pilot which height is better so that it doesn't harm the wildlife on the ground – or birds in the air – I believe the pilots would have something to offer us, because it is there line of work. Maybe we should ask them. From a safety perspective, I am wondering what makes sense – to fly lower or higher?
- MS agrees. It would be great to have a pilot participate in a TEWG meeting and describe how they have seen animals respond to helicopters.
- MLH replies that our site environment team is going to make more effort to understand this for the year, and the safety of this, to better understand from the pilot's perspective.
- JH inquires about whether the pilots are filling reports of what they see in terms of wildlife observations (e.g. caribou distribution). QIA has made a recommendation that if there is a bad weather day when it is required to fly low, Baffinland could consider reducing helicopter flights on these days for non-critical activities.
- MLH notes that all project personnel are required to fill out wildlife forms, whenever they spot any wildlife including caribou. We report directly to the site environment team so they are aware of any caribou in the region. Baffinland would not use helicopters for non-critical activities given the high cost.
- EP adds that they have safety issues – whether it's too high or low it can be dangerous – they have safe zones that they fly. The pilot and passengers have to be safe as well, and not be endangered for environmental considerations. The pilot and passenger safety has to be the number one concern.
- MLH comments that we agree. Above all else, the safety of project personnel is the number one biggest consideration for Baffinland, so when they fill out the logs and they say they had to fly low for safety concern, that trumps all other considerations.

Discussion and Comments
<p>Mammals</p> <ul style="list-style-type: none"> • Snow tracking surveys and snow bank surveys are mandated monitoring programs through our terms and conditions. Objectives of monitoring programs are to determine caribou’s response to road traffic using snow tracks and to understand how caribou behaviour and migration patterns are affected by the northern corridor and project activities along the Tote Road. • We used to conduct snow track surveys by snow machine through the Mary River valley, but we switched to doing this from the road alone because it was too difficult to traverse by snow machine. QIA in the past has agreed that doing these surveys by road was appropriate for now, especially when caribou population is low. You can see arctic fox tracks up to 300 m from the road. This has been discussed at TEWG meetings, and previous participants agreed in principle that it was unnecessary to switch back to snow machine surveys. • From 2014 – 2017 we have not recorded any wolves or caribou during the snow track survey – arctic fox populations were high during 2015 and 2016 in North Baffin and other regions across Nunavut, and Arctic hare populations have been increasing from 2016 and 2017. • Baffinland is required to keep snowbank heights at 1m or less along the Tote Road. During 2017, we only did one day of snow-bank height monitoring, and it was after a large snow event - to improve understanding of effects over all the winter months, we have started doing these more frequently throughout. In 2018, we conducted snow bank surveys once in Jan, Feb, April and May. • MLH added that an increase of snow bank surveys is an example of where we have responded to TEWG requests to changes to the monitoring programs. This also serves as a better tool for on-site performance because it helps our site team better understand snow management along the Tote Road, so that from an operational perspective, we know if any changes with our road services are required. • JH asks for clarification on whether the site staff are doing both the snow-track and snow bank surveys? If they did 4 snow bank surveys why did the team not also do snow track surveys at the same time? This would help to increase total number of snow track surveys and respond to QIA request for more frequent comments. • MLH answers that at a minimum, staff have to complete one snow track survey, but this may be able to increase to more if the opportunity arises throughout the year. • BP brings up that the GN noted in comments that the methods of snow bank monitoring needed to be changed this year due to the high snow banks. The spatial extent of surveys should be consistent between years. The GN would also like to see modification of design to include any track resetting (recording of snow or wind events). • MLH responds that this is one of the positives of having site staff complete these surveys instead of having a consultant do this – because site staff can better time surveys with snow tracking events.
<p>HOL Surveys</p> <ul style="list-style-type: none"> • We decided to do HOL surveys as opposed to aerial surveys because there is less disturbance to animals when surveys are completed on ground. If we start to see more caribou during HOL surveys (through trends) and also through other wildlife recording, GN led surveys, etc, we may revise our approach. This is a survey on its own to understand animal behaviour relevant to the Project. If trends show we should increase surveys / change survey design because caribou populations have increased, then we will reconsider in consultation with the TEWG. • Surveying is focused on the calving period. Overall these provide us with about 20 hours’ worth of survey observation. There is no statistical power for these surveys, nor are they intended to provide immediate

Discussion and Comments

statistically robust data. We do know that the caribou population levels are at an all-time low. Surveys will pick up when we start to see caribou populations picking up.

- EP adds that when we did the caribou monitoring, the green marked areas on the side of the road that we saw earlier [on HoL figure that is available in annual report], those are the spots that we drove on the vehicle on the road because of poor weather conditions. We did find some old tracks – not recent ones – they had sighted caribou around that area before, but because of poor weather conditions we did not see. We saw fox, and rabbits but no caribou. I can say there was very little caribou at the height-of-the-land because they were migrating elsewhere at the time, which is why we didn't see any. That's basically all we found with that caribou survey.
- BP reminds the group that the GN has commented on the HOL surveys. This has been a reoccurring comment we made for a few years now, and we don't feel that the HOL surveys in their current design have enough statistical power to distinguish between whether or not they are not in the area because of population lows or because they are avoiding the area because of the Project. The GN proposed that there are two options. 1) Increase HOL surveys so that there is a defensible amount of observation occurring or 2) eliminate HOL surveys and put resources into regional monitoring surveys led by the GN.
- MS responds that the survey efforts will always be a challenge, but even if we expanded the program by 10X the amount of observation, we would still only be able to observe 2% of the time. Baffinland also already supports GN regional surveys, however in order to address the terms and conditions for monitoring during calving surveys and caribou interaction with the Project, we also do HOL.
- MLH states that if GN is suggesting we can switch efforts from HOL to GN caribou surveys, then we would want to understand how the objectives of the regional monitoring surveys will help BIM meet the objectives of our project in our Project Certificate conditions. We're looking forward to hearing feedback from GN Regional Wildlife Biologist at next TEWG meeting.
- BP replies that in order for regional monitoring to be effective for BIM to meet project effects monitoring, the GN will need a lot more resources contributed to the GN to support GN led regional monitoring surveys.
- AMH contributes that it is very important that BIM continue their own HOL project effects monitoring, and we support the idea that BIM continue to increase the number of hours for surveys. We would support a request of perhaps double the number of survey hours.
- MS notes that in 2006 when we started caribou workshops with community members, we were still conducting aerial surveys at that time. BIM contributed 1/4M\$ between 2009 and 2011 to GN to support the caribou collaring program, which confirmed what we heard from IQ. The last time we saw caribou on site was in 2013, and then a moratorium was put in place by the GN because caribou population levels were dropping off. Baffinland has asked GN's Director of Wildlife what caribou research programs are even in place to support this? We only have yearly MOUs with the GN on a survey-by-survey basis, so this, to Baffinland, is not an effective survey method for BIM to rely on to meet our PC objectives.
- BP responds that the GN caribou surveys would be designed based on how much financial support Baffinland is willing to contribute, and that the caribou surveys are contingent on the political climate, so we can only commit to one year MOUs at a time.
- MLH explains that as a company, we acknowledge that ultimately our responsibility is to complete our own project effects monitoring. As a proponent we need certainty if we are going to providing funding to a project. We need to be able to understand what to expect for effects monitoring year-to-year to give us the stability we need and assurance of ongoing effects monitoring. We find it interesting that this is a recommendation to BIM – given that you acknowledge the uncertainty.

Discussion and Comments

- BP explains that the dynamic political climate uses resource allocation to manipulate its will upon what resources are doing. If BIM could commit the resources to support aerial surveys, then we could probably provide more certainty.
- MLH states that for us, aerial regional surveys would not meet the same objectives as we are trying to achieve with the effects monitoring to understand how caribou survey could potentially be affected by the project. We are not asking GN to conduct our effects monitoring, but we are happy to support GN regional surveys because they help inform us when we need to trigger more robust surveys (e.g. if # of caribou in the region increase).
- BP is looking for a project related effect with any survey, BIM needs more survey hours no matter what method you are doing.
- JH has never seen any data on caribou observations from haul truck drivers or other community observation data. Could truck observations be presented as a data set. What is the trigger for knowing that you don't need to do additional monitoring?
- MS answers that the observations from HTOs are built into final reporting already (as in if they were reported we would include this in reporting) so I think the way we're going to know when caribou come back is from the communities first, through the HTOs and then from GN surveys and then from HOL and snow track surveys.
- EP suggests that surveys can be a very useful tool. Just because you don't see it, you think its absent and you come to a conclusion. In the past, we had too many people up north. We saw plenty of caribou, and it goes through cycle. They should be coming back soon. Aerial surveys also don't really bother the caribou but I believe that iron and dust may be more harmful to the caribou – possibly because they are avoiding the area. We use binoculars in our survey. We talked about a certain area, and somewhere in there, an exact geographical location, a mountain, and on the side a valley, there is always caribou, but they don't seem to be crossing that way anymore either. This could mean they are moving away from that area because of the mine site. 3 years of data is not enough to know, monitoring and research would probably be. We predict the caribou will return to that area.
- MS says we know that QIA submitted comments on the Annual report suggesting that EP's participation in the HOL surveys was Baffinland misusing IQ to defend the survey design. That has never been Baffinland's intention in having EP or community members participate in the surveys – it is because of their vast knowledge of caribou in the area – so we realize how valuable this is.
- EP on GN surveys: I have no problem with the surveys, we do also need to know are the adult caribou increasing or decreasing. Within the area of Kuloktoo Bay and Kujarak with the chopper we checked for caribou calves; there were 100, and adults were over 1000 within the grid we were doing our survey on. We have a time limit of so many hours' survey work and could have done a better job with more time.
- BP expresses that right now our biologist is out in the field on another survey. We find that our November / fall meetings are the right time to analyze the results and share information with you. If we are able to further increase survey efforts, and as data is collected over several survey periods, we expect to further tease out the trends that could indicate what potential project effects exist.
- MLH understand more hours = more resources = more data. We will continue to have these discussions moving forward.

Birds

- Project certificate conditions mandate that Baffinland monitor for raptor occupancy and productivity, and that the objective of this monitoring program is to distinguish between project effects and natural variation.

Discussion and Comments
<ul style="list-style-type: none"> • Baffinland’s cliff nesting raptor monitoring program is a tripartite funded research program that Baffinland contributes to. There is lots of cliff-nesting raptor habitat near the project area. The concern is that mine activities could cause raptors to abandon their nests. QIA vis-à-vis the TEWG has influenced the design of the program. • Between 2012 and 2017, we have seen slight trends in decrease of population in peregrine falcons. For Rough legged hawks we have seen mixed trends; some years decreases, and some years increases. Overall, there has not been any statistically significant trends. • In 2018, we will continue to do our active migratory bird nest surveys. We will continue to support the Canadian Wildlife Service PRISM, which is a regional shorebird monitoring program, led by Environment and Climate Change Canada – and repeated raptor effort similar to 2017. • MLH adds that CWS – PRISM will be running. The development of this program is an example of how input from the Working Group has informed commitment to continue supporting this program. Efforts on our own for shorebird monitoring were not statistically strong enough, so this collaboration allows for improved efforts. The program is targeted towards the distribution and abundance for the Baffin region. Baffinland has also been in discussions with CWS / ECCC working on including automated recording units for red-knot. We are deferring this until next year. We have been in discussions with redesigning the raptor survey to include looking at environmental conditions / lemming cycles etc. to better understand what drivers could be affecting occupancy and productivity for raptors in the region. • JH asks whether there are other environmental factors considered in part of the study design, for example rain events could be a source of chick mortality. • MLH answers yes, we review these data in concert with other weather events / data collected for the program. JH adds that some of the records for red knots could have been pulled for sensitivity reasons too.
Summary and Conclusion
<ul style="list-style-type: none"> • MS explains that every year we provide a summary of changes that are made to all our terrestrial monitoring programs. When we review the summary of changes [showing slide of track changes table at beginning of TEMMP] – we are clearly seeing that the working groups are influencing the design of the monitoring programs. • In 2018, we are planning on reviewing reclamation planning, and looking at the possibilities for reclamation this far north. We are going to look at other mine sites in the north to see what they are doing for closure to rehabilitate the area. We will continue to investigate whether we could start looking at experimental plots. So far we have thought this was too premature because we are still doing construction.
GN Update on Caribou Survey
<ul style="list-style-type: none"> • There were a total of 3 survey days - April 26,27,28. The team was based out of Mary River, refuelled and stayed there during this period. Areas surveyed included the Steensby camp. • Observations: we saw less animals than we did last year, but these results are still preliminarily so we cannot make conclusions yet. • Caribou were not where they were in previous years, so they have moved from where they are normally spending time. No caribou was observed in the direct vicinity of the camp. This does not necessarily mean that caribou don’t interact in areas near the Project – it could just be relevant to the time the survey was conducted.

Discussion and Comments

- Fresh snow: we were able to see tracks, but heavily used travel routes may not have been identifiable at this time. We did observe a number of snow machine tracks south of the Project site. The GN would like to know if BIM knows whether or not this is from operational activities or from hunters.
- The methods used for these surveys provide a snap shot in time, but population trends cannot be understood with this level of effort; additional resources would be required. The most cost effective would be herd demographics to track populations through the number of new calves each year. This can also be used to set the harvesting regimes.
- Four main objectives of the study are to:
 - Assess the vigor of the population
 - Develop a trajectory of the populations based on the herds demographic compositions
 - Analyze herd size through composition modelling
 - Develop estimates of sustainable harvest levels – to determine if total sustainable harvest levels are appropriate for the herd.
- We hope to be able to provide a more comprehensive summary at next TEWG meeting.
- EP requested clarification on where the survey was carried out, and when specifically, surveys were done.
- BP responded South to southeast of Mary River – towards Steensby Inlet (25 km from Mine site), on April 26, April 27, April 28 of 2018.
- MS asked whether anyone from HTO takes part in these surveys?
- BP replied yes, someone from the HTO took part in a part of the survey but he was not well on the helicopter so he could not complete the full surveys.
- EP offered he believes community members from Igloodik hunt caribou in that area, and suspects it is Igloodik hunters that use the snow machines. They have a quota in that area of 29. We hunt caribou also from Pond Inlet that way, even I have not heard of any reports from Pond that they ran into hunters from Igloodik. When there was the dog sled race, I believe they went hunting before then, so there is a lot of activity from the hunters too.
- PE also saw two hunters around the time of the dog sled race that were going up there for hunting.
- EP says that we know caribou; we know where they calve. In the spring time as it warms up, they go up to higher ground with their calves. The bulls don't move as much, but in the fall they move again to the east to feed off for the winter to fatten themselves. This is how know how they will be affected by the railway.
- JH asks whether we know where GN is planning to survey next spring? Will they survey next spring?
- BP answers that the extent of the survey is really dependent on the amount of funding they get, but the GN is planning to continue surveys on an annual basis.
- EP adds that, for the last time; skidoo tracks you saw going to Steensby inlet, we go caribou hunting to – it's further in the fjord towards the ocean. Some people from Igloodik hunt there – they have more bull over there so they prefer to kill bulls by the shoreline.
- MS contributes that for the sake of the Working Groups we think it would be really helpful to see maps of where the biologists have seen the caribou.
- BP responds that now that we have a regional wildlife biologist on staff we will be able to increase efforts on mapping and analysis.

Conclusion / Round Table

- 1) Follow up discussion between BIM / QIA and GN to flesh out details on methodology for survey on dust fall and vegetation survey

Discussion and Comments	
2) Investigate opportunities for BIM to work more closely with communities to discuss potential harm from the area with dust in the area 3) Investigate using aerial surveys / digital imagery to understand dust fall extent across the project site 4) GN and BIM to have offline discussion regarding support for caribou surveys 5) BIM to work with Site team to ensure signs for recording observations are more apparent throughout the complexes and on site – and additional training as required to make them better used	
Wildlife on Site	
<ul style="list-style-type: none"> • PE says that, regarding fox, they are very tame. Is that because they are fed scraps? You seem to have an abundance of fox. I thought BIM staff may be feeding them or they may be eating garbage, maybe this is why you have so many arctic fox. • JT replies that when the mine first opened, the fox went after the garbage and work sites, and they also said some staff fed them in the beginning unfortunately. This has been corrected, and they are not allowed to feed them. The GN has a law not to feed wildlife. • PE asks, what about ravens? I have seen some people feeding the ravens at the fjord. • MLH responds that if there are observations of project personnel feeding the wildlife, please report it. This is absolutely not allowed. If anyone is found doing this, there are strict procedures in place to deal with this, including possible employee termination. It is known that foxes are in the area, and that they are attracted to activities. We have deterrents on site which include fencing on all project complexes and building to prevent animals from coming in. We have strict waste sorting guidelines, so we incinerate waste to reduce smell that would attract them. • BP adds that one of our biologists observed that you do have a number of fox and rabbits at site and one of the methods BIM used is recording these observations. However, when our biologists were up at site, we noticed these weren't being used properly. Based on this, we think it would be important for additional training and increased awareness to staff and making signage more apparent. 	

	Action Item	Action By	Update
1	MLH to follow up with the WG on adaptive management for the Tote road dust.	Baffinland	
2	MLH to send copy of PDF with information about road warrior to BP.	Baffinland	Completed on June 5, 2018
3	Follow up discussion between BIM / QIA and GN to flesh out details on methodology for survey on dust fall and vegetation survey	BIM/QIA/GN	Completed on August 3, 2018.
4	Investigate opportunities for BIM to work more closely with communities to discuss potential harm from the area with dust in the area	BIM and communities	Ongoing – meeting to be held in Pond Inlet on July 12, 2018

	Action Item	Action By	Update
5	Investigate using aerial surveys / digital imagery to understand dust fall extent across the project site	BIM	
6	GN and BIM to have offline discussion regarding support for caribou surveys	GN/BIM	Completed on August 3, 2018.
7	BIM to work with Site team to ensure signs for recording wildlife observations are more apparent throughout the complexes and on site – and additional training with site staff to increase effectiveness of recording procedures.	BIM	Completed on June 11, 2018

Terrestrial Environment Working Group (TEWG) Meeting

Date: September 20, 2018

2:00 pm – 4:00 pm (EST)

Call in #: +1-416-607-0170 **Access Code:** 999 276 019

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	N	Mittimatalik Hunters and Trappers Organization (MHTO)	Joshua Arreak (JA)	N
	Joe Tigullaraq (JT)	N		Elijah Panipakoocho (EP)	
	Emma Malcolm (EM)	P	Observer Organization	Participants	
Qikiqtani Inuit Association (QIA) and Consultants	Jeff Higdon (JH)	P	World Wildlife Fund – Canada (WWF)	Amanda Hanson Main (AHM)	P
	Fai Ndofor (FN)			Brandon Laforest	
	Sean Joseph (SJ)				
	David Qamaniq (DQ)				
Environment and Climate Change Canada (ECCC)	JF Dufour (JD)	N	Baffinland Consultants	Participants	
	Paul Smith (PS)	P			
Government of Nunavut	Brad Pirie (BP)	P	EDI	Mike Setterington (MS)	P
	John Ringrose (JR)	P			
	Alexander Kelly (AK)				
	Alexandre Chaikine (AC)				

P-phone in participation, I – In person, N- Not attending

Discussion and Comments
Baffinland Project Update
<p>General Update:</p> <p>EM: Baffinland officially commenced the shipping season on July 20, when the Ice Management Vessel entered Milne Inlet. The first ore carrier was loaded on July 24. We installed 6 additional dust fall samplers this year. They will be placed at the 1km distance from the road. Calcium chloride and water dust suppression activities also continued, as well as procurement of 50 additional covers for the crusher.</p> <p>BP: When are dust fall collectors being installed?</p> <p>MS: They were installed this week, and we will begin collecting data in 2019.</p> <p>BP: Have the additional covers been installed at the crusher:</p> <p>EM: They are installed on an as-needed basis, either to replace existing ones, or along areas where additional mitigation is required.</p>

Discussion and Comments

6MTPA:

EM: Baffinland received a recommendation from NIRB that the Project should not increase to hauling and shipping of 6MTPA of iron ore in 2018. We are currently reviewing how we will move forward and will submit a public response in the coming weeks.

DQ: Will the production increase go ahead even if the community of Pond Inlet doesn't support it?

EM: Listening and responding to community concerns related to all aspects of the Project and Project planning is important to Baffinland. Megan and Joe are not able to be a part of this call today, as they are currently meeting with representatives from Pond Inlet to discuss the proposed increase and understand how to resolve outstanding concerns.

JR: Will the hauling limits exceed 4.2MTPA before the end of the year, even if Baffinland does not receive approval?

EM: At this point, we are assessing our options on how to proceed in the event that we do not receive Ministerial approval on the 6MTPA application.

Phase 2 EIS:

EM: Baffinland submitted the Phase 2 EIS to NIRB on August 15. On September 14, we received notice from NIRB that our original submission did not achieve conformity with the EIS Guidelines. This was largely due to administrative issues, and we are therefore expecting to resubmit in the coming weeks. Once the EIS passes conformity, the NIRB will issue a schedule for the assessment process.

AHM: When can non-governmental reviewers expect to receive electronic copies of the EIS?

EM: I will get back to you with this information.

{Post-meeting note: The EIS is available on the NIRB Public Registry for interested parties who wish to submit comments.}

2018 Terrestrial Monitoring Program Overview

MS: The purpose of today's presentation will be to present a summary of the monitoring programs that were carried out during the 2018 field season. Key monitoring programs that occurred in 2018 for the Terrestrial Environment included Dust Fall monitoring, vegetation abundance and distribution monitoring, mammal monitoring via snow track and height of land surveys, raptor occupancy and productivity survey and support for the Canadian Wildlife Service Program for Regional and International Shorebird Monitoring and helicopter flight height adherence monitoring.

Dust Fall:

DQ: Does Baffinland apply calcium chloride throughout the entire year, or just in the summer? Do you monitor for potential effects of calcium chloride in freshwater?

AHM: Is the calcium chloride applied in only targeted areas (e.g. where dust fall tends to be higher)?

EM: The use of calcium chloride as a dust suppression method is an approved mitigation method in Nunavut, and is well known for its efficacy. We screen for calcium chloride as part of our aquatic effects monitoring program. Calcium chloride and water suppressants are applied primarily in summer months. We avoid using these suppressants near stock piles at Milne Port because we don't want it to interact with the iron ore.

Vegetation:

DQ: Do you know if vegetation is not changing at the Project because of caribou? Have you seen more lichen growing because there is no caribou around?

MS: As a control measure in our design of the vegetation monitoring program, we establish enclosed plots, so we can compare what is growing in and outside of the plots. In other words, this helps us to assess whether vegetation is growing the same in the plot, where animals can't access it, as it is outside of the plots. To date we have not seen a significant difference in vegetation abundance or variety within or outside of the plots.

JH: Can the Working Group receive a copy of the meeting minutes from the follow up meeting that was held between Baffinland and the Government of Nunavut (GN) after the June TEWG meeting?

Discussion and Comments
<p>EM: We can share if the GN agrees. BP: Yes, we can share once a final copy is complete. EM: I will distribute to the group when these are ready.</p> <p>Mammal Monitoring: DQ: Have you seen any caribou during Height of Land (HOL) surveys? MS: We haven't seen any caribou on site since 2013. Baffinland does however, have a protocol in place for recording any incidental observations, should they occur. We discussed the methodology of the HOL surveys during the June TEWG meeting, but we can continue to discuss as necessary at future meetings.</p> <p>PRISM Surveys (ECCC): PS: Baffinland has supported Canadian Wildlife Surveys to help meet their own Project Certificate requirements. This year we did not observe any red knots, despite observing that there is suitable habitat available. We will have recordings completed for next year's survey. We also have a graduate student who is researching the densities of bird populations can be affected by mineral development in the region. DQ: Since CWS is running this program, I am assuming Bylot Island is included? PS: Yes. DQ: Is Artic Bay, Resolute and Grise Fjord included in the North Baffin survey? This year only Artic Bay was included. Future years would look to include Grise Fjord and North Baffin.</p>
<p>Conclusion / Round Table</p>
<p>Suggestion by PS to hold next TEWG meeting in Ottawa during the same week as Arctic Net Conference.</p>

	Action Item	Action By	Update
1	EM to reach out to Working Groups to confirm next dates and proposed for final TEWG meeting of the year.	Baffinland	Completed. Final TEWG meeting of the year scheduled for December 11, 2018 in Ottawa.
2	EM to circulate a copy of August 3 meeting minutes from Baffinland / GN follow up meeting.	Baffinland	

Terrestrial Environment Working Group (TEWG) Meeting

Date: December 11, 2018

9:00 am – 5:00 pm (EST)

Location: Delta Hotel Ottawa, 101 Lyon St. N, Ottawa ON

Call in #: +1-416-607-0170 **Access Code:** 996 175 305

Member Organization	Participants		Member Organization	Participants	
Baffinland Iron Mines Corporation (Baffinland)	Megan Lord-Hoyle (MLH)	I	Mittimatalik Hunters and Trappers Organization (MHTO)	Phanuel Enoogak (PE)	I
	Joe Tigullaraq (JT)	N		Enookie Inuarak (EI)	
	Emma Malcolm (EM)	I	Observer Organization	Participants	
Qikiqtani Inuit Association (QIA) and Consultants	Jeff Higdon (JH)	I	World Wildlife Fund – Canada (WWF)	Amanda Hanson Main (AHM)	N
	Fai Ndofor (FN)			Brandon Laforest (BL)	
	Sean Joseph (SJ)				
	David Qamaniq (DQ)				
Rick Hoos (RH)		Nunavut Impact Review Board (NIRB)	Solomon Amuno (SA)	I	
Environment and Climate Change Canada (ECCC)	JF Dufour (JD)	N	Baffinland Consultants	Participants	
	Paul Smith (PS)	P			
Government of Nunavut	Brad Pirie (BP)	I	EDI	Mike Settingington (MS)	I
	John Ringrose (JR)			Lyndsay Doetzel	
	Alexander Kelly (AK)			Allison Patterson (AP)	

P-phone in participation, I – In person, N- Not attending

Discussion and Comments
Baffinland Project Update
<p>6MTPA: MLH: Baffinland submitted an application to NIRB in April and it was approved by the Minister in October. Application proposed increasing hauling and shipping from 4.2MTPA to 6MTPA, the addition of a 15ML fuel tank and a new 380-person camp at Milne Port. Additional conditions were assigned as part of approval, including participation of NIRB as an observer in the Marine Environment Working Group (MEWG).</p>

Discussion and Comments
<p>DQ: When December 2019 comes around – you will no longer be able to haul and ship 6MPTA? MLH: Yes, the term and condition would have us going back to the 4.2MTPA at the end of 2019, however we have submitted our Phase 2 application, so we are hoping to be able to increase shipping in 2020 in accordance with our Phase 2 plan. DQ: Are you going to ship 6MTPA in 2019? MLH: Yes, we are currently planning to ship 6MTPA – the start of our current shipping window is July 15, so we will begin anytime ice conditions allow after July 15.</p> <p>Phase 2: MLH: BIM received concordance from NIRB on the Final Environmental Impact Statement (FEIS) addendum in October. Information Requests (IRs) were submitted by reviewers, and Baffinland will be providing responses to those IRs in the coming weeks. As the purpose of these Working Groups is to focus on environmental monitoring for our currently approved Project, I am suggesting we hold two TEWG meetings throughout the Phase 2 regulatory review process; one the first week of February and one the second week of April. The intent would be to include both regularly attending members of the Working Groups, as well as Phase 2 focused representatives from regulatory agencies who have a jurisdictional interest in the Project.</p>
<p>2018 Terrestrial Monitoring Program Overview</p> <p>MS: The Draft Terrestrial Annual report was sent out to the TEWG on November 25, 2018. We are requesting comments on the report from TEWG members by December 17, 2018. Last year Baffinland developed the Working Group Comment form so that comments received by members of the Working Groups and Baffinland’s responses could be shared in the Annual Report with other interested stakeholders.</p> <p>MS: Since the start of the Project, the terrestrial monitoring program has improved as a result of comments received from the working group and the subsequent expansions of the program. With annual reporting the goal is to verify impact predictions, demonstrate how we incorporate input from Inuit participating in the programs, how we incorporate feedback from the TEWG, and to describe how we have developed adaptive management practices to respond to regulator and community concerns and improve the overall design of the Project.</p>
<p>Vegetation</p> <p>MS: This is our fourth year of vegetation monitoring; we now have three years of repeatable monitoring. This program was developed with substantial input from the GN through the TEWG over the years, and as a result of QIA’s request to continue the vegetation monitoring program. The objective of the program is to measure percent plant cover and plant group composition, including caribou forage, and distinguish project-related from natural impacts. We have vegetation plots with 30m of the PDA to understand maximum impact, but we also monitor at reference plots to compare how vegetation is growing at different sites. We have set them up 30m away so the vegetation plots do not interfere with operational activities, such as snow management. We use one habitat type for sampling. The vegetation plots are permanent structures to maintain the integrity of the sampling area.</p> <p>DQ: How do you prevent lemmings from entering the vegetation plots, because they can tunnel underground? MS: That’s true, lemmings could access that. We are not able to exclude lemmings from plots, so lemming forage will be equal across open and closed plots. The exclosures exclude larger foragers.</p> <p>There are 100 samples taken within the 1M X 1M plots at the Canopy layer. There are 60 plots in total. Over the past four years, we have had very consistent sampling, and to date we have not seen any effects on total ground cover.</p> <p>JR: It appears as if there is more confidence in the reference sites than in project sites. AP: Confidence intervals on reference sites are wider because of the number of sample sites versus those where we have a higher number of sample sites at the 30m and 100m where we would expect to see effects.</p>

Discussion and Comments

JR: What is the purpose of having reference sites to validate what is occurring near the PDA if the confidence levels between PDA and reference sites are different?

AP: That is a fair criticism, however given that we are not seeing any project effects within the 1000m, it does not seem that there would be need. I am not sure that statistically we would really require additional vegetation plots 20km away from the Project site.

RH: In terms of a lack of difference between the open vs closed plots – can we assert that there is likely very little grazing occurring near the Project site?

MS: Correct, there are not many grazing animals in the region.

RH: Based on the results, do you think it seems like there is more canopy cover nears the Project sites in area where there is disturbance?

MS: It is not a discernible difference.

MS: The program was designed to monitor for lichen, but lichen cover has been low in the area at least since we started doing vegetation monitoring in 2014. Based on what we've heard, the caribou foraged in the area in the late 90s and early 2000s, but then they have left the area. This has been agreed upon by community members in the area and is aligned with the idea that caribou move in 70-75 year cycles.

JR: Can you explain the decrease in graminoid in the canopy cover?

MS: In 2014 we had a very green year. We could hypothesize that in 2014 there was a very green year which produced a lot of standing dead litter in subsequent years, and subsequently created cover preventing other plants to grow.

PS: My guess is that it was likely due to the fact that 2015 was a late snow melt, so maybe it influenced growth levels.

DQ: Don't you think there if there is no caribou the lichen in the area should have grown? Do you think it has to do with the weather?

MS: My guess is that we are going to see lichen gradually increase in abundance, in line with the expected 70-75 year caribou cycle.

AP: Lichen is one species we can really measure accurately and precisely because it grows outward it is relatively easy to measure with the laser point with a repeatable methodology.

JR: If the laser hits a clump of standing litter, do you move it out of the way and take another measurement?

AP: For each area, we test two layers (canopy and ground cover) – lichen only grows in the ground layer. If additional comments can be sent in on the report, we can revise and provide additional details.

PS: Have you measured soil moisture as part of your program, especially for a mossy area?

MS: We haven't but we could think about including that.

JR: I agree that moisture we should look into, willows and mosses would be indicative of a moist site.

AP: What we were interested in with the repeatability study was to remeasure the same plots within the same day or next day, so we made 2 measurements of the same plot. In most cases, this showed that the design and results were very repeatable and similar. Lichen was 95% the same and moss was 97% repeatable. The graminoids did not have the same level of repeatability, which we think is probably because it does not grow vertically, so it's difficult to measure as consistently or accurately, which is why we have included graminoid as dead and standing litter.

JH: If we combine past data to see how this would look together would it affect the amount of growth?

AP: This is something we might consider in future analysis and reporting.

DQ: We have a very short growing season in the Arctic and if the weather stays cool vegetation doesn't grow until later. We see growth in July and it dies off by August. I think you also need to keep this in mind. We have no more caribou and we know that because of activity around there. I believe when there is wildlife to eat vegetation, it will grow more.

Droppings from animals will also make the vegetation grow more.

JR: Are you noticing the differences year to year in the same reference sites? Perhaps it's an issue of seasonality (e.g. if you are doing the sampling at different times within the growing season.)

MS: We do go to the same reference sites each year. But yes, trying to hit the same part of the growing season each year is challenging, because the growth season does change each year.

Discussion and Comments
<p>JR: So if sampling goes on for 10 or 15 years, and seasonality influences growth, are you still going to be able to detect project effects?</p> <p>AP: Project changes should be detectable whether or not we are sampling within the exact same period throughout the growth season.</p> <p>PS: The difference of 2 weeks is extremely important in the Arctic though, when you really only have about a month of growing in the summer. You could use satellite imagery to monitor the growth season.</p> <p>AP: We could look into what we're doing with satellite imagery, but we can't plan our sampling period based on satellite images because it would be retroactively collected. However, we could assess if there is a daily trend across our sampling program.</p> <p>DQ: You have to remember, the trees burn in the south, we have many forest fires in the south – but we get very little sun because of the smoke and dust.</p> <p>MS: That's a good point. That's why we include reference points as well. They allow us to better understand what is happening across the region.</p> <p>JR: I'm assuming you use a helicopter to do all the reference sites? Do you do this all in one day? Conducting sampling across several different days could also influence the variability in results.</p> <p>AP: We'll have to check and look into this.</p>
<p>Birds</p> <p>PS: Do you know in the spring what areas you will be disturbing before the migratory bird surveys? At Agnico we are looking for mitigation to prevent birds from nesting. We have also looked into using deterrents and reflective.</p> <p>MLH: We don't always know.</p> <p>DQ: It says you deploy passive recorders for red knot, but that this was deferred from 2018 to 2019/2020. Why was it deferred?</p> <p>MS: We will speak to that on a later slide. PS has a presentation on 2018 results.</p> <p>MS: The Project Certificate requires Baffinland to commit to monitoring peregrine falcon nesting activities to develop and update relevant monitoring and management plans for migratory birds. We are looking for birds that come and occupy these sites and whether or not chicks are occupying the sites. We have found some nesting sites since we began conducting this monitoring at the start of the Project for peregrine falcon and rough-legged hawks.</p> <p>JR: If you are finding new nests every year, do you go back the next year and check that those nests are still there? If you are increasing the number of nests that you see because you're increasing the area that is surveyed each year, how do you know if the number of nests are actually increasing or decreasing?</p> <p>MS: One of the key indicators is occupancy – so even if you increase the number of sample sites, what we are primarily concerned with is whether birds are coming back each year and if they are producing young.</p> <p>PE: We know peregrine falcons and gyrfalcons have permanent nesting sites, so they go back and they do return to their sites annually and permanently, and it doesn't seem to change their habitat when it comes to nesting. Seals do the same – whether it's a bird or a mammal.</p> <p>PS: Right, exactly, so if we start to see that the birds don't return, then we could find a conclusion that maybe the Project is making them not want to go back to their nests. They are also only measuring productivity at the end of the season. For bird populations it's important to have a regional context as much as the local populations.</p> <p>MS: One of our grad students is investigating methodology for search efforts.</p> <p>JR: Where can description of methodology be found?</p> <p>MS: That is included in the annual Report.</p> <p>DQ: I have not seen any information about snowy owls in the reports?</p> <p>MS: The staff on site see snowy owls sometimes, and this is recorded, but we don't report on it on a regular basis.</p>
<p>Helicopter Overflight</p>

Discussion and Comments

MS: The key concerns in the Project Certificate is that Baffinland should be informing pilots of the recommended guidelines for flight heights. To address these condition's, we retrieve the satellite data for the flights, check the height in the data, and then compare this with the descriptions of flights provided by pilots for each recorded trip (e.g. why are they flying lower if this occurs). Transport Canada notes that there is a requirement that flight heights be determined at pilot's discretion. For the purposes of reporting, we classify flights as "compliant" where a rationale for a low level flight was provided by the pilot, although this does not mean that a low level flight did not occur.

PS: Were all flights in June 1500m from the edge of the Snow Goose concentration area. Even if a reason is provided for elevation, there is no reason pilots couldn't fly 1500m horizontal from the area.

MS: That's a good question, I can go back and look at the data, although it is noted that this is not a specific requirement of the term and condition.

MS: The suggestion to record rationale for flights was one of the key inputs from the TEWG, and we have used this to better understand why lower-level flights are occurring.

JH: In the annual report there is 6 categories for flight data, but I don't see any related to horizontal distance, only for elevation.

MS: We can go back and take a look at this data for horizontal flights.

JH: In the terms and conditions, the reason for elevation recommendations is to be protective of minimizing disturbances to wildlife. Do you have rationale for low level flights broken into different categories so reviewers can better understand the justification? Do you take into consideration how much you could avoid use of the helicopter?

MLH: That is why we have begun to ask pilots to record this information, so we do have a better understanding. However, in many instances, using the helicopter is really only the way to access monitoring sites.

JR: Our concern is that when the Project grows in size, and helicopter flights and risks for disturbances increase, then that is an issue.

MS: Agreed. This is really an industry-wide issue, and to date Baffinland is the only company collecting and reporting on these data. But yes, it is a challenge for sure.

Mammals

MS: Baffinland conducts several different kinds of terrestrial mammal monitoring programs. We have conducted substantial IQ collection regarding caribou migration trails, but since the start of the Project we have seen such a decrease in caribou abundance in the region, so we have not needed to update maps as one of the Project conditions specifies. We are continuing to see arctic fox and hare tracks through our snow track monitoring frequently on site. We measure snowbanks stopping at every KM post along the Tote Road. Initially we had just one survey per year, but based on feedback from TEWG we increased this to four times per year to improve the on-site compliance with making sure heights of snowbanks are managed.

BP: Why weren't snow bank surveys conducted in March?

MLH: I will look into it.

[Post Meeting Notes: The surveys were missed in March due to other site environmental priorities].

DQ: It says in the report that Government of Nunavut conducted regional caribou surveys in spring of 2018, but the fall survey was not conducted. Is this due to lack of funding?

JR: We [GN] will speak to it this afternoon.

MS: We have not seen any caribou or wolf as part of the snow track surveys since Project monitoring in 2014.

RH: The trend line indicated that in 2017 you had low compliance for snow bank monitoring. So were you not managing snow at that time?

MS: In 2017, we were only doing snowbank monitoring once per year – and in 2017 it was conducted after a large snow event [wind], which in a way skews the reporting. This is another reason why we increased it to four times per year.

Discussion and Comments

PE: We have certain seasons of the year when we have Arctic Fox, there is a lot of variation. This is hard because we rely on this for our income, but sometimes there is just very little to catch.

MS: We don't currently monitor fox population cycles as part of our programs. We just report on it as part of our snow track monitoring.

MLH: But it is interesting that trend graphs reflect an increase and then decrease year-to-year which reflects the information provided by Phaniel.

DQ: Do you only track fox and hare through snowtrack surveys? Or do you report when you see them on site?

MS: Yes – Baffinland has a protocol in place to record anytime wildlife is observed on site, and this information is then shared in the Terrestrial Annual Report in the incidental wildlife sightings log summary.

JR: How do you complete the snowtrack surveys when the snowbank heights are too high?

MS: If it is needed, we will walk along the high sections of the snow banks to check for snowtracks.

DQ: Doesn't Baffinland have snowbank height management practices in place?

MS: Yes – they do. The snowbanks are flattened out after major snow events.

MLH: From a safety perspective as well, we will always work to get these flattened out as efficiently as possible. One of the reasons we adopted this as a site based program is because our Site environment department was able to complete these surveys much more frequently and thereby improve our operations on an ongoing basis as well.

JR: Are these surveys dependent on site resources? Or are there controls in place to firm up the methodology of the surveys?

MS: The snowbank survey is done based on staff availability, and the snow track survey is the same and is completed by Baffinland Site Environment staff. We do try and track weather conditions beforehand so we can understand how much fresh snow will be there.

JR: So are there instances where you have different snow conditions between the start or end of the survey?

MS: No, because the snow track surveys are conducted in about a day long period, so there are no substantial weather changes within the survey period.

BP: Do you observe both sides of the road, and do you provide any training to the individuals conducting the snow track surveys? How do you distinguish between different animals (e.g. differentiating that it is not the same animal that you have seen all the tracks for).

MS: It is fairly easy to spot the tracks, and we run the survey up both on the side of the road, as you return to the original departure location. They're fairly easy to spot.

JR: Over the past couple of years, the GN has consistently made comments that HOL and snow track surveys should increase. Based on what you have said you are sampling a very small amount of time, so how can you feel confident that this is representative of what is actually happening on the land?

MS: Yes, we agree that this a low number of survey hours and not the only method we should be relying on to know how frequently animals are near the road. However, we do have ore haul truck (OHT) drivers continually traversing the road – and they would be required to report any sightings.

JR: If the point of the survey is to understand Project effects, and you agree this level of sampling is too small, then how can you know if you are accurately capturing Project effects and have the right mitigations in place?

MS: This survey is specifically designed to monitor Project effects on caribou. Until caribou are present in greater abundance in the region, than we won't have any response variable to monitor. Given how frequently OHTs are frequenting the road, while it's not explicitly stated, there is a really intensive level of observation efforts.

JR: But of course OHTs are not going to be able to spot for caribou. If caribou are seeing a constant line of traffic, why would they go to a close distance towards the roads.

BP: The annual report noted that the survey was good for about 50km, and then light was beginning to fade, so I wonder if it is enough effort. The methodology described in the report is not the same as what was said during the TEWG meeting.

MLH: We can touch base with our site team to get more specifics on the methodology, but these questions need to stay focused on what the objectives of PC conditions are, and how relevant this is to monitoring caribou. Until we have the response variable of caribou, there would be no need to increase the level of effort in this survey. These snow track

Discussion and Comments
<p>surveys are not designed for arctic fox and hare, they are designed for caribou. The sightings with arctic fox and hare are almost incidental.</p> <p>MS: These are designed to assess behavioral response of caribou. It is based on methods that had been used at Ekati diamond mine.</p> <p>JR: So are you confident that these are a large enough to assess behavior?</p> <p>MS: Yes, these are a matter of scales of effects. The snowtrack surveys are used to detect very localized behavioral responses to disturbances along the Tote Road.</p> <p>JH: Mike can you begin including more information on incidental siting's from OHT drivers?</p> <p>MS: Yes, we can, but there is not a significant amount of data to report on.</p> <p>JR: It would be helpful if we can get a better sense of the capacity for spatial siting for the snow track survey so we have a better understanding of where visibility is limited.</p> <p>MS: Yes, we can look into this.</p>
<p>Height of Land Surveys</p> <p>MS: Objective of the monitoring program is to observe caribou behavior near Project footprint, determine if there are work stoppage requirements and to use this as an indicator for further survey requirements.</p> <p>We have conducted a view shed analysis to better understand how far across the land we can actually see from the various sample sites. Right now we do this at most twice per year, and at least during the caribou calving season, but we would like to do it more frequently and with more involvement from elders and other Inuit observers.</p> <p>JH: Can we get a map of the viewshed analysis map overlaid with the caribou trails and IQ identified areas?</p> <p>MS: Yes, we could prepare this for another TEWG meeting.</p> <p>PS: Another thing you could report easily is the number of hours completed for bird surveys, and whether or not any caribou were sighted during that time.</p> <p>MS: Agreed, because that is about 40 hours of surveying time.</p> <p>JR: If you are creating so much disturbance in a core area because of the helicopters used for HOL surveys, you may be skewing the data.</p> <p>MS: Agreed, there is a definitely the possibility that this could occur. That is why we have described a 14km zone of influence, but this is not an exclusion area for caribou. There is just nothing to suggest that.</p> <p>JR: I'm not sure with your methodology of current programs that you will be able to capture whether or not caribou in the region is affected by the mine or if because the population is low at a regional level.</p> <p>MS: We have had this conversation several times, I don't believe that with population levels this low we would be able to capture this either way.</p> <p>JR: The GN has indeed identified issues over the past several of years with the level and amount of surveys. In 2014 we indicated this was not enough, and then in 2018 the GN and WWF also noted that surveys were not robust enough. If there are only 100 animals within the Project vicinity, 20 hours is not enough. The other concern is relative to the use of flying a helicopter to the sampling locations, so you may have already influenced caribou behavior. This is an ongoing conversation, but the GN's position has not changed.</p> <p>MS: We can't look at any of these monitoring programs in isolation of other observational data and what else is occurring in the region – it is important to keep that in mind.</p>
<p>Government of Nunavut – Caribou Monitoring Program</p> <p>JR: There are two primary types of caribou surveys conducted by GN:</p> <ul style="list-style-type: none"> - Abundance surveys (actual # of caribou on the Island) - Compositions surveys (ratio of bulls, cows, calves and calf survival) <ul style="list-style-type: none"> o Spring Surveys are used for calf over-winter survival while Fall are best for cow ration and after summer calf recruitment <p>Last time GN conducted an abundance survey was in 2014, while composition surveys were completed from 2015 to 2018. The next composition survey is planned for March / April 2019.</p>

Discussion and Comments

Abundance survey sample sites are determined based on budget and resource constraints and input from HTOs. The 2014 Abundance Survey report is available on the GN Website. Once transects are set, observations occur from the airplane with four observers (two on each side of the plane) and a one recorder on each side, switching throughout the day to correct for observer error.

We know caribou are on a long cycle depending on predators in the region, disease, availability of foraging, etc. So in 2014 GN estimated between 3,462 – 6,250. After having a sense of abundance, we conduct composition surveys so we can better understand the make up of the populations.

DQ: In Baffin Island, you're going all the way to Clyde River, but there is no indication of why you would go to Clyde River. Please clarify what else you're doing in Clyde River.

JR: I don't believe we have done any composition surveying recently in Clyde River. Recognizing that the population is low in the North Baffin, we have been trying to focus on key areas.

DQ: In 2014, I understand you hired people from a different area to do that study. Why wouldn't you have hired people from North Baffin to survey that area?

JR: I agree that is the preferred approach moving forward.

DQ: Are you planning on doing more surveys on the areas you missed in the past?

JR: For Spring, we don't have a plan to do this mountainous area (*pointing to map on slide*), we are designing our composition areas right now based on where we have identified that populations are higher.

DQ: Why was the Fall 2018 survey not completed by the GN?

JR: I will get back to that.

MS: When Baffinland was holding caribou IQ workshops in 2008, we started to better understand the cycle of how caribou move along the various regions across Nunavut. Back in 2008 Inuit participants indicated that the caribou went into the mountains near Clyde River. So David's question is very similar to what we have heard in the past.

JR: The objectives of the composition surveys are to determine the vigor of the population; determine the trajectory of productivity; monitor bull ratios to ensure that bull harvest is not reducing bulls to a proportion that could interfere with rutting success; and to build a database to estimate current population trend and inform on management discussions regarding current TAH levels.

DQ: The GN has suggested that should limit harvesting to bulls. We could also hunt females who don't have calves in the winter.

JR: We heard this from other community members as well. The purpose of the composition survey is set up to make sure there are still a balanced number of males and females across the population. The impact to population is less when you are focused on harvesting bulls.

PE: Bull caribou tend to taste very bad during mating season. Did you know that there are certain times of the year that we simply can't eat them because of the taste? We don't even want to hunt them during this time. I think you need to understand why the female and male need to be treated equally.

JR: We will definitely discuss this further at the HTO meetings, but I do understand your concerns and think we should talk about them more in the future so the GN can hear your concerns.

PE: In my community, when we still had plenty of caribou there was a season that they all died off and it was because of competition for food, it is part of the cycle.

JR: Agreed this is part of the cycle.

JR: The GN does not have a Baffin Island specific composition / population threshold, so we use population data from other areas to establish a threshold or indicator.

Composition reports from 2015 to 2018 are available as well. GN is currently planning to conduct composition survey in March or April of 2019, and is planning to conduct surveys only in South and Central Baffin. GN is in discussions with Baffinland regarding additional survey effort for North Baffin. Other upcoming research is to be determined right now.

Discussion and Comments

HTO consultations are scheduled for January 2019, and once these occurs, research priorities can be set. GN is scheduled to do consultation with MTHO in January 2018.

PS: You had said 100 animals were observed for the North Baffin region. How many caribous did you see per flight hour? That way we could compare what GN is seeing vs what pilots working for the Mine are seeing.

JR: Yes, we saw 100 caribou in 2018 during the Spring Survey. This should be fairly accurate because we fly the tracks and follow them.

MS: Paul is discussing the fact that you're looking specifically for caribou 'hot-spots' and you're still only seeing 100. If you're having that level of effort, and still only seeing that few. While we're waiting for the caribou to come, and we're not seeing many – and yet you are surprised by the small level we are seeing. So we are unsure what you're expecting us to see, and why the emphasis on more HoL survey time? What will it achieve when caribou numbers are so low?

JR: Just because we only saw 100 caribou, it doesn't mean that there not there. We've also been focusing more south of the mine, instead of directly around the Mine. This is just a snapshot in time.

MS: The population estimate you have is anywhere from 95-521 so that is an abundance level survey – so we need to look at all the information available to us. Based on there being at most 521 animals in the area (all north Baffin Island), we are not going to see Project level effects. The GN is criticizing the BIM surveys, even though the densities are far too low to detect Project effects.

JR: Our concern is that caribou may not increase in the general vicinity of the mine at all because of the Mine.

EI: Someone went caribou hunting by Mary River, and I believe they harvested caribou near there. When you do aerial surveys, you could use ordinary hunters to do the surveys from a larger area, not a limited area. The use of the local people and hunters could go a long way.

JH: Any idea on when the GN may do another abundance survey?

JR: Without having confident delineations of where caribou are going (i.e. focusing exclusively on North Baffin) we would not have a lot of confidence in the estimates. Currently there is no plan to do it, but that could change. We're using the composition surveys to also support setting research priorities and using this data to justify or indicate that population levels have changed enough that it warrants another survey.

JH: Is the money that BIM has committed to community-based monitoring available for marine or terrestrial research?

MLH: it is completely up to the communities.

DQ: It looks like GN is ignoring North Baffin, and because Baffinland is there, it seems like GN is relying on Baffinland to do the work of GN.

JR: GN does not expect Baffinland to conduct abundance or composition surveys, but yes we do have financial constraints which mean that we cannot do the North Baffin surveys without support from Baffinland.

DQ: People always say it is too expensive to do research in North Baffin or Grise Fjord and Resolute. We are part of Nunavut so they need money to also do this work here.

JR: I agree and feel this is an equal priority – but the finances were decided on before I started, so we are trying to make the most of the program with what is there. We were also relying on external funding sources that we didn't end up receiving.

DQ: When was the last time you did a survey in South Baffin? So you are proposing all prioritizing of South Baffin.

JR: We did composition surveys in 2018 and we will do them again in 2019. This is being planned based on current financials but if we can get external support or support in kind this may change.

DQ: If you can't find external partners for North Baffin, when will you do more surveys.

JR: Until we have more secure funding and do consultation with HTOs, we won't have a long term plan for monitoring in the area.

Discussion and Comments
<p>PS: If we're interested in Project effects on caribou, there are also lots of mines where caribou are near the mine. Can we infer any information from these mines to better understand how caribou will respond to effects of disturbances from the mine?</p> <p>JR: I'm not sure – possibly.</p> <p>PS: Given current densities in North Baffin, maybe the best way to identify Project effects is to look at studies for other areas.</p> <p>JR: Possibly, but I think all variables would have to be comparable for that to make sense.</p> <p>DQ: I think you based your methodology on NWT findings, though right?</p> <p>JR: Yes, but we won't use this prescriptively forever. It is meant to serve as a starting point.</p>
<p>Dust Fall</p> <p>LD: The program objectives are to understand the magnitude and extent of dustfall, seasonal variation within dustfall and total annual dust fall. The Tote Road, the crusher, the loaders at the Port and at the airstrip are all primary areas of dust fall. We also analyze traffic levels to better understand how the numbers of transit on the Tote Road (OHT and other trucks on the road) may be contributing to the total amount of dust in the area.</p> <p>JH: Are the truck trips reported as one-way or two-way?</p> <p>LD: They are tracked as one-way transits.</p> <p>LD: The dust fall program is split into four key areas across the site at different sampling distances from the Project area 30m, 100, 500m, 1000m (except for in Milne Inlet where we have point sources instead of distance categories). There are 33 sites in total, but only 16 are monitored year-round because of health and safety issues with accessing the 500m and 1km sites during the winter.</p> <p>LD: In 2018, some additional mitigations were taken included installing shrouding at the crusher circuit transfer point, minimizing drop distance for stockpiling activities, installing fence downwind of ore stockpiles in Ore Pad beach area, ore pad re-design, continual road resurfacing using granular material, improvement to Mine Haul Road, limiting of</p> <p>DQ: You said you use EK-35 at airstrip and water and calcium chloride at Tote Road. Could you use EK-35 all along the Tote Road as well?</p> <p>MLH: I'm not sure if it's permitted for use beyond the airstrip – and I think it is very expensive, but we can look at using it elsewhere. We are currently looking at a number of products that we could either as a replacement for CaCl or in conjunction with it, but this has to be economically feasible.</p> <p>JH: Can you give information about quantity of EK-35 being applied?</p> <p>MLH: We will have to get back to you.</p> <p>LD: Water is used at the Mine and Port site, where CaCl is typically mostly distributed along the Tote Road.</p> <p>LD: The main sources of dust at the mine site appear to be at the Air Strip because of heavy traffic associated with Weather Haven, at the crusher (and roads near-by) and traffic on the mine haul road and near the ore deposit.</p> <p>JH: Regarding the reference sites, is there a way to set up monitors so that you can leave it over the winter and pick it up in the spring, because we are missing a lot of information.</p> <p>LD: We have alcohol in collectors in winter and algaecide in summer to collect the dust fall – the maximum you can leave this is 30 days, because after 30 days, a series of errors could be introduced to your sample. So essentially no, there is no way to get a valid measure if you're leaving it for any periods longer than 30 days.</p> <p>JR: How tall is the collection head on dust fall monitors?</p> <p>LD: It's about 2m high.</p> <p>JR: If you have substantial amount of dust near by the road, and it's not being redistributed through and kicked up into the air (i.e. at 2m), isn't there a possibility this isn't all being captured?</p>

Discussion and Comments

LD: I don't have that answer, because this methodology was developed before I began managing the program. However, when you look at images of the dust plumes, you see that most of the dust is being kicked higher than 2M. Plus if you lower it, you risk other things being introduced by ground contamination, in addition to capturing most of the dust.

DQ: Do you know why the air strip has the highest amount of dust fall?

LD: It is likely because of all the air traffic.

DQ: How many flights a day?

MLH: We have one community flight from Monday to Friday, we have 3 Nolinor flights from Iqaluit each week, and then other additional ad hoc flights.

JH: Is there a substantial difference between dust produced when flight takes off vs arrives?

LD: I'm not sure. That would require a substantial amount of nuanced data to be collected.

LD: Most of dust at Milne Port is a result of the quarry and stock pile.

JR: Are the locations with the highest amount of dust correlated with the greatest wind exposure?

LD: Yes, that correlation does seem to exist.

LD: We did see an overall reduction of dustfall in 2018, which I think is a combined result of both the dust suppression mitigations and the fact that we had a very wet summer.

PS: Why are your confidence limits asymmetrical?

LD: It is likely just an error in how the information transferred to the presentation [*Post Meeting Note: The error bars on the dust graphs are asymmetrical because the data were log transformed for analysis, but we have been plotting the results on the natural scale. Because the log scale is bounded by 0 and infinity, the lower 95% CI is always narrower than the upper 95% CI. We will either state that in the figure captions or explore presenting the data on the log scale instead, which would make the CI symmetrical*].

LD: In 2018 we saw across the site more dust fall in the winter than in the summer. Once we have the final amount from winter – I would guess that there is the same amount of dustfall from last winter to this winter, but what changed is that the amount of dustfall in the summer actually decreased.

LD: In the FEIS, annual dust fall ranges were predicted and divided into low, medium and high categories.

BP: Why do you use different units for isopleths compared to what you are collecting?

LD: It is because the lab does a daily assessment of the number. We're trying to look at places where we were expecting large amounts of dust fall over the year. The daily lab measure is a deposition method, divided based on the number of days the sampler was active. I don't know how I could take a mean daily dust fall and spread it out through the year.

MS: You are talking about isopleths for Total Particulate Matter – this is a standardized method for total particulate matter, but we can circle back and think about this.

MLH: These numbers will also be updated to show an annual dust fall for sites that we are able to collect year round data for.

LD: What is different for this year is that some of the dust fall numbers that were previously above the predicted ranges, are now within predicted range, which is good. Although we will need to get dust fall data for the rest of the year before we can confirm that this reduction has occurred.

LD: in 2019 we are expanding our dust fall program, focused on areas 1km from the Tote Road as this appears to be the one area where dustfall may be increasing from previous years. They were strategically positioned to capture different topography and wind conditions.

DQ: Is the health of truck drivers monitored because they are near so much dust all the time?

MLH: This would be monitored through an occupational hygiene program. I don't have full details but I can look into it.

EI: Regarding wildlife on the side of the road, there is a river, stream and lakes along the road and they have fish in the lakes. Are you studying fish in the lakes to make sure they are not being affected by dust?

Discussion and Comments

MLH: Yes. We have freshwater monitoring programs to look at fish and sediment and water quality. We haven't focused on the freshwater programs at these meetings, but we do have these programs.

BP: Regarding the winter dust fall sites you picked the three months where the lowest dust fall would happen. Won't that give you an error?

LD: We can't do anything to get to those sites safely in winter, so there is nothing to do to collect these sampling stations.

BP: From DF-M 6 to DF-M 9 you are showing that DFM-02 dropped to below detection in the summer, so it averages out to a factor of 21X. So why can you not access them?

LD: There are still safety issues. All those sites are over 1km from the roads. If we continue to be concerned with these sites, we could consider looking at developing trails to access to these sites, but this is the first time we have seen higher winter sampling. It is also worth noting that we are the only mine in the region that is even doing winter sampling, but we can't compromise safety of our workers, and we're still monitoring the 30m and 100m year-round. We are still trying to investigate ways to sample the 1km sites, but we don't have an answer yet.

JR: So is the plan for the additional sites going to need to use a helicopter to collect these and you're going to increase your helicopter usage?

LD: Possibly, but it won't really be additional time, it will just be additional landings to collect the samples.

JR: Dust fall monitoring is an example of where I would look for adaptive monitoring techniques (i.e. avoiding use of helicopter) to include the additional 1km stations.

MLH: The point is valid and we can look into this. These samples were added at the request of QIA. The data we're collecting and the methodology for collecting these is consistent with what other projects in the region are doing. We don't have any other viable alternatives right now, but it is a good question. Is the inclusion of additional 1km sampling stations worth potential disturbances from helicopters to mammals? The site selection was done in consultation with QIA and HTO, and was finalized by EDI. We wanted to try and stagger it with where the current sites are, we also want to select these based on plans for developing rail line for Phase 2, and it's also aligned with vegetation transects and the topography in the area.

DQ: There are explosives at the Mine Site. Where does this dust go when you use explosives to blast?

MLH: Monitoring for explosives residue is part of our freshwater monitoring program under MMR. I can try and get more specific details on that for you as well.

DQ: In Pond Inlet we used dynamite. The snow was white but after it was blowing snow, there was a lot of dust in the snow that went a long distance. Where does the dust go? With where the wind is blowing or is it determined by land formation?

LD: It is affected by both wind direction and topography. Together these factors will influence how dust moves away from its sources.

BP: Has Baffinland made any progress in designing a study to look at the extent of dustfall in winter surveys? We discussed this at the June meeting. Depending how far snow is travelling, it could be moving even further out than your dust fall sampling locations.

LD: Ultimately our program is designed to understand whether or not the dustfall is affecting metals accumulation on vegetation.

DQ: Dust travels and the wind moves the dust everywhere. We saw dust that was brown snow. Have you noticed that dusty snow melts faster than snow without dust on it? I'm thinking of the Canada Geese that come to our land and have a resting area near Mary River. Do the geese go there to feed?

EI: I may be able to reply to that. In the fall and spring I have travelled through the area while travelling to Igloolik. I have seen in the spring, at the side of the road it melts a lot faster than clean snow on the other side, and the water also moves faster in those streams.

PS: That is a well known phenomenon that dust at mine sites creates snow to melt faster. So yes, the birds will go there faster because it is one of the first places that birds will go to.

Discussion and Comments

LD: In preparation of freshet, the site team does try and clear dust laden snow from the streams to minimize this effect.

EI: What does the dust contain? Why is it red? It is filled with asbestos?

LD: We do have a vegetation metal monitoring program to analyze what effect this could be having on the receiving environment and what metals are in the dust. The red colour comes from the iron in the ore. The amount of iron in the dust along the Tote Road is starting to decrease though because the road is being resurfaced with new materials. There are also sometimes bits of clay and that can cause the red. We don't test for asbestos – but there is no reason why this should be in the dust, it would mostly just be natural sources, iron ore, gravel, soil, etc.

MS: We are also going to reinitiate our vegetation metal monitoring program in maybe 2019 or 2020. We were not seeing any metals in the vegetation as a result of dustfall so we suspended the program to look at vegetation abundance, but we will reinitiate this soon.

DQ: Where do you get aggregate from? Is this from IOL?

MLH: Yes

Environment and Climate Change Canada – PRISM Surveys

PS: This program focuses on songbirds and shorebirds. We use the Arctic PRISM method for surveying shorebirds in the region. We also encourage mining companies to do PRISM surveys so we can compare this to what is happening at a regional level.

CWS surveyed 14 plots in 2018 within 100km of the mine and 24 across North Baffin. We were looking for red knot, but none have been observed despite seeing suitable habitat – could be a result of bad weather conditions. Because other mines are using the same methodology, we can compare results across sites to have a better understanding of how mining could be affecting density and distribution of shorebirds. We also look at what other factors could be influencing density. This helps us to better disaggregate what is a Project related effect versus natural variation.

Red knots are an endangered species that has been observed in Baffin region, and we expect that this is around region and around the Mine. They're very hard to observe, so we are looking into using recorders to see if we can hear Red knots to identify presence. We would like to aim to deploy these in 2019 at the Mine site.

JR: Are there any differences in dialects for red knots?

PS: The red knot call is very distinctive.

DQ: I am interested because these are species at risk. Where do they winter?

PS: Redknots migrate 13,000km from the top of the Arctic to the tip of South America.

DQ: Do you know why these are declining?

PS: They are not gaining enough fat from horse shoe crab eggs in New Jersey to make the journey back to the Arctic in the summer.

DQ: What do they eat in our area?

PS: They eat bugs. People are concerned that because bugs are coming earlier, and the birds aren't there yet they are not getting their nutrition to be able to make their full flight south.

MS: With most of the terrestrial mammals we study for the Project, taking a collaborative approach for Arctic research is very effective, because you can assess in consideration of what is happening at a regional level.

DQ: You said CWS did 14 plots in 2018. Is this going to be ongoing?

PS: The plan is that this will cover the entire Arctic, so it will be every 10 years or so until CWS does this again, but Baffinland will do this every 3 to 5 years.

	Action Item	Action By	Update
1	Baffinland to provide QIA with additional information regarding MMER freshwater monitoring programs.	Baffinland	
2	Baffinland to provide information regarding occupational hygiene program for monitoring health of OHT drivers and interactions with dust.	Baffinland	
3	Baffinland to present a map of the viewshed analysis figure overlaid with the caribou trails and IQ identified areas?	Baffinland	
4	Baffinland to provide information on dust suppressants used at the airstrip and consideration of dust suppressants along the tote road	Baffinland	

APPENDIX C3
SEMWG MEETING RECORDS

Meeting of the Mary River Socio-Economic Monitoring Working Group

Auyuittuq Lodge, Pangnirtung, Nunavut

June 19, 2018 (7:30pm)

Meeting Chair: Baffinland

Note Taker: Baffinland

Attendance:

Jason Prno, Consultant to Baffinland (JP)

Andrew Moore, Baffinland (AM)

Bethany Scott, QIA (BS)

Luc Brisbois, QIA (LB)

Rhoda Katsak, GN (RK)

Chantelle Mason, GN (CM)

Erika Zell, GN (EZ)

David Abernethy, CIRNAC (DA)

1. Project Update

- Phase 2 update provided by Andrew
- AM- Phase 2 NPC positive decision. Now getting into NIRB process. EIS development underway.
- RK- How long does this process take?
 - AM- been working on this for sometime internally.
 - JP- Process has been going on for sometime. Lots of internal work. NIRB has to lay out the process.
- DA- Saw NIRB letters, 2 processes. 6 million tonnes/year? And 12 million tonnes/year? Please explain.
 - AM- Yes 2 different applications. May hit 4.2 million tonnes/year during this shipping season. Need discussions with regulators QIA, to discuss next steps.
- LB- What can you currently ship?
 - AM- Truck and ship 4.2 million tonnes/year. Limited stockpile ability outside of Milne.
- JP- General discussion on planned upcoming IQ workshops and socio economic work related to Phase 2.
- BS- Can you describe the economic modelling work further?
 - JP- Input-output model was used. Report looks at everything from GDP, government and Inuit organization revenues, direct jobs, to spin off opportunities from Phase 2. Marcel LeBreton is doing this work; His company is called EcoTec Consultants.
- DA- Community workshops. Is this a continuation of past IQ work, or is it only for Phase 2?
 - JP- We look at it as a continuation of past work, which included several workshops and one-on-one interviews. More recently, workshops were held on Phase 2 and land use, caribou, and shipping-related topics. Winter shipping is now off the table.
- RK- When you talk about workshops...there are lots of meetings that go on. It's Phase 2, it's early revenue phase. How has it been with the general public? QIA is involved in this discussion. Are people confused?

- AM- Good questions. Baffinland is working with QIA to improve community consultation.
- LB- Talked about NPC process, went to Mary River, Phase 2 group formed in Pond Inlet to respond to NPC. QIA doing what it can to engage. Radio, etc...
- LB- Now it's a straight forward project. But changes exist.

2. **2017 Socio-Economic Monitoring Report**

- JP- General discussion about process, NIRB, commenting, data gaps exist. Some specific community level data is non-existent.
- LB- For data gaps you mentioned, is it not BIM's responsibility to get the data?
 - i. JP- BIM is not a statistics agency. We can report on what exists [in addition, BIM is often not the only 'responsible party' listed on the Project Certificate's Terms and Conditions related to socio-economic monitoring].
 - ii. JP- We rely on these QSEMC meetings and BIM's community engagement program to gather qualitative information on these topics instead.
 - iii. LB- Compared to the marine and environment monitoring groups, there seems to be less data presented by BIM on socio-economics. Can't these serve as a model example? Seems like more effort is needed from Baffinland.
 - iv. JP- You should read the annual report; there is a considerable amount of information included in it. In addition to government statistics, Baffinland collects (and reports on) a lot of its own information.
 - v. CM- Where gaps exist is related to self reported items. For example, gambling issues. How can we find data on this?
 - vi. General discussion on surveys and ability of surveys to answer these questions
 - vii. BS- QIA community based socio-economic work did ask gambling related questions. 280 households surveyed in Pond Inlet, Igloolik, and Cape Dorset. Will present on this at QSEMC. Work funded by CIRNAC. This will be a public report.
 - viii. AM- This is good. Need to talk about bridging the gap between other departments in QIA and Baffinland.
 - ix. CM- What was the response rate?
 - 1. BS- Goal was 90 households in each community. Total was 280 households.
 - x. AM- This is where we want to see this group moving to. Working together to discuss data gaps and ways to address them.
 - xi. JP- Responsibility for several PC conditions on socio-economic monitoring not all on Baffinland but also the QSEMC and other parties.
 - xii. DA- Is Baffinland working with other mining companies on data gaps
 - 1. AM- Yes, to extent possible. However, we all have to monitor different things in different ways.
 - 2. JP- All mining companies have different data gaps
- JP- This group should be where we have discussions about the NIRB annual report and where issues are resolved if possible.
- LB- What sort of process can we take to address comments from the SEMWG?
 - i. JP- Yes we can find new ways of doing this.
- RK- Only one apprentice in 2017

- i. AM- Bit of a misnomer as we now have trade assistants. We can make it clearer moving forward.
- DA- Should we be meeting 2 weeks before the NIRB deadline? To discuss comments?
 - i. JP- We are open to suggestions. We were a little concerned this year as we asked for comments from SEMWG members several times and didn't receive any.
 - ii. DA- NIRB comment period is over but we have the ability to continue to work on items.
 - iii. JP- Absolutely. Baffinland is happy to have that discussion.
- BS- Question on indicator 'number of youth charged'?
 - i. JP- Yes, it's actual numbers of youth charged; Statistics Canada data.
- LB- When did you reach out about comments?
 - i. JP – Several times. No comments were received from QIA.

3. Plans for 2018 Socio-Economic Monitoring Report

- JP- Always open for suggestions on how our monitoring program could be made better. We will also look at the GN's final socio-economic monitoring workshop report.
- JP- Another employee survey will be conducted. Expected to be very similar to the one included in this year's report.
- RK- Was mentioned by communities that they want to do their own monitoring
 - i. JP- This can have value. But from a monitoring perspective we need data to be regularly produced to allow for data comparison.
 - ii. RK- Communities confused about where to get money for this type of monitoring?
 - iii. BS- Part of the gap here is those sustained opportunities to get community monitoring going.
 - iv. LB- Community based monitoring and what it is sits with the QIA. In the major projects office.

4. Revised SEMWG Terms of Reference

- JP- Breakdown of changes. Changes were to really just update the mandate of this group and what it should do.
- CM- Trying to align with other regions and their TORs. Alignment between the projects.
- JP- We used the Agnico TOR as a base and made edits from there.
- DA- CIRNAC is good to go. Just a couple clarifications needed on the difference between 6.2 and 6.3
 - i. CM- Plan to get things formalized at the territorial level
- AM- Need to find out how we get this approved?
 - i. Baffinland to send out final version for email approval. 30-day approval period. Baffinland to send out on Friday.

5. Other Items

- Update on Territorial Monitoring Framework

- i. CM- Work ongoing. Looking at getting everything finalized in October-November. Report produced will be both working group and community focused. Based on all 2017 monitoring reports and meetings.
- Timing of next SEMWG meeting
 - i. Could be by teleconference.
 - ii. JP- Worth having one before issuing the Project monitoring report?
 - iii. JP- We will issue report March 31.
 - iv. BS- Meeting in early February
 - v. JP- Next meeting we can plan to occur in February-March. And perhaps a meeting a month or so after the report is issued. Agreed?
 - vi. Agreed.
- Items for next meeting
 - i. Focused on plans for 2018 monitoring report
- LB- This whole meeting seems very fast. This was not like the marine and terrestrial monitoring groups. Seems short. We need to discuss making this meeting bigger.
- JP – This working group meeting also coincides with the much longer QSEMC meeting, where lengthy discussions and presentations of data take place.
- CM- Maybe we can schedule a meeting of this group after the QSEMC meeting next time.
- CM- Maybe we can have a meeting to plan what we want to achieve for an SEMC meeting?

Meeting Closed- 8:50pm.

APPENDIX C4
Q-SEMC MEETING RECORDS

QSEMC Meeting, June 20, 2018 - Pangnirtung, NU

Attendees

Gabrielle Morrill - Iqaluit
Bethany Scott - QIA
Kimberly Masson - Embrace Life
Meeka Mearns - NBS
Timoon Toonoo - Cape Dorset
Mialiralaaq Judea - Kimmirut
Joshua Katsak - Pond Inlet
Jaypetee Audlakiak - Hall beach
Eljassie Kavik - Sanikiluaq
Mary Ann Qiyutaq - Qikiqtarjuaq
Andrew Moore - Baffinland
Jason Prno - Consultant for Baffinland
Rhoda Katsak - EDT
Chantelle Masson - EDT
Erika Zell - EDT
Frank May - Arctic Bay
Celestino Uyarak - Igloolik
Sandy Kautuq - Clyde River
David Abernathy - INAC
Stevie Komoartok - Pangnirtung
Luc Brisebois - QIA

Minutes

Opening remarks by chairperson - Speak in your most comfortable first language throughout the meeting. We have Baffinland representatives here. During the meeting if you have a question and you didn't say anything you can email me or write a letter with any questions, even after the meetings. Anything you read about and bring home you can ask me.

Mayor of Pangnirtung - I recognize many people around the table. Welcome everyone that is here.

Community Roundtable

Arctic Bay - The mine has a big impact on our community - 25 or so people working from Arctic Bay. I saw somewhere its 1.7 million in gross wages. From my point of view the impact from the mine has been positive. We've had a lot of exposure to the mine. A lot of people understand what's expected from the mine since Nanisivik has also been active there for quite a long time. The fiscal input for the minds also contributes to items such as Christmas hampers in communities. There's more money with Mary River than there was with Nanisivik. We are seeing some family issues with regards to rotational work. It takes a strong relationship at home to make it work but as of yet I haven't heard of any major issues concerning that aspect of the schedule.

Igloolik - Last year in Igloolik in regards to Baffinland's Mary River before an MOU was in place we are looking at their business plans. Igloolik people in the Hamlet are working much closer with Baffinland especially in construction of the roads leading to the mine. We are working on

some projects with Baffinland and one of those is a metal project. I can see the benefits that will come with that. During winter maybe an ice road could be constructed as its very flat. We had two close calls in terms of safety, but the age of the people was also a factor. Very large terrain so search and rescue do have to come around. In Hall Beach there are no docks, we want to work with other agencies to come up with programs to benefit the communities with services.

Clyde River - I went on the radio quite a bit to find out what the people would like me to bring forward to the meeting but didn't get any calls. I see people going to work at the mine, I see a lot of young people quitting school. This is something we should be targeting. Quitting school impacts their lack of employment later on in their lives.

Pang - We've had a lot of development with youth projects up until 2015 when we lost our funding. We've been lucky to have a society take over the youth center. Implemented a soup kitchen that serves 3x a week to roughly 30-60 people. Peregrine Diamonds have a project close to our community and we were hoping to see them today to get some information from them. Quite a few social issues in the community had roughly 12 attempted suicides in February. Drug and alcohol abuse is high in the community and roughly 90% of crime statistics are alcohol related. Pang will be very interested in learning from communities with mines nearby. There are very few to no people in the community working at the mines. We are interesting in knowing what other community's impacts to social well-being were with employment at the mine? Many of the communities will know about both positive and negative impacts and we are interested to learn what other's experiences are.

Iqaluit – Iqaluit has been seeing a lot of economic growth. 30 new businesses opened this year - most by non-beneficiaries. The beer and wine store opened this year, so some community members feel there is a lot more alcohol consumption happening and have seen some violent crimes. Number and severity of crimes has increased. Youth have a lot of high hopes with careers that they can follow but a few have said they are interested in work at the mine and QIA's training opportunities. Iqaluit has seen some in-migration from other communities. Some have partner's working at the mine and they hope to find employment and childcare. It may be better to break-down numbers by the community instead of regional/territorial.

Grise Fiord - We are now at about 130 residents - The alcohol and drug issue is also affecting our community. We are open without restrictions. Youth are trying out new drugs or alcohol and sometimes they over-indulge and we recognize that - it's normal for young people to try new things. People coming from other communities with restricted alcohol rules come to Grise Fiord and order large amounts of alcohol. As the alcohol committee we tell them to limit their alcohol intake since it has a large impact on families. We don't want to see alcohol being a major disruption in families' lives. If you're restricted in a community you are probably breaking the law to drink more. Before the children graduate school we try to teach them about what are acceptable limits so that if you're drinking, you're drinking responsibly. Unfortunately our students in the higher grades have been dropping out. We had graduates this year that we are very proud of. Only when they do their departmental exams do we know if they pass grade 12. It's always good to see students in the higher grades participate in activities such as sports to get out of their home community. We recently had a youth go to Indigenous games and Arctic Winter Games and they both got medals. It's a good opportunity to keep youth healthy and gives them exposure to other communities and cities. Not enough jobs available in Grise Fiord, we have no daycare. The daycare closed and now we are really hoping we can get another daycare opened. We have a privately owned gas bar that benefits the community economically. If we see someone coming in to sell liquor without a permit, the police are very active. When they hear of bootleggers, they meet them at the airport to stop negative impacts to the

community. There are many old houses that once housed police that need to be renovated. We have to work on beautifying the community. We had a small amount of seal pups because of the bad ice conditions due to a changing climate. There are many people who want to work at Mary River but a lot of people don't want to move to another community because it would impact their families. Some have moved to the south. We've been looking at the fishing industry for ten years and it's positively impacted the community. We work with other communities - Resolute, Arctic Bay, Qikiqtarjuaq, and Grise Fiord work together to contribute to the fishing industry. People on social assistance have to pay a lot of money for products at the stores - up to 3 times more than other communities - so with the fishing industry we can also provide food to people with low incomes at low costs. All communities should work together to help people living on social assistance so they can afford more food. We are planning on doing a sealift order for people living with low incomes. We are a happy community; we use the radio quite a bit especially when something affects the community we rally behind to family to come up with solutions.

Cape Dorset - The Co-op has been running very well. Kingait is a good resource for the community and work with other museums and galleries and do in-house artist presentations. We are working with better partnerships between Kingait and the co-ops. We are developing a local culture center on the culture industry signed to be manned by the hamlet employees. People who go to Dorset can purchase their art at the culture center that the hamlet and co-op are working together to build. The plans to open are in motion and we hope that the GN can assist us. GN employees will be going to the opening. GN has assisted in the construction of the building, and all partners at every level are invited to the opening. The Community Economic Plan is going ahead and is being used quite a bit, especially when we need new employees it's a good database to go to. This has been in motion for the last few years. Baffinland were never really a big part of our community but for airfare and meals they have been quite open and Dorset is seeing benefits. At the Hamlet level, the metal project is what we've been working on. It started last year and already had a positive impact. All the old cars, ATVs, anything metal related is being used in different ways. We are also working on the sewage and water pumps and fixing those since they are so outdated. We would also like those to be looked at by the Government. We try to assist all the businesses in the communities - Dorset Suites is doing very well. There is also a mechanical shop for cars and skidoos. They are working on the community economic plan and using different ventures for that.

Kimmirut - I haven't gathered a whole lot of information for this meeting. Everything seems to be fine; I try to assist individuals and the community as a whole. The sub-committee is tourism but due to having no EDO we don't meet very often. The job has been open for some time but no one has been applying. The EDO position changes quite a bit year to year and it makes it hard to gather information.

Pond Inlet - The dock (small craft harbor) construction has started and we thank EDT for providing funds and making this happen. Before they started the work, the construction workers are arriving in the summer and tools are coming up on the second last sealift ship. We can see the economic benefits that will come from this dock. The research ship Nulialuq has been researching sea depths and it was good to see what they can research. From the research we saw what we can harvest from the sea and that will have positive impacts for Pond Inlet. We were able to retrieve information that we didn't have before, such as clam information. We had no idea there were clams right in front of Pond Inlet. We can now see the economic benefit in harvesting clams and shrimps. Numbers of employees from Pond Inlet has been dwindling; we also see an impact from alcohol consumption. We knew ahead of time a lot of people would be leaving to work there and that there would be both negative and positive impacts. What we have

seen with alcohol is not good. Not just up in Pond but other communities too. We've had to let go of employees due to their alcohol consumption. We heard of one person making their own moonshine and drinking it up at the mine. We are aware of that problem - when you have a lot of money coming in it can impact the community. We are trying to educate about these impacts of having a mine nearby. Treatment options could be given to employees but there are no treatment facilities in Nunavut. The socio-economic impacts aren't really looked at or discussed. We are looking more into these impacts and how we can assist people who are making good money and how to be responsible with this money.

Baffinland - We appreciate you raising this concern and we do have resources for employees to help with these types of issues. One of these is the Employee and Family Assistance Program that employees can call a hotline 24/7 in all languages. Customized counselling for any issues including drug and alcohol, troubles with supervisors, etc. We've had a good uptake of individuals accessing this programming. We are always looking for solutions to help with negative impacts on and off the mine site.

Hall Beach - We received a letter inviting us to this meeting and the EDO was unable to attend. We are still without a dock but it's good to hear that some work will be done this year to look at the feasibility of dock construction. We are able to see lands now that we were never able to see before so climate change is impacting our community. As the permafrost thaws we will be seeing more changes of the land. When I was running for hamlet counsellor I was really vying for a dock which I think is why I got elected. We've lost a lot of boats because of the lack of dock and this costs people a lot of money to replace. Our public housing has a lot of mold issues. We are working with our MLA to fix this. One of our Hamlet staff houses is affected and we don't know if we can keep our hamlet employees if they don't have good housing. One of our employees wasn't sure if they would stay in the community since they don't have housing. Igloolik and Hall Beach are close to each other and we try to work together and keep our communication lines open as to how we can work together to create solutions for development. When we have the same vision it makes partnerships easier.

Sanikiluaq - For the last two months we've had no EDO and we are actively looking for one. We are seeking funds from other agencies. We have a new health center being constructed and a new water facility and expanding the dump. We are also looking to adding new roads to accommodate the increasing population. The recreation department will be doing day camps this summer for children. I don't know how we can participate more in employment and contracting with the mining industry. We would like to work more with the Mary River project. This summer and fall Sanikiluaq will be hosting the Elder meetings. Elders come from Nunavut and Nunavik.

Qikiqtarjuaq - Our mayor could not attend so I am here on behalf of the Hamlet. The garbage at the dump sometimes goes into the water reservoir and so we are working on that and we hire employees for a couple of days to clean up garbage around the community.

Nunavut Bureau of Statistics

Arctic Bay - Is there information on attendance rates on NBS website?

NBS - You have to ask Department of Education

Arctic Bay - Your total population numbers about 100 people higher than what CGS is using in their information

Igloolik - We see high population increases. We have seen some numbers different at the community level than what's being used at the government level.

NBS - There's two different ways of doing statistics - the ones from Statistics Canada that we get here they do counts every 4 years. They go to the houses and that's who we get our information from. That's where there may be some confusion

Igloolik - At the local level we know there were 20 births in the month of January.

Iqaluit - Population estimates - are transients measured? Municipally we are struggling to keep up with infrastructure demands.

NBS - We have a small office and we rely on Statistics Canada.

Embrace Life Presentation

Igloolik - We've been working with embrace life over the years. This information has helped us a lot. Last year we had a lot of instances and we try to help any way we can. We got the community involved to develop some action plans. We have a community wellness community working together to help improve community members lives. It has helped a lot, I'm sure many communities have the same issues. There are ways to find solutions when we work together.

Iqaluit - in Iqaluit we had two murder suicides and an Elder wanted to put on a program on "what is love?" vs. "what is abuse?" She would like to find training for a program like this and turn it into something more Inuit culturally appropriate.

Embrace Life – There is a program out of Rankin developed specifically for Inuit by Inuit. It's a family violence education program run through department of Justice. It's also delivered in schools. If the Elder wants a copy, I can provide.

Lunch Break

Meeting Resume at 1:15

Chairperson – This is a reminder that this is a discussion forum, we are a committee that can bring information back to our workplaces. If you want to share more information on impacts on your community and what you've seen please feel free to share. All of the reports from this committee meeting are shared with the NIRB.

Arctic Bay - would like to see all the documents prior to the meeting * **ACTION ITEM FOR NEXT YEAR – Send all presentations and documents prior to meeting**

Indigenous and Northern Affairs - Nunavut General Monitoring Plan

Igloolik – The mayor met a group with the University of Ottawa and CGS came at the same time and we wanted them to meet with and talk to us about our drinking water. 2015 we ran out of water. Two years later they came to test how our water has improved - in Igloolik our water has to be snow or tap water because our drinking water has high levels of chlorine and we can't drink. I hope to see this improve in the future.

INAC - I understand CGS has worked with universities to look at these issues and make informed decisions. I should also note that we issue calls for proposals for projects (with one coming out in the fall). So I encourage you to think about NGMP and contact me about the programs we fund. They have to benefit community members so please share what your concerns are. You can also submit proposals for funding to do these projects. If there's an issue that's important to you we want you to come to us and perhaps create partnerships to do this research.

Baffinland - Introduction to Project and Update on Socio-Economic Monitoring Program Results

Baffinland has conducted a number of workshops with Elders in communities to discuss the best way forward with the updated phase 2 proposals.

Through the IIBA, QIA and Baffinland give preferential hiring to Inuit in the Qikiqtaaluk region with a focus on the 5 LSA communities. Also, Baffinland has committed to hiring Inuit from all Qikiqtaaluk communities. Baffinland will work with community members and has looked at covering expenses in working towards employment at the mine.

Pond Inlet - Is Baffinland making efforts to work with EDOs in the communities?

Baffinland - Yes this is something we are looking at. Baffinland hopes to make it as easy as possible for individuals to apply for employment at the mine. Not only to post these job opportunities, but finding the easiest way for people to apply for jobs at Baffinland.

Iqaluit - Do you know what communities they are moving into and out of in the LSA?

Baffinland - We have that data but if it's a single individual due to confidentiality reasons we can't necessarily report on this.

Iqaluit - I would like to look at how many people are moving into Iqaluit, is this possible?

Baffinland - yes we can look at the data sets for this information – ****Action Item – Share these data sets if possible**

Arctic Bay - What is the difference in the kind of jobs being done if you work directly with Baffinland vs. working as a contractor

Baffinland - We are a mining company so the general scope of work in general terms is that you're working in mine operations. However, drilling and blasting is done by contractors. Flight operations are contractors. Maintenance on the tote road is done by Baffinland employees. We have two kinds of contractors - service contractors (emergency electrician, power plant issues) and then we have workforce contractors - They provide services in emergency instances such as contracting flights if there are issues with charter flights not being able to come in from communities.

Pang - In the other section on the "other Nunavut" section on the table on page 13 it's all 0's. Why is that?

Baffinland - We have a commitment to hire from the Qikiqtaaluk region, it's also a lack of applications from other regions.

Pang - I know there are people working at the site even though it's not listed on the table.

Baffinland - That's a data gap and we will look into that

Arctic Bay - For heavy equipment training are you including training outside of the Mary River site?

Baffinland - You have to go through the site-specific training (specifically for safety reasons). Q-Step has also been initiated to provide a number of training aspects including pre-employment and apprenticeships. All individuals that complete this training will offer employment to all successful trainees. 48% of training hours went to Inuit in 2017.

QIA - Can you provide more information on school literacy and lunch programs?

Baffinland - We are currently providing school lunch programs at 3 schools. What we are going to do is help bring some learning opportunities into schools. So the food will be made at hotels and co-ops, but students will be cooking and serving, so will be learning at the same time about food safety and culinary skills. We also donated books to school libraries in the north Baffin communities. Through this initiative we were able to talk about opportunities at Baffinland and what education is required to gain this employment. This allowed Baffinland the opportunity to talk about the importance of staying in school to gain future employment.

Pang - Our youth are just starting to understand how important it is to have money in their pocket, have education, and the importance in saving money for the long-term. This is why you need to keep coming to the schools and remind students. It's only in the last few decades that we started attending school and it's only in the last 10-20 years we've been taught how valuable it really is to go to school. That's why we need companies to come to visit schools to keep our youth informed.

Baffinland - We agree and we are taking steps to do that. Our CEO's tour was an initiative related to this. They went into schools to talk about how important it is to keep attending school and to get an education to gain employment. We have people attending career fairs in schools, we attend graduations, and we encourage graduates and current students. Every graduate from the north Baffin receives a laptop from Baffinland with our laptop program.

Pond Inlet - QIA has the QSTEP program - are they working together with Baffinland?

QIA - The partners are Baffinland, QIA, Kakivak, Government of Nunavut and Government of Canada

Clyde River - We are very thankful for the laptop program but is there something else Baffinland can provide such as cell phones? Youth are using cell phones more than laptops these days.

Baffinland - This is something we can definitely take back and discuss. - ****Action Item – Baffinland to discuss the option of a cell phone program vs. laptop program**

Pang - Are there companies in Nunavut doing bear monitoring in Mary River? We have community members that haven't heard of that being an opportunity.

Baffinland - We do have bear monitors and they are contracted so it is people already employed by who we are contracting

EDT - Maybe some of these jobs that are open could be employed by Inuit (referring to slide13). Are there opportunities for more Inuit to be employed?

Baffinland - Yes there are initiatives and the important part of this report is that we can break down what things we are doing well and what things need improvement. Later we will talk about what things the company is doing to increase Inuit employment.

QIA - What are the reasons for such high turnover rates?

Baffinland - We report to QIA quarterly in our IIBA report. Generally we've heard 3 common comments on why staff leave Baffinland – 1) Found a job in my home community 2) Dislike of rotational work 3) Stress on family.

QIA - So this isn't only voluntary turnover rate?

Baffinland - This is terminations, individuals who quit, didn't pass their probation period, and no contract renewal.

Arctic Bay - Is there a way to compare turnover rates in other provinces at mines as well as GN turnover rates, and other companies?

Baffinland - Yes we do compare these rates. We also understand that there are high turnover rates in other companies in Nunavut and we can compare those numbers.

Baffinland does not turn a profit. All of our money is from our investors. That is why the phase development is so important so that we can get out of a deficit and get into a profit phase.

Iqaluit - Why did procurement values skyrocket in 2017?

Baffinland - 2017 was a construction phase year which involves a lot of contracting. Construction years are the big spending periods in a project.

Apprenticeship program is implemented right now. The company is very hopeful that every graduate of that 4 year program (on the job and apprenticeship) will all want to stay working for Baffinland or one of its contractors. To be an apprentice you must be registered with the GN by writing a pre-trades exam. Baffinland provides support to ensure that Nunavummiut can and will pass this exam.

EDT - A comment that was made on the Pond Inlet radio that it's so hard to hire Inuit. It's discouraging that you open the position but nobody applies. Another comment was that "when we get hired, we are hired for a position but when we get to site it's only a labor job. We applied for a different position but are hired for general labor positions". Ten positions were open - maybe 4 could be filled by Inuit? How many vacant positions were open but nobody managed to grab the opportunity. Do you have those numbers? What positions are possibly available?

Baffinland - We do not have those statistics right now. We have numerous positions open with a lot summer positions. We are targeting Inuit employees for every single position at the company but we don't have the specific statistics.

Pang - How many years' worth of mining do you believe there are?

Baffinland - 100 years but there's still a lot of exploration to do. The exploration that has been done to date shows the iron is at the highest grade and is sustainable for at least the next 100 years.

Pang - Are employees bringing drugs and alcohol on-site?

Baffinland - We have a zero tolerance policy and bags are screened before employees come on-site

Cape Dorset - In regards to turnover rate, do you monitor the gender of turnover.

Baffinland - We do capture that information we just don't report on it in this monitoring program report. I can provide that information if people are interested.

Qikiqtani Inuit Association

Igloolik - Will there be another survey in the next 5 years?

QIA - 2019 or 2020 would like to survey again. It depends on funding, capacity to coordinate the project, etc.

Igloolik - The self-reported gambling numbers might be a little low.

Baffinland - Would you do the same communities again?

QIA - Yes

Baffinland - You asked the question about community consultation, 69% said not enough, was the question general, specific to mining, government, etc.

QIA - I believe it was quite general but I can double check.

Embrace Life – In regards to the dialogue about social networking, were there discussions or questions about social media?

QIA – The questions focused more on face-to-face dialogue and didn't focus so much on social networking.

Pang - Government of Canada sent in people to do the census and going house to house and did not bring interpreters and did not understand what is needed going door to door. The way you performed the census seems like a much better approach.

QIA - The contractor hired on to help develop the census went on to hire at least two of our community researchers to help the Department of Health in doing their own (unrelated) survey that the contractor was helping Health develop and implement.

QIA - There is a final report on the website and is currently being translated.

EDT - In Baffinland's presentation there is a slide on data gaps and it has gambling issues as one of those gaps but I see you presented on it and collected it - can you share this?

QIA - We can share it. We don't do the survey annually but it is information all stakeholders can use in monitoring. - **** Action Item – QIA to share results of gambling issues data**

Closing Statements for afternoon session

EDT - After supper please consider everything that was presented today and come back with questions and observations. Are there things that you aren't seeing? Are there items you would like to discuss more? We won't have any presentations, just more discussions.

End of Afternoon

Evening Session - Open Discussions, Q & A, Roundtable

Iqaluit - On social media there was a disturbing article about a woman reporting that she was sexually harassed at the Baffinland mine and some posts from employers talking about Inuit women at the Mary River site. Regarding the 46% turnover rate numbers - who was delivering this survey to the staff to get these reasoning's behind their leaving?

Baffinland - The CEO delivered a statement on this today. The company was very disturbed to read this online, we want the employees to be comfortable to come to HR and Elders. A full investigation will be done and if these allegations turn out to be true, these individuals will be terminated. Second part of the question - in the presentation, when we report turnover it's all encompassing (quit, dismissed, end of contract, temporary position). We also look at it quarterly because in the summer we have many more employees than in other seasons. So through the reporting, that counts as turnover too. We report to QIA about turnover and employee retention rates. We offer employees exit interviews, but these are voluntary. With Inuit employees this interview is done with an HR representative and Elders.

Iglolik - Last year we discussed potential visits to Mary River for Mayors and administrative staff. Is this an option, has this option been explored?

Baffinland - If you can find a time to make it work, email us with dates and names of Mayors/staff and Baffinland can make that work. - **** Action Item – Community Mayors to send information to Baffinland to organize site visits**

Pang - General observation as a nurse working with clients from the mine over many years. It is not uncommon that STIs are contracted on the mine site. Do any of the mines have clear responsibilities and accountability to ensure that public health measures are being implemented? This is a common impact on social and family well-being. Does the Government provide any regulations or Government inspections on the mines in this respect? Or on the health and well-being of families and individuals? If there is no such public health accountability, were there any thoughts to implement such a thing or these protocols?

Baffinland - We have an MOU with the GN for the provision of certain health services. For employees at the mine, they have to go through pre-employment checks, including a medical exam. This is in place to protect the individuals and avoid any unknown medical incidents due to any underlying medical conditions. On-site we have 2 physician assistants to provide check-ups and guidance on various health matters. We do have to report through the NIRB about

communicable diseases on-site. Project certificate condition 154 asks Baffinland to report on rates of STI's and communicable diseases.

GN - Regulations exist under the Public Health that requires the reporting of incidents of communicable diseases, including sexually transmitted infections. Department of Health is working very hard to ensure that Companies provide STI testing on-site, there may have even been agreements made in some of the new project terms and conditions in other Projects agreeing to provide this testing.

Pang – This should be followed up on by the socio-economic monitoring committee and statistics should be kept so that we know what types of measures are being taken and whether we see any progress being made. Mines and stakeholders need a system in place where accountability will be measured.

Pang - In this community we work on many ventures. It's hard being a business owner; it's mainly non-Inuit who own businesses here. When you're starting out in business you're a small operator. I've had my painting business for the last 5 years and I rent out vehicles. It is a slow progress but it's something I work on that helps the community. You are required to have housing, a good building, and good tools as a business owner. There are a lot of regulations that you have to abide by. When Nunavut was created we had a lot of visions to have a lot of small business in small communities but today that is not the case. It takes a long time to create stability in businesses. It's very important to support the small businesses in your community and other communities.

Grise Fiord – Why didn't Peregrine Diamonds attend?

EDT - We invite them every year, this year they were unable to attend. We will follow up with them to have any questions answered. - ****Action Item – EDT to follow up with community representatives and pass along questions to Peregrine Diamonds**

EDT - You saw the statistics reports and the presentations given today. Are there any questions, comments, and were you surprised by any of the numbers or presentations given this afternoon?

Arctic Bay - When talking about socio-economic development in the communities, in my mind the biggest infrastructure issue in Nunavut is housing. If you can't fix inadequate housing, you aren't fixing the problem of all the other social and economic problems. There isn't enough money coming out of Nunavut to take care of all of our housing needs. The communities in the Qikiqtaaluk region, there is an awful lot of royalty money flowing into QIA from Mary River, and has there ever been any thought given to setting up a housing co-op to help out some employees and to give them an initiative to stay in their job, maybe a mortgage fund, to get out of social housing and get their own house.

QIA - Department of social policy spends a lot of time talking about housing and education. When it comes to all of the millions of dollars flowing to QIA, 2 years ago QIA set up a new revenue policy to do with the royalties coming from many different areas. Revenue policy sets up two funds - legacy fund (how we will save and invest this money) because there wasn't a desire to spend all this money and it's gone. So the legacy fund is to save and invest until there's \$75 million and QIA board will look at what happens when we reach that target (now at about \$36/37 million). The investment is a 4% amount of the legacy fund and this money is how we spend this money. QIA is committed to going to all communities every 2 years asking what

programs communities want them to spend it on. At that time the answers were cultural activities, sewing programs, daycares and early childhood education. Set up the new Q-CAP program - The QIA board wants to be re-elected so they want to deliver things that want to be seen. So at the next consultations there's opportunity for people to say what it is they want and need. If this means asking about helping us with housing, then that's how you can influence them. QIA also manages IOL's where there are parcels in municipalities (such as in Iqaluit, where QIA is developing municipal IOL). QIA is committed to putting affordable housing for Inuit on this piece of land - we don't know what it will look like yet, but they have committed. This way, we see what works, what can be improved, and other communities with IOL can then replicate these successes. If you have IOL in your municipality, talk to your QIA director and discuss these options.

QIA – We've also been attending poverty reduction roundtable and housing is the main priority. We developed a model that we pushed forward to Family Services also attended the Northern Housing Forum where we discuss many aspects of housing in the arctic. Housing is at the top of the list.

Igloolik - We've been talking about housing for employees since 2013 and we worked on a 5 year plan. This is something we are still trying to work with; we know these employees need housing. We are trying to acquire a building to do research, looking at other ventures too. Under education and skill building, 2012-2014 some research had been done so there's been a lot of ongoing research but no production yet. We've notified QIA and EDT and Baffinland that we would like to work with these corporations, as well as other agencies and government. We want the fishermen in our communities to benefit. We also have a music festival in our community to bring happiness to the community.

Clyde River - Our community members are seeing and benefitting from employment at Baffinland. We are expecting a bigger payout to work closer with Baffinland. What Arctic Bay discussed about housing, this is an everyday issue. Inadequate housing results in other social and wellbeing issues. We would like to see QC and QIA providing funds to smaller communities. The dropout rate is very high in our communities from schools which impact their future employment since they don't have the right education and skills.

Iqaluit – I want to reiterate that it's not accurate to lump communities in with Iqaluit when it comes to monitoring. Because of the population of Iqaluit, results will be skewed. I would like to see Baffinland separate Iqaluit from the rest of the communities when it comes to statistical analyses. In regards to Government of Canada, we never see federal representatives do community consultations. When they do consultations in Iqaluit they never give a lot of warning, they never visit anywhere other than Iqaluit, and since there isn't a lot of warning there are very few community representatives that turn out to the consultations. Please send back that we need adequate advance warning for communities, and go see other communities. How many Inuit Owned Businesses were unable to start up because of inadequate buildings for their business, or inadequate funding? I know of many people that have tried to startup businesses but they were Inuit owned, Inuit staffed, fluent in Inuktitut and were unable to find funding for their business. A month or two ago we put in a request to remove section 12 of the Cities, Towns and Villages act. For monitoring Projects, is there any support that could go towards staff administration costs? So many organizations are understaffed that they can't take on the opportunities that are handed to them because they are so short staffed.

INAC - We do expect organizations to pay their own staffing funds with the NGMP monitoring program funds. In regards to the Minister visiting, a lot of work is put in to meet with the right people but it's hard to meet with everyone all the time.

Baffinland - In regards to Inuit Business, Baffinland has an agreement in their IIBA that supports the development of Inuit owned businesses. This can help to pay for business licenses and the process to obtain a business license done through QIA. QIA has reported that it is underused, so this is an available funding source.

Iqaluit - It's not always getting the funding that's the issue, it's also skills development and help getting through the paperwork process on the Hamlet's part.

Grise Fiord - Which Inuit Owned Businesses does Baffinland give money to? QIA and NTI registered businesses? We need help for the business owners to get started up. I just learned there is the \$75 million target from QIA; I had never heard that before. I've gone through so many meetings for a long time. We hoped and were expecting that we would benefit from this money. There are only a few thousand people even a small amount would be enough. There are so many elders with businesses in our communities; they don't always get as much help as they should. It would benefit our communities. People are tired of waiting for this \$75 million cap, there are people starving, there are many elders who have nothing. We're working with Baffinland; we need to work together by listening to each other. Inuit need more, if we can think about today, and not necessarily waiting for the future. We have the lowest population and we are told that our community is too small but we need equal treatment. It's hard to hear that there's money there but it isn't being utilized. We need to look into all these buildings that aren't being used in communities. Elders are abused, they've never been employed, and they don't have food to eat.

Cape Dorset - Quite happy with all the presentations that were in front of us and the flow of the agenda, feeling like we are getting a lot more answers instead of "I will get back to you".

Pond Inlet - Looking at the Nunavut Agreement, a lot of Inuit have not looked into the document and what we are entitled to. Under the NLCA, we as Inuit have a lot of power. We do not understand it as to how we should be using what is granted to us. Hunter's capabilities and abilities are much more than when we were previously with NWT. There are other schedules under the NLCA that we need to use and understand. Maybe we should look at developing some kind of training for Inuit to better understand NLCA and how Inuit can better benefit in the long term.

Hall Beach - I had said when we started that this is more of a learning curve for me. After what I've heard and seen, I'm very happy with what we do here at the SEMCs. We have offices in the 5 communities that make our work a lot easier and our communication lines much more open. We were very happy to hear about the new ventures that Baffinland is going ahead with, with the other communities. QIA has an office in each of these communities where people can go and discuss and learn more. Unfortunately not every community has an EDO, but maybe each QIA community office could be a place for people to get information and pass along information.

Sanikiluaq – Thank you to all the presentations, and from Embrace Life, I thank you.

Qikiqtarjuaq – Discussing new businesses and small businesses, I hope to see more opening. Especially for carvers and artists, I really want them to benefit.

EDT - I want to comment on NLCA Article 12.7, it is specified there and that is why we are meeting today. It is legally binding. Our job is to comply with the NLCA and we gather information from our communities and yes we do need to have a better understanding on what our communities are asking for and how we can support them. Once we know the NLCA better, we can make better agreements.

QIA - QIA does have funding available that individuals, community groups, and hamlets can access. There is an annual \$750,000 funding that communities can apply to. They take proposals throughout the whole year. QCAP program funded 31 projects in communities; a second callout is coming around the middle of July so I encourage you to apply for this. QIA also has a grants and contributions program where you can ask for smaller amounts of money. Business capacity and start up fund that provides funding to expand businesses or startup businesses.

Iqaluit - I have had people ask about Inuit owned businesses so if these stats are available as well as the GDP that comes from these.

Embrace Life - We fully fund a firearms safety course so that we can wave the fee for community members as long as there is an instructor in your community. Healthy Nunavummiut are healthy for everyone, so if there is a service that we can provide in your community or your corporation or your hamlets, we can provide services and work together.

Closing

There was a vote for where the next QSEMC meeting will be held. The results were as follows:

6 votes Iqaluit
 5 votes Cape Dorset
 4 votes Baffinland
 1 vote Clyde River

Therefore, the next meeting will be in May in Iqaluit; dates, location and logistics to be confirmed

Action Items

Item	Organization	Timeframe
Send all presentations and documents prior to meeting	GN - EDT	1-2 weeks prior to next SEMC meeting and all meetings following
Share data of Mary River employees moving into Iqaluit (specifically to Iqaluit representative) – if available	Baffinland	As soon as possible and discuss at next SEMC
Separate Iqaluit from the rest of the data results – look at a community based approach for monitoring if that data is available so as not to skew the results due to Iqaluit's high population	Baffinland	Ongoing

Discuss and explore the option of turning the laptop program into a cell phone program	Baffinland	As soon as possible and report back to communities
Share results of reported gambling problems with SEMC and SEMWG	QIA	Immediately and discuss at future meetings
Send information (dates, names, availability) of interested Mayors and organize a Mary River site visit	Community Mayors to send information; Baffinland to organize site visit	Ongoing
Follow up with questions from community representatives and pass along to Peregrine Diamonds and follow up with responses	EDT	Ongoing

2018 QSEMC Baffinland Action Items

1. Share data of Mary River employees moving into Iqaluit if available [Request made by Iqaluit representative]

Baffinland's response:

Baffinland collects employee/contractor migration data from two sources: Baffinland Community Liaison Officer (BCLO) Surveys and Workplace Surveys. Data from these two surveys may provide insights into potential in-migration trends to Iqaluit. However, Baffinland does not collect survey data on non-Inuit employees/contractors moving into Iqaluit from non-Local Study Area (LSA) communities (the LSA refers to the communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet, and Iqaluit).

- 2018 BCLO Survey
 - 3 Inuit employees/contractors out-migrated from North Baffin LSA communities. However, none of these individuals out-migrated to Iqaluit. 0 non-Inuit employees/contractors out-migrated from North Baffin LSA communities.
- 2018 Workplace Survey (71 Inuit employee/contractor respondents)
 - 7 individuals (9.9%) answered 'yes' to the question 'Have you moved to a different community in the past 12 months?'. However, 0 (0.0%) of these individuals had moved from a North Baffin LSA community to Iqaluit.
 - 12 individuals (16.9%) answered 'yes' to the question 'Do you intend to move to a different community in the next 12 months?'. 2 of these individuals indicated they intended to move from a North Baffin LSA community to Iqaluit and 1 individual indicated they intended to move from a North Baffin LSA community to Iqaluit or a non-Nunavut community.

2. Separate Iqaluit from the rest of the data results and look at a community-based approach for monitoring if that data is available so as not to skew the results due to Iqaluit's high population [Request made by Iqaluit representative]

Baffinland's response:

Baffinland separates Iqaluit data from other community (e.g. North Baffin LSA) data in its annual socio-economic monitoring reports, where appropriate. This is currently done in the following areas:

- Population estimates (government sourced data)
- Employee origin (Baffinland sourced data)
- Hours of Project labour performed (Baffinland sourced data)
- Employee payroll (Baffinland sourced data)
- Secondary school graduates (government sourced data)
- Number of NTI registered Inuit firms (NTI sourced data)
- Number of youth charged (government sourced data)
- Proportion of taxfilers with employment income (government sourced data)
- Median employment income (government sourced data)
- Percentage of population receiving social assistance (government sourced data)
- Number of impaired driving violations (government sourced data)

- Number of drug violations (government sourced data)
- Health centre visits related to infectious diseases (government sourced data)
- Crime rate/number of violations per 100,000 persons (government sourced data)
- Health centre visits, total number (government sourced data)
- Health centre visits, per capita (government sourced data)
- Project aircraft movements (Baffinland sourced data)

**3. Discuss and explore the option of turning the laptop program into a cell phone program
[Request made by Clyde River representative]**

Baffinland's response:

We thank the Mayor of Clyde River for his request that Baffinland look at changing its annual laptop program into a cell phone program. At this time, Baffinland will continue to provide laptops to new high school graduates. Baffinland believes that laptops are better suited for educational and employment-related purposes than other devices such as cell phones. However, should a graduating student have the need for an alternative device due to a special need, Baffinland will do its best to accommodate those requests.

4. Send information (dates, names, availability) of interested Mayors and organize a Mary River site visit [Baffinland commitment]

Baffinland's response:

Baffinland remains committed to hosting a Mary River Project site visit for interested regional Mayors. Baffinland is prepared to plan and host this visit once interest is confirmed and additional details are available. To make this visit possible, Baffinland encourages the Mayors to provide dates that may work for a group visit to the Mary River Project.

APPENDIX D
2018 PHOTO ESSAY

Project Overview – 2018

In 2018, Baffinland focused on mine production from Deposit No. 1 with roughly 5.5 million tonnes of iron ore mined and hauled using the Tote Road.



Deposit No. 1 has an estimated 20-year resource. There is potential to expand the mine life of the Mary River Project through the development of other deposits in the area.





Ore is transported from the Mine Site to the Port along the Tote Road in the form of lump and fines. There are no concentrators, tailings, or tailing ponds associated with production.

Shipment of iron ore to Milne Port by Ore Haul Transport along the Tote Road



After being hauled along the Tote Road, the ore is stockpiled at Milne Port and loaded onto ships that travel across the North Atlantic to deliver the ore to markets in Europe and Asia.

Stockpiling of iron ore at Milne Port during winter months



From July 24 to October 17 2018, Baffinland shipped nearly 5.1 million tonnes of iron ore to markets in Europe, the United Kingdom, Taiwan, and Japan. Seventy-one voyages using panama vessels were executed, carrying an average of 71,750 tonnes of iron ore each over an 86-day period.



Panamax vessel being loaded with iron ore at Milne Port using ship loading conveyors

Site Activities Completed in 2018

In addition to the mining, hauling and shipping of ore, several activities were undertaken to support the continued advancement of Project operations in 2018. Notable activities included the continued construction of the 800-person (Salilvik) hard wall camp at the Mine site, continued construction of additional fuel storage at Milne Port, and the erection of additional maintenance facilities.



Ongoing construction of the 800-person camp at the Mary River Mine

New passenger airport terminal at the Mary River airstrip



Mine truck shop under construction to accommodate CAT ultra-class trucks



12.5M litre tank construction at Milne Port



Project Monitoring

Baffinland conducts a number of annual monitoring programs including those focused on marine mammal monitoring, marine environmental effects monitoring program, terrestrial environment monitoring, aquatic environment monitoring, air and noise monitoring and socio-economic monitoring.

Marine Mammal and Environment Monitoring

In 2018, Baffinland led two marine mammal monitoring programs, which included the Bruce Head Vessel-Based Monitoring Program and the Ship-Based Observer Program. The Bruce Head Vessel-Based program was a pilot project for 2018. The objective of the program was to investigate narwhal response to shipping along the Northern Shipping Route by observing them from a boat anchored near the shipping corridor. The Ship-Based Observer program was re-initiated in 2018 through the introduction of the Ice Management Vessel, which provided a safe platform to undertaken observations. Baffinland also contributed to the Tremblay Sound Narwhal Tagging Program, which is a monitoring program led by Fisheries and Oceans Canada.

Information on the 2018 marine wildlife monitoring programs can be found in Section 4.6.10 of the 2018 Annual Report



Marine Mammal Observers aboard the MSV Botnica during the 2018 Ship-Based Observer Program

In 2018, Baffinland also ran the Marine Environmental Effects Monitoring Program, which is focused on monitoring for potential Project-related effects on the marine habitat, including Aquatic and Invasive Species monitoring in and around Milne Port. A physical oceanography program was also executed in 2018, to collect additional data on the salinity and temperature in Milne Inlet near Bruce Head and Milne Port.



Terrestrial Environment Monitoring

As part of the terrestrial environment monitoring program Baffinland monitored several aspects of the terrestrial environment related to dust fall, vegetation abundance, snow track and snow bank height monitoring, height of land caribou surveys, pre-clearing nest surveys and cliff nesting raptor occupancy and productivity surveys. Baffinland also provided support to regional caribou monitoring surveys conducted by the Government of Nunavut in the fall of 2018.

R3 Laydown active migratory bird nest survey



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.



Six additional dust fall sites 1 km from edge of the Tote Road were installed in 2018 to increase the spatial extent of dustfall monitoring and potential effects on vegetation.



Freshwater Monitoring

In 2018, monitoring activities undertaken in relation to the freshwater environment included monitoring the effectiveness of fish habitat offsetting measures for crossings along the Tote Road, monitoring benthic and fish species as part of the aquatic effects monitoring program and monitoring water quality and levels of sedimentation in water bodies downstream of the Project.

Routine water quality and flow monitoring



Hydrology Program





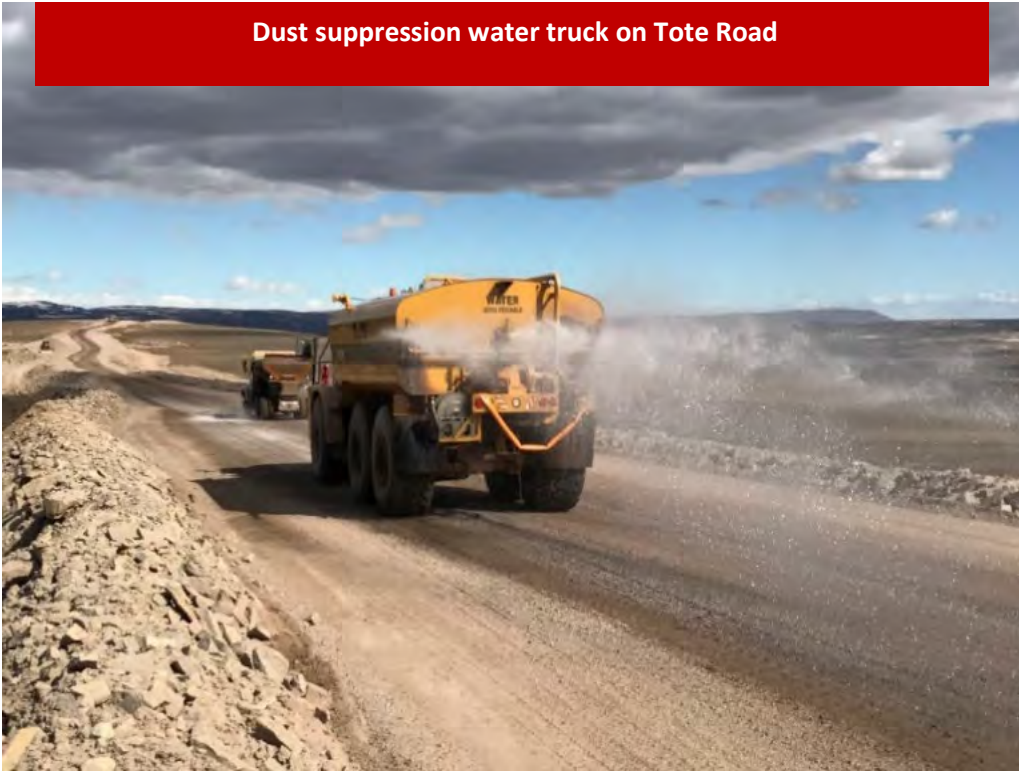
Additional details regarding Baffinland's freshwater monitoring program and mitigation measures can be found in PC Summary Sheet 41 to 48a.

Environmental Mitigations and Adaptive Management

Dust Fall

Adaptive mitigation measures continued to be implemented in 2018 to further minimize the total amount of dustfall resulting from Project activities, and to minimize potential effects of dustfall from the Project on the environment.

Dust suppression water truck on Tote Road



Crusher Facility surge bin shrouding





Waste Rock Facility Water Treatment Plant

In 2018 Baffinland successfully installed and began operation of a dedicated water treatment plant at the Waste Rock Facility to ensure effluent water quality compliance under the Metal & Diamond Mining Effluent Regulations (MDMER) and Type A Water Licence during controlled discharge.

Waste Rock Facility Water Treatment Plant



Landfill Fencing

In September of 2018, Baffinland completed the installation of a perimeter fence downwind of the active portion of the landfill. The installed fence is 215 meters in length, eight feet tall and made up of two-inch galvanized chain link heavy gauge meshing with a tire base.

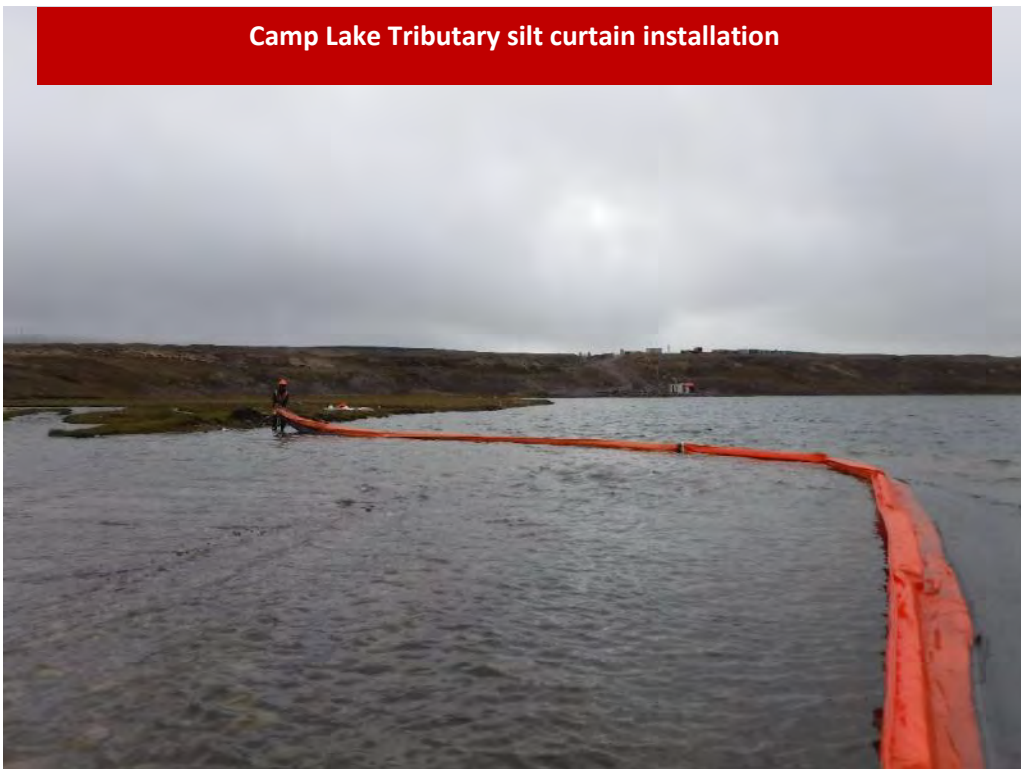
Completed construction of Landfill Fence



Erosion and Sedimentation Management

Adaptive mitigation measures such as the installation of silt fences are executed as required during freshet to manage the effects of spring melt on Project infrastructure.

Camp Lake Tributary silt curtain installation



Sediment control measures at culvert BG-27



Inuit Engagement

IIBA Renegotiation

Baffinland and QIA renegotiated the IIBA in accordance with Article 22 over the course of 2018. The amended IIBA was signed by the President of QIA and President and CEO of Baffinland in Iqaluit during the QIA Annual General Meeting on October 3, 2018. The amended IIBA formally came into effect on October 22, 2018.



Inuit Employment

In 2018, on average, Inuit employment at the Project hovered around 14%, with significantly more Inuit men employed by the Project than Inuit women.



Approximately \$140.9 million in contracts were awarded to Inuit-owned businesses and joint ventures in 2018. Of a total of ten (10) contracts awarded to Inuit-owned businesses and joint ventures, nine (9) were awarded to businesses based out of the five (5) North Baffin communities.



In 2018, Inuit training hours totalled 32,629.2 hours which is 45% of the total training provided by Baffinland, a 25% increase from 2017, where Inuit training hours represented only 11% of training conducted for the Project.

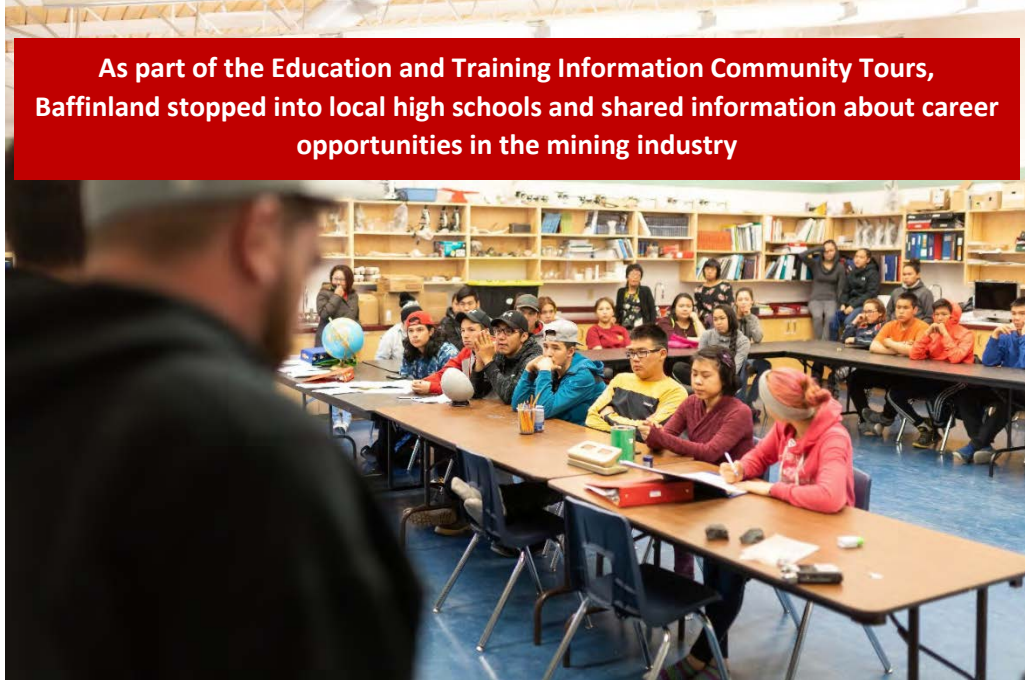


Additional information related to education and training and employment initiatives implemented by Baffinland in 2017 can be found in PC Conditions 135 to 141.

Inuit and Stakeholder Engagement

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. Details related to Baffinland's stakeholder and engagement for 2018 can be found in Section 2 of the 2018 Annual Report.





Baffinland will continue to implement a proactive approach to engagement with various stakeholders through meetings, workshops, surveys and dissemination of information and reports. This will ensure that the communities, QIA, regulators and the public are informed in a timely manner of the Project's progress and the potential environmental and social impacts of ongoing operations.

APPENDIX E
CONCORDANCE TO NIRB RECOMMENDATIONS

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
1	<p><u>Climate Change Strategy</u> Baffinland is required pursuant to Condition 3 of the Project Certificate to provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas (GHG) emissions from the Project area. Within its 2017 Annual Monitoring Report to the NIRB, Baffinland reported that it calculated the annual GHG emissions from the Project site; however, the NIRB notes that the Proponent did not include any information or documents substantiating how it has implemented site-specific initiatives to reduce GHG emissions. Further, the NIRB's 2017 Board Recommendation #2, the Board requested that Baffinland provide updates within the 2017 Annual Report regarding its climate change strategy noting any specific activities it has undertaken to reduce GHG emissions from the Project sites. The NIRB reminds the Proponent that the reporting requirement for site-specific initiatives for GHG reduction has not diminished in importance and continues to be a requirement for the Early Revenue Phase of the Mary River Project.</p>	<p>The Board requires that Baffinland report on its development and implementation of a climate change strategy for the Early Revenue Phase of the Mary River Project, and discuss any additional efforts made to comply with Project Certificate Term and Condition 3 of the Project Certificate to date. Recognizing that significant deferral or delay in implementing a climate change strategy and greenhouse gas (GHG) emissions reduction measures for the Project could result in a finding of non-compliance, Baffinland is encouraged to describe any ongoing activities or planned initiatives outside of a formal strategy or plan designed to reduce greenhouse gas emissions from the Project.</p> <p>It is requested that Baffinland provide its report to the Nunavut Impact Review Board within 90 days.</p>	<p>Baffinland provided NIRB with a copy of the Baffinland Climate Change Strategy on February 8, 2019. Information regarding initiatives undertaken by Baffinland to date to comply with the objectives of PC No. 3 were also provided in the covering letter to NIRB that accompanied submission of the Climate Change Strategy. A description of these initiatives has also been provided in the NIRB Report.</p>	<p>PC Conditions No. 2, 3 and 4</p>
2	<p><u>Dust Management</u> In reviewing Baffinland's 2017 Annual Monitoring Report to the NIRB, the Qikiqtani Inuit Association (QIA) specifically noted that the annual terrestrial dustfall exceeded the predicted threshold levels at all but one of the monitoring sites at Milne Port and within 30 metres (m) and 1000 m on either side of the Tote Road. Further, the QIA noted that modelling predictions in the 2013 Final Environmental Impact Statement (FEIS) Addendum for the Early Revenue Phase (ERP) of the Mary River Project underestimated dustfall levels. Although Baffinland clarified that these exceedances occurred despite dust suppression efforts using applications of water and calcium carbonate, the QIA noted that the amount of dust entering the aquatic receiving environments directly as dustfall and in runoff from surrounding areas is unknown, and that there is no information available regarding how the potential for increased dustfall levels and applications of calcium carbonate dust suppressants influence aquatic sedimentation rates and affect aquatic biota along the Tote Road and in Phillips Creek. Further, the QIA also commented that Baffinland's 2017 annual reporting did not provide information on the quantity of dust entering the aquatic environment or its effects.</p>	<p>The Board requires that Baffinland revise the dustfall modelling predictions presented within the 2013 Final Environmental Impact Statement (FEIS) Addendum for the Early Revenue Phase (ERP) of the Mary River Project with data collected from site-wide monitoring programs to date and reassess the potential impacts of dust on the aquatic receiving environment to inform ongoing dust management efforts onsite. Further, the Proponent is directed to implement long-term monitoring programs for dustfall and specifically assess potential sediment deposition, impacts on water quality, impacts to biota at fish-bearing streams and lakes along the Tote Road (including at Phillips Creek), and in the marine environment downstream of the creek outlet.</p> <p>It is requested that Baffinland report back on its implementation of these items within the Proponent's 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Baffinland acknowledges that fugitive dust emissions for the Project have exceed predictions presented in the FEIS. The intent of the monitoring program is to assess Project effects against the predictions included in the FEIS. Updating the predictions does not improve the understanding of the effects assessment – instead actual data collected will determine if the potential effects have occurred as a result of the observation of levels above predictions.</p> <p>To date, Baffinland has implemented a robust dustfall monitoring network at the Mine Site, Milne Port and along the Tote Road. Baffinland has included sediment deposition sampling as part of the Aquatic Effects Monitoring Program (AEMP) at the Mine Site, and the Marine Environment Effects Monitoring Program (MEEMP) at Milne Port. Results of the AEMP are used to represent broader trends that could be occurring in and near the Project site, where effects are less acute (i.e. If effects are negligible at the Mine Site, it is expected that they will be even less prominent at other Project locations where fugitive dust emissions are less substantive). Results of the MEEMP are used to assess the trends associated with the influence of Phillips Creek and the project activities (i.e. stockpiling and shiploading) at Milne Port.</p> <p>In 2019 Baffinland will be implementing the Tote Road Monitoring Program to assess water quality at select fisheries crossings, areas of recent construction, and areas historically prone to sedimentation events. This program was designed in consultation with QIA throughout 2018 to formalize and improve upon the existing water quality monitoring conducted on the Tote Road.</p>	<p>PC Conditions No. 10, 21, 46, 54 and 58</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
3	<p><u>Dust Management</u></p> <p>In reviewing Baffinland's 2017 Annual Monitoring Report to the NIRB, the Qikiqtani Inuit Association (QIA) specifically noted that the annual terrestrial dustfall exceeded the predicted threshold levels at all but one of the monitoring sites at Milne Port and within 30 metres (m) and 1000 m on either side of the Tote Road. Further, the QIA noted that modelling predictions in the 2013 Final Environmental Impact Statement (FEIS) Addendum for the Early Revenue Phase (ERP) of the Mary River Project underestimated dustfall levels. Although Baffinland clarified that these exceedances occurred despite dust suppression efforts using applications of water and calcium carbonate, the QIA noted that the amount of dust entering the aquatic receiving environments directly as dustfall and in runoff from surrounding areas is unknown, and that there is no information available regarding how the potential for increased dustfall levels and applications of calcium carbonate dust suppressants influence aquatic sedimentation rates and affect aquatic biota along the Tote Road and in Philips Creek. Further, the QIA also commented that Baffinland's 2017 annual reporting did not provide information on the quantity of dust entering the aquatic environment or its effects.</p>	<p>The Board requests that Baffinland revise the dust isopleth model using existing dustfall collection data and make revisions to the existing Dust Management and Roads Management Plan to include "specific adaptive management measures" to be implemented should monitoring observations confirm that dust deposition from the Project is greater than initially predicted.</p> <p>It is requested that Baffinland highlight revisions to the dust isopleth model within the Proponent's 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Baffinland continues to apply dust suppression and mitigation measures to minimize fugitive dust emissions as a result of the Project to the fullest extent possible. Furthermore, in 2017 and 2018 Baffinland observed decreases in dustfall at the Project site, which may be partially or wholly attributed to increased dust suppression measures implemented by Baffinland.</p> <p>Dust mitigation measures were implemented in 2018 and six (6) additional remote dustfall sites were installed along the Tote Road in consultation with QIA and the MHTO and will be monitored for additional information on dustfall in 2019. Additionally, in 2019 Baffinland will be implementing the Tote Road Monitoring Program to assess water quality at select fisheries crossings, areas of recent construction, and areas historically prone to sedimentation events. This program was designed in consultation with QIA throughout 2018 to formalize and improve upon the existing water quality monitoring conducted on the Tote Road.</p>	<p>PC Conditions No. 10, 21, 46, 54 and 58</p>
4	<p><u>Noise and Vibration Monitoring</u></p> <p>Condition 14 of the Project Certificate requires Baffinland to conduct noise and vibration monitoring at Project accommodations during all phases of the Project, particularly during the summer and winter seasons. In Baffinland's 2017 Annual Monitoring Report to the NIRB, the Proponent stated that in June 2017, one (1) room at the Mine Site and two (2) rooms at the Milne Port site were tested for noise and vibration levels. Baffinland further reported that due to equipment malfunction and availability issues that could not be resolved before the end of 2017 it was unable to conduct the scheduled winter noise and vibration monitoring during the 2017 period. The NIRB's 2017 Board Recommendation #5 had specifically requested that Baffinland improve its noise and vibration monitoring program across Project sites; however, during the current reporting year the NIRB noted that the recommended changes to the noise and vibration monitoring program has yet to be fully implemented and is still data deficient. The NIRB also questions the validity of Baffinland's conclusion regarding the seasonal variation of noise/vibration levels between the two (2) sites as indicated in the 2017 Annual Report due to the relatively low sample size (Mine site=1; Milne Port=2) and lack of consideration for seasonal changes in noise/vibration levels across the project sites.</p>	<p>The Board requires that Baffinland develop an action plan to comply with Project Certificate Term and Condition 14 by improving noise and vibration monitoring at site through improved seasonal sampling and increased sample sizes and frequency of monitoring of noise and vibration levels, particularly at the Mine site and Milne Port accommodation facilities. The action plan must highlight measures designed to ensure that noise and vibration levels continue to be monitored across the Project and the safety of workers maintained in the event of additional equipment malfunctions in future. Baffinland must also provide an analysis of any observed seasonal variation in noise and vibration levels (summer vs. winter) and a discussion of the implication of such variations (if any) on workers' health and safety onsite.</p> <p>It is requested that this action plan be provided within 30 days' receipt of the Board's recommendations.</p>	<p>Adaptive management measures employed in 2018 to reduce noise and vibration near the accommodation complexes included:</p> <ul style="list-style-type: none"> • Implementing quiet work hours; • Limiting operation of equipment in the vicinity of accommodation complexes where practicable; and • Relocation of the helicopter landing zone at the Mine Site further away from accommodation complexes during the morning and evening hours of the day. <p>In May and December 2018, accommodations at the Mine Site Complex (MSC), Weatherhaven Camp, and Port Site Complex (PSC) were tested for noise and vibration. During both the summer and winter sampling periods, the average noise levels and maximum vibration exposures for workers were consistently less than the exposure limits set forth in the Mine Health and Safety Act and the European Physical Agents Vibration Directive¹.</p> <p>Baffinland plans to continue its annual Noise and Vibrational testing in 2019 with two seasonal sample events (winter and summer) at five locations per site, and will continue to report the results in the NIRB annual reports. A discussion of seasonal differences will be provided, where applicable.</p>	<p>PC Condition No. 14</p>

¹ Since the Mine Health and Safety Act does not provide specific numerical limits, 8-hour equivalent vibration criteria are taken from the European Physical Agents Vibration Directive – 2002/44/EC.

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
5	<p><u>Groundwater Monitoring</u> Project Certificate Term and Condition 23 requires that Baffinland 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. In the 2017 Annual Monitoring Report, Baffinland indicated that a pilot groundwater monitoring program was implemented, and specifically involved the establishment of shallow groundwater wells up-gradient of the landfill facility. Baffinland further clarified that groundwater was detected and sampled at three (3) monitoring wells down-gradient and one (1) monitoring well located up-gradient of the landfill facility. While the 2017 Annual Monitoring Report noted all the efforts made by the Proponent to implement a groundwater monitoring program near the vicinity of the landfill, the NIRB requests that the Proponent continue to develop a site-wide groundwater monitoring program, 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.</p>	<p>The Board requests that Baffinland implement a consistent site-wide groundwater monitoring program which addresses other key project facilities beyond the landfill, likely to affect groundwater resources. Baffinland must develop a Groundwater Monitoring and Management Plan to monitor, prevent, and/or mitigate the potential effects of different Project facilities on groundwater resources within the Project area, as noted in its Surface Water and Aquatic Ecosystem Management Plan approved by the Nunavut Water Board (NWB).</p> <p>It is requested that Baffinland provide an update on its compliance with Project Certificate Term and Condition 23 in the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>During 2018, Baffinland continued the pilot groundwater monitoring program initiated in 2017 to confirm program feasibility. During September 2018, Baffinland installed shallow groundwater wells up-gradient and down-gradient of the Mine Site Non-Hazardous Waste Landfill (Landfill Facility) using drive point piezometers. Groundwater wells were established to the depth of permafrost (approx. 1 - 1.5 metres) and water samples were collected at well locations where groundwater was detected. Groundwater was detected at three monitoring wells down-gradient and two monitoring wells up-gradient of the Landfill Facility, although the data set remains too limited to adequately characterize natural groundwater chemistry and hydrogeology or identify any trends, including potential impacts as a result of Project activities of infrastructure at this juncture.</p> <p>Baffinland intends to continue the groundwater monitoring program at the Landfill Facility in 2019 using a methodology consistent with the pilot program implemented in 2018. It is expected that future years of monitoring data will serve to determine the feasibility and utility of the monitoring program and value of the expanding the program to areas beyond the Landfill Facility.</p>	<p>PC Condition No. 23</p>
6	<p><u>Permafrost Degradation</u> Baffinland is required pursuant to Project Certificate Term and Conditions 28 to monitor the effects of the Project on the permafrost around the mine development area and implement effective preventative measures to ensure that the integrity of the permafrost is maintained throughout the Project Development Area. In addressing this condition, Baffinland indicated within its 2017 Annual Report to the NIRB that the biannual geotechnical inspections it completed at the Mine Site and Milne Port revealed that the Mary River Polishing/Waste Stabilization Ponds (PWSPs) 1, 2, and 3 have experienced minor overall settlements of the structures and that this minor settlement was restricted to the berms. Additional inspections by Crown-Indigenous Relations and Northern Affairs Canada and Environment and Climate Change Canada staff further identified concerns with respect to seepages flowing from the Waste Rock Sedimentation Pond at the Mine site. Previous site visits by the NIRB noted terrain instability issues around the waste water effluent outflow area at the Mine site area. Evidence of site actions and improvements were noted in these locations during the NIRB site visits, and the Proponent has further indicated that it has retained a third-party consultant to remediate specific permafrost degradation areas during 2017. Despite this effort, the NIRB notes that some historic and localized permafrost degradation areas along the Tote Road and Mine Haul Road have yet to fully benefit from preventative and mitigation measures where they are related to direct project activities.</p>	<p>The Board requires that Baffinland take appropriate steps to address all historic and localized permafrost degradation issues along the Tote Road and Mine Haul Road, including identified terrain instability adjacent to the waste water effluent outflow area. It is requested that Baffinland provide an update on its compliance within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Project's activities have led to localized permafrost degradation along the Tote Road that are addressed on an individual basis for optimal remedial efforts. In 2019, Baffinland will continue to address permafrost degradation at the Km 97 Borrow Source. Baffinland plans to continue implementing the borrow source's progressive reclamation and rehabilitation plan outlined in Appendix B of the borrow source's approved management plan titled Borrow Source Management Plan – Kilometre 97.</p> <p>To improve historical permafrost degradation issues along the Tote Road, Baffinland will continue to develop and prioritize preventative and mitigation measures to minimize the impacts of the Project's activities and infrastructure on landforms along the Tote Road. These activities are reflected in Baffinland's 2019 Work Plan (Baffinland, 2019).</p> <p>Specific permafrost degradation areas adjacent to the Tote Road and Borrow locations were targeted during 2018 through general road maintenance programs and through the continuance of Tote Road Earth Works Execution Plan and original 2013 Hatch designs. Unstable and slumping slopes adjacent to the Tote Road were targeted and remediated with armour stone and slope redesigns. Results from geotechnical investigations conducted in 2018 will be used to support the design of future Project infrastructure.</p> <p>As identified in previous years, Project's activities have led to localized permafrost degradation along the Tote Road that are addressed on an individual basis for optimal remedial efforts. In 2019, Baffinland will continue to address permafrost degradation at the Km 97 Borrow Source. Baffinland plans to continue implementing the borrow source's progressive reclamation and rehabilitation plan outlined in Appendix B of the borrow source's approved management plan titled Borrow Source Management Plan – Kilometre 97.</p>	<p>PC Condition No. 25 and 28</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
7	<p><u>Freshwater Aquatic Environment – Setbacks</u> Term and Condition 42 of the Project Certificate requires that the Proponent adhere to setbacks to mitigate impacts of runoff into freshwater aquatic habitats. Within the 2017 Annual Monitoring Report, Baffinland noted that during inspections in 2017, there were instances of construction development within 30 metres of a waterbody. Specifically, the Board notes that in 2017 an incident occurred in Milne Inlet, when a construction pad was built over top of a non-fish bearing stream during winter months, an activity that resulted in a directive from Crown-Indigenous Relations and Northern Affairs Canada for the Proponent to stop work. Although Baffinland noted that it has developed a new ditching system to covey the stream around the pad and subsequently received the appropriate approvals from the Nunavut Water Board, the NIRB reminds the proponent that strict adherence to the requirement to maintain a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies continues to be a requirement for the approved project.</p>	<p>The Board requests that Baffinland provide an update on its protocol for educating all contractors and workers on site of the requirement to adhere to a 30 metre (m) buffer zone or setback distance from local waterbodies, including any enhancements made in reaction to recent violations of this requirement. Baffinland is further directed to highlight any instances of development within 30 m of a water body within future reporting to the NIRB, with a discussion of associated follow-up.</p> <p>It is requested that this update be included within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Baffinland continues to perform bi-weekly inspections to ensure all Project-related operations are at a distance greater than 30 metres from any water body, except where authorized under the Type A Water License and DFO Letters of Advice. If infractions are discovered, responsible departments for development areas are actioned to remove materials or infrastructure, and to reclaim the developed area. New proposed development areas must be approved by the Baffinland Site Environment Department to ensure the area has a setback of 30 metres from the high water mark of natural water bodies. Consultants preparing design drawings for new infrastructure are also made aware of the requirement. Baffinland conducts annual training on the Environmental Protection Plan (EPP) for superintendents and managers, and orientation training on the EPP for new contractors. The presentation provides an overview of key Project activities and the required natural vegetation buffers to any waterbodies.</p> <p>During internal inspections in 2018, temporary laydown of equipment was sited within 30 m of a water body and responsible departments were actioned to address these issues. Baffinland Site Environment Department followed up with further inspections to ensure that infrastructure was relocated or material was reclaimed.</p>	<p>PC Condition No. 42</p>
8	<p><u>Restrictions to Fish Passage</u> Baffinland is required pursuant to Project Certificate Term and Condition 47 to ensure that all Project infrastructure in watercourses are designed and constructed in such a manner that they do not unduly prevent and/or limit the movement of water in fish bearing streams and rivers. Baffinland further observed issues with fish passage and/or habitat at twelve (12) crossings, with three (3) of them showing some form of physical obstruction to fish that was subsequently removed during, or shortly after, completion of the July survey. Baffinland specifically reported that perching or hanging culverts were noted at five (5) crossings and in one case, BG-50, prevented passage of fish. Baffinland further identified four (4) crossing with apparent passage issues as evidenced by damaged culverts that were blocking, or had the potential to block, fish passage. The NIRB notes that the migration of fish species (both upstream and downstream) can be restricted by perched or hanging culvert and may prevent all life stages and all species from passing through the culvert during flows, which may further reduce habitat connectivity by blocking fish access to important spawning and rearing areas such as the mainstream, tributaries, ponds, and lakes.</p>	<p>The Board requires that Baffinland ensure connectivity for fish species is maintained for watercourses and tributaries intersecting with project roads, trails, or other infrastructure. Baffinland must ensure that all existing culverts, particularly those located in fish bearing streams, are properly maintained to enable fish passage. It is further requested that Baffinland provide a summary of its engagement with Fisheries and Oceans Canada to update its fish habitat monitoring program to address issues related to culvert perching and fish passage problems along the Tote Road.</p> <p>It is requested that the Proponent provide this updated information within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>During 2018, Baffinland continued to repair and upgrade water crossings at the Project to improve fish passage and surface water drainage, including five (5) fish bearing water crossings. Baffinland continues to routinely inspect fish bearing water crossings at the Project and address identified concerns. Additional works to address concerns identified in the 2018 assessments are planned for 2019. Remedying fish passage concerns at water crossings remains a top priority for Baffinland to ensure compliance with the Project's Tote Road Fisheries Act Authorization (NU-06-0084; DFO, 2007). Assessments of fish bearing water crossings will be continued in 2019 as part of the Project's fish habitat monitoring program.</p>	<p>PC Condition No. 47</p>
9	<p><u>Ballast Water Discharge and Impact Predictions</u> Within its 2017 Annual Monitoring Report to the NIRB, Baffinland indicated that it was "partially compliant" with Term and Condition 86 of the Project Certificate which requires that the Proponent use more detailed bathymetry collected from Steensby Inlet and Milne Inlet to model the anticipated ballast water discharges from ore carriers and utilize results of this modeling to update ballast water discharge impact predictions. Baffinland further noted that ballast water dispersion modelling was undertaken in 2014 prior to the start of commercial shipping of iron ore at Milne Port and that the modelling results were used to inform the location of sampling sites for Baffinland's Aquatic Invasive Species monitoring program which has been undertaken annually between 2014 and 2017. Baffinland stated in its annual report to the NIRB that supplementary oceanographic data collected post-modelling (2014 to present) was not yet used to update or further validate the original dispersion model.</p>	<p>The Board requests that Baffinland utilize all the oceanographic and bathymetric data collected between 2014 and 2017 to develop an updated ballast water dispersion model for the current Project operations, independent of the assessment of the Phase 2 proposal.</p> <p>It is requested that Baffinland provide this updated information within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>As part of the 2019 marine monitoring program, oceanographic data collected in 2018 will be used to validate the improved ballast water dispersion model reflective of current Project operations. This includes the 2018 oceanographic data (extended time series of current and Conductivity-Temperature-Depth (CTD) measurements) (collected in 2018 near Milne Port and Bruce Head, not previously available, as well as additional water level data at the Port and CTD profiles collected throughout Milne Inlet as part of the MEEMP.</p>	<p>PC Condition No. 86</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
10	<p><u>Ballast Water Discharge and Impact Predictions</u></p> <p>Within its 2017 Annual Monitoring Report to the NIRB, Baffinland indicated that it was “partially compliant” with Term and Condition 86 of the Project Certificate which requires that the Proponent use more detailed bathymetry collected from Steensby Inlet and Milne Inlet to model the anticipated ballast water discharges from ore carriers and utilize results of this modeling to update ballast water discharge impact predictions. Baffinland further noted that ballast water dispersion modelling was undertaken in 2014 prior to the start of commercial shipping of iron ore at Milne Port and that the modelling results were used to inform the location of sampling sites for Baffinland’s Aquatic Invasive Species monitoring program which has been undertaken annually between 2014 and 2017. Baffinland stated in its annual report to the NIRB that supplementary oceanographic data collected post-modelling (2014 to present) was not yet used to update or further validate the original dispersion model.</p>	<p>The Board requests that Baffinland actively monitor ballast water discharged from Project vessels to determine the efficacy of exchange and treatment methods and use resulting data to update the invasive species risk analysis and inform adaptive management measures designed to prevent invasive species introductions.</p> <p>It is requested that Baffinland provide an update on efforts undertaken to meet this recommendation within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Baffinland has developed a comprehensive, stand-alone Ballast Water Management Plan (BWMP) for the Project (available at www.baffinland.com). The BWMP includes a Standard Operating Procedure (SOP) which provides detailed instructions for salinity testing of ballast water tank on carriers calling at Milne Port, including directives for accessing on-board ballast tanks, selecting ballast tanks for testing, equipment set-up and deployment, detailed sampling and data entry procedures, guidance on instrument calibration, maintenance and storage, and reporting requirements.</p> <p>In 2018, all bulk carriers that called at Milne Port during the shipping season were boarded by a Baffinland environmental representative that conducted salinity testing of the ship’s ballast water before it was approved for release in Milne Port and before loading of the carrier could begin. In these instances, a single ballast tank on the vessel was tested for salinity concentration using a calibrated water quality meter (i.e. YSI Pro 30) to confirm that ballast water salinity levels were above 30 ‰ (parts per thousand), prior to being authorized by the port captain to discharge in Milne Port. Salinity levels were consistent with mid-ocean exchange requirements for vessels conducting a transoceanic voyage (salinity of mid-Atlantic seawater, where open-water exchange takes place, is typically in the range of 34-35 ‰).</p> <p>To date, ship ballast water has not been tested for biological composition (e.g. taxonomic screening, # of organisms, indicator microbes). The D-2 standard (treatment) specifies a maximum number of organisms and indicator microbes that are allowed to be discharged to the receiving marine environment according to the schedule set by the International Maritime Organization (IMO). As of March 2019, sampling and analysis methodologies to test for compliance with the D-2 standard have not been fully developed by the IMO yet. It is acknowledged in the IMO guidelines that although significant technical advances and refinements have been made in this area since the adoption of the Convention, there are still numerous issues to be resolved. Administrations are still undertaking research to define the most appropriate methods to test for compliance, and the best way to collect, handle and analyze samples. However, it is expected that in due course, appropriate guidance will become available once full compliance testing regimes are developed and the applicable regulators have had time to gain experience and develop best practice in ballast water sampling and analyses.</p>	<p>PC Condition No. 89</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
11	<p><u>Shoreline Effects and Sediment Redistribution</u> Term and Condition 83(a) of the Project Certificate requires that the Proponent identify potential for and conduct monitoring to identify effects of sediment redistribution associated with construction and operation of the Milne Port. Within the 2017 Annual Monitoring Report to the NIRB, Baffinland indicated that the sampling in 2017 suggested there was a significant increase in the percentage of fine sediment at far-field sampling stations (500 meter (m), 1,000 m, and 1,500 m) along the West Transect from 2014 to 2017 and further noted that this change was associated with alluvial depositions from Phillips Creek.</p>	<p>The Board requires that Baffinland conduct sediment sampling in 2018 and subsequent years to further evaluate temporal trends and monitor annual sediment transport via Phillips Creek into Milne Inlet, as well as to learn how alluvial transport may be affecting sediment deposition and composition near the head of Milne Inlet.</p> <p>It is requested that Baffinland provide an update on its compliance within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>In 2017, as part of the MEEMP, an increase in fine sediments was reported along the West Transect (extending westward from the existing ore dock towards the mouth of Phillips Creek). In 2018, following the collection of an additional year of data, and a refinement of the model, it was concluded that no persistent increases occurred at the West Transect throughout the 2013-2018 sampling period. The 2018 MEEMP and AIS Monitoring Report presents sediment sampling results over five consecutive years of environmental effects monitoring at Milne Port. Fines content was shown to remain stable between the five years of sampling on the West and East transects, with no consistent between-year increases. On the Coastal Transect, there was an observed increase in sampled percent fines at the 1,000-m and 1,500-m distances between 2013 and 2016. This increase was reflected in the modeled estimates. However, the 2018 data and model results showed no consistent increase relative to the 2014-2017 data collected at the transect. On the North Transect, a significant increase in percent fines was estimated at transect origin between 2014 and 2015, followed by a small decline in 2016 and no further changes throughout 2017-2018. Overall, there were no significant changes in percent fines between 2014 and 2018 on any of the four transects.</p> <p>Aerial imagery shows a delta extending outwards from the mouth of Phillips Creek approximately 500 m into Milne Inlet. This suggests that Phillips Creek plays a role in the geomorphology and sediment transport regime at the head of Milne Inlet. However, additional imagery indicates that sediment deposits are present both to the east and west of the ore dock along the shoreline at the head of Milne Inlet. These sediment deposits indicate that longshore sediment transport occurs, likely driven by freshwater discharge and physical processes in Milne Inlet (i.e. waves and currents) and that this longshore transport also plays a role in the geomorphology and sediment transport regime of Milne Inlet.</p> <p>As a response to Board Recommendation No. 11, Baffinland is considering to conduct a desktop review of available data to evaluate the hydrological, geomorphological and sediment transport regime at the Project site. The desktop-based review will also include a forensic analysis of historical sediment data collected in Milne Inlet in terms of the relation of the sampling periods and the sediment results to freshet events, tidal cycles, open water wind/wave events and similar physical forcing processes.</p>	<p>PC Condition No. 83(a)</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
12	<p><u>Traffic Log and Shipping Information</u> Pursuant to Term and Condition 105 of the Project Certificate, Baffinland is required to 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. The NIRB Project Certificate specifically indicates that such measures could include reduced shipping speeds where ship-marine mammal interactions are most likely, including changes in the frequency and timing of shipping as well as identification of alternate shipping routes. Within the 2017 Annual Monitoring Report to the NIRB, Baffinland indicated that some vessels exceeded the speed of 10 knots when transiting in the Project area and that it is committed to ensuring that in 2018 cargo and fuel vessels will be provided with instructions on how to approach Milne Inlet with speeds between 7-10 knots.</p>	<p>The Board requests that Baffinland update the Bruce Head Shore-based Monitoring Program to study the response of narwhals to vessels at varying speeds in Milne Inlet. The Board further requires that Baffinland report on steps taken to ensure that captains and crews of all Project vessels are provided with advance instruction to approach Milne Inlet with speeds limited to 7-10 knots.</p> <p>It is requested that Baffinland provide an update on its compliance within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>Studying narwhal response to Project vessels travelling at different speeds along the shipping corridor has not been possible to date as Baffinland requires all Project vessels to restrict speeds along the shipping route to 9 knots. Although some vessel speed exceedances were recorded near Bruce Head in 2017 and 2018, the overall number of exceedances was too low to allow for 'vessel speed' to be included as a control variable in the integrated analysis.</p> <p>A visual-based behavioural monitoring program at Bruce Head (shore-based monitoring) is being considered by Baffinland for 2019, and if implemented, would look at ways to incorporate a vessel speed component to the study design. This would need to involve some level of coordination with a sub-set of ship operators instructing them to deliberately operate at a set increased and/or decreased ship speed while transiting the study area.</p> <p>As described in PC No. 120, The Shipping and Marine Wildlife Management Plan (SMWMP) and Standing Instructions to Masters provide guidance on ship speeds and ship tracks that should be followed by all Project vessels contracted by Baffinland. The requirements are provided to all vessels procured by Baffinland prior to entry to Eclipse Sound.</p>	<p>PC Conditions No. 105, 120</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
13	<p><u>Shipboard Observer Program</u> Baffinland reported to the NIRB that the ship-based surveillance monitoring was discontinued in 2016 due to safety concerns arising from the on-boarding of the observers, and the general lack of success of observers on ships to observe marine mammals during ship voyages. The NIRB notes that Baffinland's 2017 Annual Report provided no updates on any alternative programs it was considering for monitoring vessel interactions with marine mammals and seabirds during the year; however, Baffinland indicated that a shipboard observer program committee was formed in 2017 with the goal to identify feasible alternatives. Recognizing that an alternative has not yet been identified which has resulted in restrictions to implementation of monitoring for impacts of shipping to marine mammals, while Baffinland continues to seek approvals for increased marine shipping from Milne Inlet, the Board is aware of the potential for increased public concern over unidentified impacts to marine mammals; therefore, the Board encourages Baffinland to prioritize achieving compliance to this recommendation.</p>	<p>The Board requires that Baffinland provide a detailed update regarding the alternative strategy being used to prevent, limit, and monitor for vessel interactions with marine mammals and seabirds. Baffinland must demonstrate that Project vessels are implementing early warning indicators that will ensure rapid identification of negative impacts to marine wildlife along Project shipping routes. This update must include a discussion of comments and concerns provided through the Marine Environmental Working Group when designing and implementing the alternative monitoring strategy, including the selected indicators.</p> <p>It is requested that this update be provided to the Nunavut Impact Review Board within 60 days.</p>	<p>Baffinland described in its response to reviewer comments on the 2017 Annual Report that the shipboard observer program would be reinstated in 2018. Baffinland confirms that the program was implemented as described and split into two sessions. The first leg of the program was active from July 28 to August 7 and included one technical consultant observer and two Inuit observers. The second leg of the program ran from September 29 to October 17, and included one technical consultant observer and three Inuit observers. The program included conducting marine mammals and seabird counts and any recordable behavioural responses to Project-shipping activities.</p> <p>Consultation on the design of the shipboard observer program occurred with the Marine Environment Working Group (MEWG) meetings held in advance of the field season, including:</p> <ul style="list-style-type: none"> • May 17, 2018 – Ship-based observer program planning committee call (included invitations to all members of the MEWG); • June 6, 2018 – MEWG Meeting with members and observers of the MEWG; • June 7-8, 2018 – Pre-shipping season meeting with Hunters and Trappers Organization in Pond Inlet; and • July 12, 2018 – Meeting in Pond Inlet. <p>Subsequent to the June 7-8 meetings, a letter of support for this program was provided by the Mittimatalik Hunters and Trappers Organization.</p> <p>Baffinland also produced a fact sheet, which summarized marine environmental monitoring programs planned for the 2018 season, including an overview of the Ship-based observer program.</p> <p>A one-day training program for Inuit Ship-board observers was held in Pond Inlet on July 18, 2018 in advance of the start of the program.</p> <p>Other vessel management practices implemented in 2018 to minimize potential negative effects to marine wildlife along the Project shipping route included:</p> <ul style="list-style-type: none"> • Reducing ship speed to 9 knots from 10 knots along Shipping Corridor; • Ensure vessels follow the shipping route, avoiding key areas such as Koluktoo Bay and the western shoreline near Bruce Head; • Use AIS monitoring system to track vessel speed and movements; and • Improve QA/QC for ballast water sampling. 	<p>PC Conditions No. 106, 107, 108 and 123</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
14	<p><u>Marine Environment – Ship Noise</u> Baffinland is required pursuant to Project Certificate Terms and Conditions 110 and 111 to develop a monitoring protocol to prevent impacts to marine mammals from Project shipping activities and expected to work with the Marine Environment Working Group (MEWG) to determine appropriate early warning indicator(s) that will ensure rapid identification of negative impacts along the southern and northern shipping routes. In addressing these Terms and Conditions, Baffinland indicated in its 2017 Annual Report to the NIRB that no threshold have been developed for determining if negative impacts due to vessel noise are occurring. The NIRB is aware that the Proponent is currently investigating options to conduct acoustic/visual monitoring program (vessel-based pilot study) near Bruce Head to further evaluate the response of narwhals to shipping.</p>	<p>The Board requires that Baffinland provide a detailed update regarding the alternative strategy being used to prevent, limit and monitor for vessel interactions with marine mammals and seabirds. Baffinland must demonstrate that Project vessels are implementing early warning indicators that will ensure rapid identification of negative impacts to marine wildlife along Project shipping routes. This update must include a discussion of comments and concerns provided through the Marine Environmental Working Group when designing and implementing the alternative monitoring strategy, including the selected indicators.</p> <p>It is requested that this update be provided to the Nunavut Impact Review Board within 60 days</p>	<p>Baffinland described in its response to reviewer comments on the 2017 Annual Report that Baffinland and the MEWG have been holding ongoing discussions related to the development of early warning indicators (EWI) during the:</p> <ul style="list-style-type: none"> • November 29 and 30, 2017 MEWG Meeting; and • June 6, 2018 MEWG Meeting. <p>A copy of these meeting minutes are provided as Attachment 5. Baffinland created and distributed an EWI framework development template (Attachment6) to the Working Group and next steps at the September 13, 2018 MEWG meeting.</p> <p>Subsequent information was provided in the form of the EWI template from Parks Canada (PC) and Fisheries and Oceans Canada (DFO). Baffinland also held a consultation session with the Pond Inlet Hunter and Trappers (MHTO) on EWIs on November 29, 2018. Specific information sought from MHTO members was related to how body condition and calving rates are assessed by hunters, what other factors (e.g. killer whales) influence year-to-year population levels of narwhals and monitoring programs that could provide information on EWIs.</p> <p>A preliminary screening of indicator species was discussed during the December 10, 2018 MEWG Meeting based on feedback received from PC, DFO and MHTO. During discussions, it was noted that the development of EWIs was a very difficult exercise and that a confluence of monitoring programs would be necessary to fully define what would be considered an appropriate EWI, and for which species. To aid in upcoming discussions, Baffinland drafted and shared an information sheet with potential indicators and monitoring programs to the Working Group during Q1 of 2019. This information sheet will be used to facilitate ongoing discussions related to EWI development with the MEWG early in 2019.</p> <p>Additional details regarding progress made on the development of key EWIs have been provided in PC No. 110-112.</p>	<p>PC Conditions No. 101, 105, 110, 111 and 112</p>
15	<p><u>Survey and Monitoring of Arctic Char</u> Project Certificate Term and Condition 48(a) requires Baffinland to provide plans to conduct additional surveys for the presence of arctic char in freshwater bodies and implement ongoing monitoring of arctic char health in areas affected by the Project. While Baffinland noted that char monitoring activities was described in marine areas at the Port and freshwater near the mine, the QIA specifically noted that the extent of char monitoring in fresh water along the Tote Road in 2017 remain unclear.</p>	<p>The Board requires Baffinland to report on electrofishing efforts undertaken and catches at stream crossings along the Tote Road, including a discussion of survey outcomes and monitoring of arctic char presence, condition, and health.</p> <p>It is requested that this information be incorporated in the 2018 Annual Monitoring Report to the Nunavut Impact Review Board.</p>	<p>In 2018, Baffinland conducted monitoring at fish-bearing crossings along the Tote Road. The emphasis of the 2018 monitoring program was to assess the presence of fish, habitat quality and fish passage success at all fish-bearing sites and to identify any potential impacts from upgrades or general road maintenance.</p> <p>Habitat surveys involved observations of substrate, flow characteristics and potential fish use along 50 m reaches upstream and downstream of each applicable crossing. Fish presence was determined through visual surveys and the use of an electrofisher.</p> <p>Fish were captured or observed at all known fish-bearing crossing in 2018, with the exception of crossings CV-115 and BG-50. The fish-bearing stream at crossing CV-115 is considered marginal habitat and was dry in 2018 and did not contain fish at the time of the survey in early July, which is consistent with observations since monitoring began in 2009. The fish-bearing stream at crossing BG-50 provided important habitat, but fish were not captured or observed in the right channel. This is the second consecutive year in which juvenile char were not captured directly downstream of the culverts. Causes of their absence in 2017 and 2018 are not known, but it may be a result of decreased use of the branch in response to perched culverts. It should be noted that upstream habitat was still accessible and fish observed in the left channel at the bridge crossing.</p>	<p>PC Conditions No. 47 and 48(a)</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
16	<p><u>Marine Environment – Vessel Fouling Monitoring</u> Pursuant to Project Certificate Term and Condition 91, Baffinland is required to develop a detailed monitoring plan for Steensby Inlet and Milne Inlet for vessel fouling 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. Within its annual reporting to the NIRB, Baffinland indicated that in discussion with the Marine Environment Working Group it was considering an alternative monitoring tool for hull biofouling, which would involve use of an underwater video mounted on a remotely operated underwater vehicle. Baffinland further reported that no fouling monitoring has taken place on vessel hulls in 2017, and that no trends in fouling in the marine environment of Milne Inlet have been reported based on the 2014 and 2015 data.</p>	<p>The Board directs Baffinland to develop an action plan to address required monitoring of fouling on the hulls of project vessels, as required by Project Certificate Term and Condition 91. Baffinland must further coordinate with the Marine Environment Working Group to implement a suitable alternative monitoring tool for hull biofouling, such as underwater video captured with a remotely operated vehicle. Baffinland must provide results on annual basis for completed surveys for detection of fouling on vessel hulls moored at Milne Port.</p> <p>It is requested that an action plan to address required monitoring of fouling on the hulls of project vessels be provided to the Nunavut Impact Review Board within 60 days and that updates be incorporated into the 2018 Annual Monitoring Report to the Nunavut Impact Review Board.</p>	<p>Previous attempts were made in 2017 to address this condition. A SCUBA-based vessel hull biofouling survey of Project-vessels anchored in Milne Port was proposed. However, after completing a site assessment and options analysis, Baffinland determined that the risk to the safety of the sampling crew was extremely high, as lock out protocols could not be implemented to ensure the safety of the dive team. Baffinland described in its response to reviewer comments on the 2017 Annual Report that in 2018 Baffinland would be implementing an alternative monitoring tool for hull biofouling using a remotely operated vehicle (ROV) system for underwater video surveys.</p> <p>The proposed alternative ROV monitoring did indeed occur in 2018, with three (3) ore carrier hulls being surveyed during the program. It is noted however there was no accessible epifaunal growth available for sample collection, nor has Baffinland commissioned any purpose-built vessels for the Project to date. Baffinland will continue the use of ROV systems in 2019, including the use of upgraded high definition video equipment, and evaluate potential alternative methodologies to complete sampling.</p>	PC Condition No. 87 and 91
17	<p><u>Shipping Route Deviations</u> The Qikiqtani Inuit Association (QIA) indicated that Baffinland's 2017 Annual Monitoring Report noted that some vessels deviated at least 15 kilometers (km) northward into Navy Board Inlet and others southward about 15 km into Eclipse Sound and further requested that the Proponent clarify the types of vessels that deviated from the shipping route and provide a revised map with vessel types. Further, the QIA also requested that the Proponent clarify what constituted a significant course of deviation in the waters west of Baffin Bay, and why these deviations occurred.</p>	<p>The Board directs Baffinland to clarify the types of vessels that deviated from the approved shipping route and provide a revised map with vessel types shown, and with a detailed discussion of why these deviations occurred.</p> <p>It is requested that this update be included within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	The ship track by vessel type transiting Milne Inlet in 2018 have been presented as part of the summary for PC Condition No. 103 in the 2018 Annual Report. As described in the Annual Report, there were no significant deviations from the nominal shipping route in 2018 by Project ore carriers.	PC Condition No. 103, 104 and 120
18	<p><u>Caribou Survey</u> The Government of Nunavut (GN) noted it had concerns regarding the method employed by the Proponent in conducting the caribou height of land surveys and the amount of time employed for survey effort and the results of the surveys, which showed that no caribou was detected around the project site during the surveys in 2017. The NIRB notes that the result of this current survey was consistent with the results from the past four (4) years confirming no observation of caribou around the Mary River Project. Further, the GN also questioned the validity of the current study design and the level of survey efforts adopted by the Proponent noting that the survey method employed does not offer the power to distinguish whether the caribou observation was influenced by the general low population density or caused by avoidance behavior/deflection of caribou from the Project infrastructure. The GN indicated that the study design relied on behavioral observations to indicate how caribou might be interacting with Project infrastructure and that the study approach will only be effective in instances of high caribou population density, which is not the case in the North Baffin region, particularly around the Project area. The NIRB expects the Proponent to continue working closely with the GN and the Terrestrial Environment Working Group in developing and/or modifying mitigation and monitoring programs for caribou and other terrestrial wildlife species around the Project site.</p>	<p>The Board requires Baffinland to report on its engagement with the Terrestrial Environment Working Group (TEWG) and efforts to address feedback received with the objective of developing improvements for caribou surveys and monitoring programs for the Project. Baffinland must specifically address feedback received from the Government of Nunavut regarding areas that are considered inadequate in the current Wildlife Management Plan and the Terrestrial Environmental Monitoring Program for the Project.</p> <p>It is requested that this update be included within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>In 2018, the TEWG held meetings on March 22, June 5, September 20 and December 11. The TEWG provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The TEWG also serves as an advisory group to provide recommendations on appropriate management approaches related to the Project.</p> <p>The TEWG has guided the development of the Terrestrial Environment Effects Monitoring Plan (TEEMP; Baffinland, 2016j). 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. Baffinland will continue to work with the TEWG to review and guide monitoring programs on an annual basis and develop mitigation measures or action plans as and when needed.</p> <p>Baffinland, with support from the QIA and other members of the TEWG, has put a strong emphasis on continuing the existing monitoring programs and developing more diverse community-based monitoring initiatives. Additional details are provided in the 2018 Terrestrial Annual Report and the 2018 Annual Report to NIRB.</p>	PC Condition No. 49

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
19	<p><u>Used Tires</u> During the 2018 site visits, it was noted that used tires are a significant waste stream across the Project sites, particularly around the Mine site and Milne Port, and as noted in the 2016 and 2017 site visits. During the August 2018 site visit, NIRB staff noted that several of the used tire piles are now removed and stored in seacans for shipping and disposal offsite. In general, the state of tire disposal has significantly improved during the site visits in 2018.</p>	<p>The Board requires Baffinland to provide continued reporting regarding how it has implemented measures within its Tire Management Plan for re-treading, reuse, or offsite disposal of tires generated from the site. Baffinland must implement an organized method of storing and relocating tire piles across the Project consistently moving forward.</p> <p>It is requested that an update regarding this recommendation be provided within the next 30 days to the Nunavut Impact Review Board.</p>	<p>Baffinland continued to make significant progress on used tire management in 2018. Starting in mid-2017 the current used tire stream is organized and stored in designated seacans at the Mine Site and Milne Port tire shops. These seacans are then sent offsite for disposal during sealift backhaul activities.</p> <p>As planned and committed to do in 2017, the vast majority of historical tire piles at Milne Port were processed and organized into seacans in 2018.</p> <p>Approximately 11,700 of both used and historical tires were backhauled from Milne Port in 2018.</p> <p>Baffinland is currently developing an action plan to process the historical tire pile in Mary River for backhaul offsite during the open water season in 2019. Where possible, Baffinland uses and repurposes tires for barriers, berms and ballasts across the site.</p>	<p>Not Applicable. Issue has been resolved.</p>
20	<p><u>Waste Landfill</u> During both the April and August 2018 NIRB site visits, it was noted that all of the protective mesh around the landfill area were completely removed from the supporting poles similar to previous site visit observations in 2014, 2015, 2016, and 2017, and the newly installed wooden fence around the facility was observed to be insufficient to contain the landfill footprint, thereby increasing the risk of wind-blown debris from the facility. The NIRB further notes that the condition of the fencing around the landfill during the 2018 site visits have not significantly improved compared to previous years. Further, the NIRB's 2017 Board Recommendation #31 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.</p>	<p>The Board directs Baffinland to improve the quality of fencing around the perimeter of landfill sites to reflect industry best practices for these operations. Landfill litter fences must be of sufficient quality and height and encircle the entire landfill area to ensure that waste materials are not dispersed offsite. Baffinland must include evidence of this issue being satisfactorily addressed within its annual reporting in future. It is requested that an update regarding implementation of this direction be provided within the next 30 days to the Nunavut Impact Review Board, and with updates included within the Annual Reports to the Nunavut Impact Review Board moving forward.</p>	<p>The design and installation of the perimeter fence has been a priority action item for Baffinland. Throughout 2017 and into early 2018 Baffinland proposed a number of different designs for the landfill fence and had several conversations with NIRB monitoring officers on the development of the designs. Following a final design criteria taking into consideration future expansion of the landfill, all materials were ordered in early 2018.</p> <p>In September 2018, Baffinland completed the installation of a perimeter fence downwind of the active portion of the landfill. Construction commenced on August 20 and was completed on September 18, 2018. The installed fence is 215 meters in length, eight feet tall and made up of two-inch galvanized chain link heavy gauge meshing with a tire base (see Photo 1 and 2).</p> <p>Baffinland intends to expand the fence progressively with the landfill expansion of additional cells and will provide further updates in subsequent annual reports to the NIRB as relevant.</p>	<p>Not Applicable. Issue has been resolved.</p>

No.	NIRB Comment	NIRB Recommendation	Baffinland Response	Concordance to 2018 Annual Report
21	<p><u>Dust Management</u> During the April 2018 site visit, NIRB staff observed dust emissions, including visible dust plumes generated from the crusher plant, which continues to be an ongoing issue at the crusher facility. Specific parts of the crusher and screening plant were also noted to lack appropriate sealing or dust containment system, resulting in the release and dispersion of fugitive dust to the surrounding environment as was observed during previous site visits. Proper engineering designs and controls is required to address the increased dust emissions from the crusher plant.</p>	<p>The Board requires Baffinland to improve the effectiveness of its management of ore dust exposure to workers, particularly for crusher operations. Baffinland must report on improvements made and provide evidence to support that dust levels are kept within acceptable levels to ensure the safety of workers on site.</p> <p>It is requested that this update be included within the 2018 Annual Report to the Nunavut Impact Review Board.</p>	<p>In 2017, following a site inspection, the Workers' Safety and Compensation Commission (WSCC) provided Baffinland with a directive to establish a crushing and screening plant work-zone area, and to ensure that every person must wear suitable respiratory protection at all times when in the work-zone of an active crusher. This directive was addressed, and PPE requirements have been established and are enforced when the crusher is running.</p> <p>In 2018, Baffinland continued implementing mitigation measures to minimize fugitive dust emissions resulting from the crusher. Mitigation measures included:</p> <ul style="list-style-type: none"> - Installation of dust hood covers on all conveyors - Installation of dust hoods on surge bin transfer points - Installation of dust hoods on transfer points <p>RWDI was retained by Baffinland to complete occupational health and safety monitoring of noise, vibration and air quality. On-site sampling was conducted by a senior air quality specialist from May 24 to 30, 2018. The crusher was included as a sample site for inhalable particulate and silica, with three key receptors identified:</p> <ol style="list-style-type: none"> 1) Bobcat Operator 2) Loader Operator 3) Yardman <p>Results of the air quality testing was compared to their respective time weighted average (TWA) limits as defined under the Occupational Health and Safety Regulations R-003-2016, as amended, for the worker exposure sampling by the Government of Nunavut. The TWA is the average of the airborne concentrations of a biological and/or chemical agent determined from air samples of airborne concentrations to which a worker is exposed in a typical day. The TWA values were prorated to reflect a longer working shift, as Baffinland employees typically work a 12-hour day.</p> <p>Results of the monitoring demonstrate that for all receptors at the crusher site, exposure was well within the acceptable range of the TWA.</p> <p>For 2019, Baffinland has retained SPI Health and Safety to conduct occupational health and safety for air quality. There will be four sampling events for 2019, starting in April 2019, to account for how, if at all, seasonal variation could influence magnitude of exposure events. Occupational health and safety requirements will continue to be addressed by Baffinland with the WSCC.</p>	<p>Not Applicable. Worker health and safety for the Project is regulated by the Workers' Safety and Compensation Commission.</p>

APPENDIX F
2018 SOCIO-ECONOMIC MONITORING REPORT

2018 Socio-Economic Monitoring Report for the Mary River Project

March 31, 2019

Prepared For:
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Jason Prno
CONSULTING SERVICES LTD

Report Contributors

This report has been prepared by Jason Prno (PhD) and Melissa Johnston (MA) of Jason Prno Consulting Services Ltd. on behalf of Baffinland Iron Mines Corporation. This report has been reviewed by Baffinland Iron Mines Corporation and may contain various company statements.

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EXECUTIVE SUMMARY

This report has assessed the socio-economic performance of the Mary River Project in 2018, as well as Baffinland's compliance with various Project Certificate Terms and Conditions. Performance was assessed using socio-economic indicators and information for several Valued Socio-Economic Components (VSECs) included in the Final Environmental Impact Statement (EIS):

- Population demographics
- Education and training
- Livelihood and employment
- Contracting and business opportunities
- Human health and well-being
- Community infrastructure and public services
- Resources and land use
- Economic development and self-reliance
- Benefits, royalty, and taxation
- Governance and leadership

This report has identified various positive effects of the Project and presents information that is consistent with several EIS predictions. For example, 3.1 million hours of Project labour were performed by Baffinland employees and contractors in 2018, equal to approximately 1,529 full-time equivalent positions (FTEs). Of this total, 435,908 hours were worked by Inuit, representing approximately 216 FTEs. In addition, \$12.0 million in payroll was provided to Inuit employees in 2018. Some 72,041 hours of training were also completed, of which 34,629 hours (or 48.1%) were completed by Inuit. \$140.9 million was additionally spent on contracting with Inuit Firms in 2018.

Local Study Area (LSA) employment in 2018 was largely consistent with EIS predictions, although Iqaluit employment was somewhat less than predicted. There were also several Inuit employee departures noted. Baffinland has committed to continue addressing Inuit employee turnover in 2019 and working towards increased Inuit employment and contracting at the Project. Several initiatives are occurring in support of these efforts, including ongoing implementation of the Inuit Human Resources Strategy (IHRS) and Inuit Procurement and Contracting Strategy (IPCS) with the Qikiqtani Inuit Association (QIA). These documents describe goals and initiatives that will be used to increase Inuit employment and Inuit Firm contracting at the Project over time. In addition, Baffinland and the QIA renegotiated the Inuit Impact and Benefit Agreement (IIBA) for the Project in 2018 and several new employment and training commitments were established.

Furthermore, Baffinland and the QIA are partners in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) program, which has been designed 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 is funded in part by the Government of Canada. The Baffinland Apprenticeship Program, Morrisburg Heavy Equipment Operator Training Program, Work Ready Program, Inuit Internship Program, and other actions to meet the annual Minimum Inuit Employment Goals (MIEGs) established with the QIA may also assist with increasing Inuit employment over time.

In some cases, monitoring data have revealed unclear, inconsistent, or otherwise negative trends. Long-term monitoring will be necessary to track Project outcomes more fully over time and may contribute to

an improved understanding of observed trends and causality. However, no need has been identified to substantially modify Baffinland's existing management/mitigation approach at this time. Project benefits are being delivered and actions continue to be taken by the Company to address issues that have been identified. It is also likely some Project benefits will take time to be fully realized. Likewise, the negative trends observed for some monitoring indicators are not all necessarily due to the Project, and there is currently no direct evidence to suggest key EIS predictions are inaccurate (although additional monitoring may be necessary in some instances).

Where appropriate, trends have been described for indicators assessed in this 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 can be useful for assessing potential Project influences on an indicator. The table that follows summarizes the information and trends observed in 2018 relative to previous years.

2018 Socio-Economic Monitoring Reporting Summary for Baffinland Iron Mines Corporation's Mary River Project

VSEC	Indicator / Topic	Pre-Development Trend	Post-Development Trend	Trend Since Previous Year	Scale	Summary
Population Demographics	Known in-migrations of non-Inuit Project employees and contractors	Not applicable	↑	↑	North Baffin LSA	Since 2015, a net of one known non-Inuit employee/contractor has in-migrated to the North Baffin LSA.
	In-migration of non-Inuit to the North Baffin LSA	Not available	Not available	Not available	North Baffin LSA	Limited government data are 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	Not applicable	↑	↑	North Baffin LSA	Since 2015, a net of 13 known Inuit employees/contractors have out-migrated from the North Baffin LSA.
	Out-migration of Inuit from the North Baffin LSA	Not available	Not available	Not available	North Baffin LSA	Limited government data are currently available. However, the percentage of Inuit vs. non-Inuit residents in the North Baffin LSA has remained relatively constant.
	Population estimates	↑ ↑	↑ ↑	↑ ↑	North Baffin LSA Iqaluit	Population numbers continue to increase across the territory.
	Nunavut net migration	↑	↓	↑	Territory	A decreasing post-development trend in Nunavut annual net migration is currently occurring.
	Employee and contractor changes of address, housing status, and migration intentions	Not applicable	Not applicable	Not applicable	Project	5.4% of respondents to the 2019 Inuit Employee Survey changed residences in the past 12 months. 3.6% moved to a different community and 1.8% moved within their existing community. 13.8% planned to move to a different community in the next 12 months. 6.9% planned to move away from the North Baffin LSA. Data on the housing status of respondents were not collected in 2019 due to a survey administration error.
	Employee and contractor origin	Not applicable	Not applicable	Not applicable	Project	An average of 2,054 individuals worked on the Project in 2018, of which 315 were Inuit (by headcount). Most of the Project's Inuit employees and contractors were based in LSA communities. Most of the Project's non-Inuit employees and contractors were based in Canadian locations outside of Nunavut.
Education and Training	Participation in pre-employment training	Not applicable	↑	↑	Project	A new Work Ready Program was delivered in local communities in 2018 and had 59 graduates. Since 2012, there have been 336 graduates of Baffinland pre-employment training programs.
	Number of secondary school graduates	↑ ↑	↓ ↓	↑ ↓	North Baffin LSA Iqaluit	A decreasing post-development trend in graduation numbers is apparent in the LSA, which was not evident prior to the Project.
	Secondary school graduation rate	↑	↓	↑	Region	A decreasing post-development trend in graduation rates is apparent in the region, which was not evident prior to the Project.
	Investments in school-based initiatives	Not applicable	↑	No change	Project	Investments continued to be made in school-based initiatives in 2018. These included laptop donations to secondary school graduates, scholarships, a school lunch program, and a donation to Nunavut Arctic College's Environmental Technology Program.
	Hours of training completed by Inuit employees and contractors	Not applicable	↑	↑	Project	Inuit received 34,629 hours of training in 2018 and a total of 50,496 training hours since Project development.
	Types of training provided to Inuit employees and contractors	Not applicable	↑	No change	Project	Inuit continue to receive various forms of Project-related training.
	Apprenticeships and other opportunities	Not applicable	↑	↑	Project	Concluding 2018, 9 Inuit apprentices were employed in the Apprenticeship Program. 4 Inuit summer students were also hired in 2018.
	Employee education and pre-employment status	Not applicable	Not applicable	Not applicable	Project	57.4% of 2019 Inuit Employee Survey respondents had less than a high school education, 19.7% had a high school diploma or equivalent, and 23.0% of respondents had higher than a high school diploma or equivalent. 26.6% resigned from a previous job in order to take up employment with the Project and 0.0% suspended or discontinued their education because they were hired to work at the Project.
Livelihood and Employment	Hours of Project labour performed	Not applicable	↑	↑	Project	3,081,740 hours of labour were performed in 2018 and 11,919,376 hours of labour have been performed since Project development.
	Project hours worked by LSA employees and contractors	Not applicable	↑ ↑	↑ ↑	North Baffin LSA Iqaluit	287,040 hours of labour were performed by North Baffin LSA residents (9.3% of total) and 92,916 hours of labour were performed by Iqaluit residents (3.0% of total) in 2018.
	Inuit employee promotions	Not applicable	↑	↑	Project	6 Inuit employee promotions occurred in 2018.
	Inuit employee turnover	Not applicable	↑	↓	Project	There were 45 Inuit employee departures in 2018, equal to an approximate Inuit employee turnover rate of 30%. 22 Inuit were also rehired by Baffinland in 2018.
	Hours worked by female employees and contractors	Not applicable	↑	↑	Project	226,080 hours were worked by female employees and contractors in 2018 (7.3% of total), 121,378 hours of which were worked by Inuit females (3.9% of total).
	Childcare availability and costs	Not available	Not available	Not available	Project	This topic continues to be tracked through the QSEMC process and community engagement conducted for the Project.
Contracting and Business Opportunities	Value of contracting with Inuit Firms	Not applicable	↑	↓	Project	Baffinland awarded \$140.9 million in contracts to Inuit Firms in 2018; a total of \$960.0 million has been awarded to Inuit Firms since Project development.
	LSA Inuit employee payroll amounts	Not applicable	↑	↑	Project	Approximately \$10.1 million in payroll was provided to LSA Inuit residents in 2018. Since 2014, Baffinland has provided approximately \$45.2 million in payroll to its Inuit employees.
	Number of registered Inuit Firms in the LSA	Not available	↑ ↑	↑ ↑	North Baffin LSA Iqaluit	There were 51 NTI-registered Inuit Firms in the North Baffin LSA and 121 in Iqaluit in 2018.
Human Health and Well-Being	Number of youth charged	↓ ↓	↓ ↓	↓ ↓	North Baffin LSA Iqaluit	A decreasing post-development trend in the number of youth charged is apparent in the LSA and was evident prior to the Project.

VSEC	Indicator / Topic	Pre-Development Trend	Post-Development Trend	Trend Since Previous Year	Scale	Summary
	Proportion of taxfilers with employment income	↓ ↑	↓ ↓	↑ ↑	North Baffin LSA Iqaluit	A decreasing post-development trend in the proportion of taxfilers with employment income is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is also apparent in Iqaluit, which was not evident prior to the Project.
	Median employment income	↑ ↑	↑ ↑	↓ ↑	North Baffin LSA Iqaluit	An increasing post-development trend in median employment income is apparent in the LSA and was evident prior to the Project.
	Percentage of population receiving social assistance	↓ ↓	↓ ↓	↑ ↑	North Baffin LSA Iqaluit	A decreasing post-development trend in the percentage of the population receiving social assistance is apparent in the LSA and was evident prior to the Project.
	Number of drug and alcohol related contraband infractions at Project sites	Not applicable	↑	↑	Project	There were 28 drug and alcohol-related contraband infractions at Project sites in 2018.
	Number of impaired driving violations	↑ ↑	↑ ↓	↑ ↑	North Baffin LSA Iqaluit	An increasing post-development trend in the number of impaired driving violations is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is apparent in Iqaluit, which was not evident prior to the Project.
	Number of drug violations	↑ ↑	↓ ↓	↓ ↓	North Baffin LSA Iqaluit	A decreasing post-development trend in the number of drug violations is apparent in the LSA, which was not evident prior to the Project.
	Absence from the community during work rotation	Not available	Not available	Not available	Project	These topics continue to be tracked through the QSEMC process and community engagement conducted for the Project.
	Prevalence of gambling issues					
	Prevalence of family violence					
	Prevalence of marital problems					
	Rates of teenage pregnancy					
	Percent of health centre visits related to infectious diseases	↓ ↓	↑ ↓	↑ ↑	North Baffin LSA Iqaluit	An increasing post-development trend in the percent of health centre visits related to infectious diseases is apparent in the North Baffin LSA, which was not evident prior to the Project. A decreasing post-development trend is apparent in Iqaluit and was evident prior to the Project.
	Crime rate	↑ ↑	↑ ↓	↑ ↓	North Baffin LSA Iqaluit	An increasing post-development trend in crime rates is apparent in the North Baffin LSA and was evident prior to the Project. A decreasing trend is apparent in Iqaluit, which was not evident prior to the Project.
Number of times Baffinland's Employee and Family Assistance Program (EFAP) is accessed	Not applicable	↑	↑	Project	The EFAP was accessed 41 times in 2018; 15 of these were by Nunavummiut.	
Community Infrastructure and Public Services	Number of Project employees and contractors who left positions in their community	Not applicable	Not applicable	Not applicable	Project	The 2019 Inuit Employee Survey indicated 17 individuals (or 26.6% of respondents) resigned from a previous job in order to take up employment with the Project. Of these, 9 were in casual/part-time positions and 7 were in full-time positions.
	Number of health centre visits (total)	↑ ↑	↑ ↑	↓ ↓	North Baffin LSA Iqaluit	An increasing post-development trend 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)	↑ ↑	↑ ↑	↓ ↓	North Baffin LSA Iqaluit	An increasing post-development trend 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	Not applicable	↑	↓	Project	There were 6,301 visits to the Project site medic in 2018; 1,315 of these were by Inuit.
	Baffinland use of LSA community infrastructure	Not applicable	↑	No change	Project	Baffinland continued to use some LSA community infrastructure to support ongoing Project development in 2018.
	Number of Project aircraft movements at LSA community airports	Not applicable	↑	↑	Project	There were 1,802 Project aircraft movements at LSA airports in 2018.
Resources and Land Use	Number of recorded land use visitor person-days at Project sites	Not applicable	↑	↑	Project	There were 516 recorded land use visitor person-days at Project sites in 2018.
	Number of wildlife compensation fund claims	Not applicable	↑	No change	Project	One claim was submitted to QIA for review in 2017 and was approved. It resulted in compensation of \$14,200.00 being paid.
Economic Development and Self-Reliance	Project harvesting interactions and food security	Not available	Not available	Not available	Project	This topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information.
Benefits, Royalty, and Taxation	Payroll and corporate taxes paid by Baffinland to the territorial government	Not applicable	↑	↑	Project	Approximately \$5.1 million in employee payroll tax and \$5.9 million in fuel tax were paid to the GN in 2018.

Guide to Using the Table:

VSEC: Refers to 'Valued Socio-Economic Component' and includes a selection of VSECs assessed in the Mary River Project EIS.

Indicator: Indicators are an important aspect of socio-economic monitoring. Indicators are metrics used to measure and report on the condition and trend of a VSEC.

Trend: Refers to whether an indicator has exhibited change and describes the direction of that change. Black arrows (↑↓) indicate the direction of change that has occurred. Where there is no discernable or significant change 'No change' is used. Where there are insufficient data or other issues preventing a trend analysis, 'Not available' or 'Not applicable' are used. 'Pre-development trend' refers to the five-year period preceding Project construction (i.e. 2008 to 2012). In some cases, averaged data from this period have been compared against averaged data from previous years (i.e. 2003-2007, where available) to determine a trend. 'Post-development trend' refers to the period after Project construction commenced (i.e. 2013 onwards). Averaged data from this period may have also been compared against averaged data from the pre-development period to determine a trend. 'Trend since previous year' refers to the two most recent years in which indicator data are available.

Scale: 'Territory' refers to data that are available for Nunavut. 'Region' refers to data that are available for the Qikiqtaaluk Region. 'North Baffin LSA' refers to data that are available for the North Baffin Local Study Area communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet.

'Project' refers to data that are available for the Mary River Project.

Summary: A brief description of the trend and/or related data.

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ABBREVIATIONS

Baffinland	Baffinland Iron Mines Corporation
BCLO	Baffinland Community Liaison Officer
Company	Baffinland Iron Mines Corporation
EFAP	Employee and Family Assistance Program
ERP	Early Revenue Phase
ESDC	Employment and Social Development Canada
EIS	Final Environmental Impact Statement
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
GED	General Education Diploma
GN	Government of Nunavut
HEO	Heavy Equipment Operator
HTO	Hunters and Trappers Organization
IHRS	Inuit Human Resources Strategy
IIBA	Inuit Impact and Benefit Agreement
INPK	Ilagiiktunut Nunalinnullu Pivalliajutisait Kiinaujat
IPCS	Inuit Procurement and Contracting Strategy
LSA	Local Study Area
MEWG	Marine Environment Working Group
MIEG	Minimum Inuit Employment Goal
MOU	Memorandum of Understanding
NBS	Nunavut Bureau of Statistics
NHC	Nunavut Housing Corporation
NIRB	Nunavut Impact Review Board
North Baffin LSA	The communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet
NTI	Nunavut Tunngavik Incorporated
Post-Development	Period after Project construction commenced (i.e. 2013 onwards)
Pre-Development	Five-year period preceding Project construction (i.e. 2008 to 2012)
Project	Mary River Project
QIA	Qikiqtani Inuit Association
QSEMC	Qikiqtaaluk Socio-Economic Monitoring Committee
Q-STEP	Qikiqtani Skills and Training for Employment Partnership
RSA	Regional Study Area
SEMWG	Mary River Socio-Economic Monitoring Working Group
TEWG	Terrestrial Environment Working Group
TOR	Terms of Reference
VC	Valued Component
VEC	Valued Ecosystem Component
VSEC	Valued Socio-Economic Component
WCF	Wildlife Compensation Fund
Working Group	Mary River Socio-Economic Monitoring Working Group

1. INTRODUCTION

1.1 MARY RIVER PROJECT OVERVIEW

The Mary River Project (Project) is an operating open pit iron ore mine with associated project components that is owned and operated by Baffinland Iron Mines Corporation (Baffinland or the Company). The Project is located in the Qikiqtaaluk Region of Nunavut on northern Baffin Island. The mine site is located approximately 160 km south of Pond Inlet (Mittimatalik) and 1,000 km north of the territorial capital of Iqaluit.

The Project consists of three currently active main project locations - the Mine Site, the 100-km long Milne Inlet Tote Road, and Milne Port. The Project also includes a proposed railway and Steensby Port, both located to the south of the mine site. At the end of 2012, the Nunavut Impact Review Board (NIRB) issued Project Certificate No. 005 authorizing the construction, operation, and closure of an 18 million tonne per annum (Mt/a) operation which included a 149-km railway and year-round shipping of iron ore from a port facility at Steensby Inlet (Steensby Port). Mine construction began in 2013. An Inuit Impact and Benefit Agreement (IIBA) for the Project was also finalized between Baffinland and the Qikiqtani Inuit Association (QIA) in 2013; this agreement was subsequently renegotiated in 2018 (QIA and Baffinland 2018).

In 2013, Baffinland applied to the NIRB to amend its Project Certificate to allow for an Early Revenue Phase (ERP) operation, which included the additional production of up to 4.2 Mt/a of iron ore, ore haulage over the Milne Inlet Tote Road, and open water shipping of ore from Milne Port. On May 28, 2014, the NIRB issued an amended Project Certificate No. 005 approving the ERP. Mining of ore began in the last quarter of 2014 and the first shipment of ore occurred in the summer of 2015. The amended Project Certificate allowed for the future development of the 18 Mt/a railway operation, for a total combined production rate of 22.2 Mt/a. Baffinland applied to the NIRB again in 2018 to amend its Project Certificate to allow for an increase from 4.2 Mt/a to 6 Mt/a in the maximum volume of ore trucked from the mine site to Milne Port and shipped to market. On October 30, 2018, the NIRB issued an amended Project Certificate No. 005 approving this on a time limited basis (i.e. until the end of the 2019 shipping season).

On October 5, 2018, Baffinland submitted to the NIRB an EIS Addendum for the Phase 2 Proposal. The Phase 2 Proposal consists of an expansion of the 4.2 Mt/a ERP operation by 7.8 Mt/a to 12 Mt/a of ore. This ore will be transported to Milne Port by rail and then delivered to market over an expanded shipping season. The Phase 2 Proposal is part of Baffinland's approach to develop the Mary River Project in a phased and economically feasible manner. The NIRB has determined the EIS Addendum conforms to the EIS guidelines it issued and has initiated a public technical review process, expected to be completed sometime in 2019. Additional information on Baffinland's regulatory submissions and approvals can be found on the NIRB public registry: <http://www.nirb.ca/>.

1.2 SOCIO-ECONOMIC MONITORING REQUIREMENTS AND GUIDANCE

Project-specific socio-economic monitoring programs in Nunavut are generally expected to focus on two areas: 'effects monitoring' and 'compliance monitoring'. Effects monitoring keeps track of the socio-economic effects of a project to see if management plans are working or if any unexpected effects are occurring. Compliance monitoring ensures that proponents follow the terms and conditions of the licences, decisions, and certificates issued by authorizing agencies (NIRB 2013). This focus is

commensurate with socio-economic monitoring best-practice (e.g. Noble 2015; Vanclay et al. 2015) and can assist companies with achieving their sustainable development goals. Socio-economic monitoring also supports adaptive management, as findings can alert project proponents to the emergence of unanticipated effects and help initiate a management response. Furthermore, regular review of monitoring plans helps determine whether existing socio-economic indicators and monitoring methods remain appropriate (Vanclay et al. 2015).

Project-related socio-economic monitoring requirements originate from the Nunavut Agreement and NIRB Project Certificate No. 005. The Nunavut Agreement is a comprehensive land claims agreement signed in 1993 between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada. As a result of signing the Nunavut Agreement, Inuit exchanged Aboriginal title to all their traditional land in the Nunavut Settlement Area for a series of rights and benefits. The Nunavut Agreement also created various 'institutions of public government' such as the NIRB and established conditions for the review and oversight of resource development projects. Article 12, Part 7 of the Nunavut Agreement provides details on monitoring programs which may be required under a NIRB project certificate and notes the purpose of these programs shall be:

- (a) to measure the relevant effects of projects on the ecosystemic and socio-economic environments of the Nunavut Settlement Area;*
- (b) to determine whether and to what extent the land or resource use in question is carried out within the predetermined terms and conditions;*
- (c) to provide the information base necessary for agencies to enforce terms and conditions of land or resource use approvals; and*
- (d) to assess the accuracy of the predictions contained in the project impact statements.*

As noted previously, the NIRB issued the most recent amended Project Certificate No. 005 on October 30, 2018 (NIRB 2018a). NIRB (2018a) should be consulted for further information on the Terms and Conditions specific to socio-economic monitoring that were included in the Project Certificate, although the 'Compliance Assessment' sections of this report also contain information on this topic.

Some Terms and Conditions included in Project Certificate No. 005 relate to Baffinland's engagement with the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC). The QSEMC is one of three regional socio-economic monitoring committees in Nunavut. These committees were established in 2007 to address project certificate requirements for project-specific monitoring programs and to create a discussion forum and information sharing hub that supports impacted communities and interested stakeholders to take part in monitoring efforts (SEMCs 2018a). Baffinland is actively involved in the QSEMC and regularly participates in its meetings. Most recently, Baffinland participated in the QSEMC's June 2018 meeting in Pangnirtung. A summary of this meeting can be found in Appendix A. Baffinland's responses to Project-specific action items/recommendations issued by the QSEMC can also be found in Appendix A.

The Mary River Socio-Economic Monitoring Working Group (SEMWG or Working Group) Terms of Reference (TOR) also provides guidance on Baffinland's socio-economic monitoring program. Baffinland, in addition to the Government of Nunavut, the Government of Canada, and the QIA, is a member of the SEMWG. The SEMWG is intended to support the QSEMC's regional monitoring initiatives through Project-specific socio-economic monitoring. The SEMWG also supports the fulfillment of Terms and Conditions set out in Project Certificate No. 005 that relate to socio-economic monitoring. The

SEMWG TOR has been included in Baffinland’s Socio-Economic Monitoring Plan (Baffinland 2018a).¹ It describes the Working Group’s purpose; membership and member roles; objectives; and reporting, communication, and meeting requirements. Furthermore, Section 4.1 of the TOR notes that Baffinland:

“...will prepare an annual socio-economic report, presenting performance data, to the Nunavut Impact Review Board for review...containing data on the indicators selected by the Working Group for the previous calendar year (January to December). These reports will further describe the Company’s participation in the [QSEMC], other collaborative monitoring processes and any activities related to better understanding of socio-economic processes.”

As established in the TOR, the Working Group members agreed that collaboration is required to effectively monitor the socio-economic performance of the Project. It was acknowledged that Baffinland is best able to collect and provide data concerning employment and training in relation to the Project, and the Government of Nunavut and the Government of Canada are best able to report public statistics on general health and well-being, food security, demographics, and other socio-economic indicators at the community and territorial level. The QIA was noted to be best able to provide information and data relating to Inuit land use and culture at the community and regional level. Baffinland is actively involved in the SEMWG and regularly participates in its meetings. Most recently, Baffinland met with the SEMWG in February (by teleconference) and June (in-person) 2018. A summary of these meetings can be found in Appendix A. Baffinland responded to all questions and comments directed to them at these meetings; no follow-up items were identified.

The Project’s Socio-Economic Monitoring Plan (Baffinland 2018a) was designed to help address Project-related socio-economic monitoring requirements and guidance associated with the Nunavut Agreement, NIRB Project Certificate No. 005, and SEMWG TOR, described above.² An annual monitoring report (i.e. this report) assists with the implementation of this Plan. Baffinland has been undertaking socio-economic monitoring for the Project since 2013. It took a stepwise approach to developing its socio-economic monitoring program, focusing its initial reporting on a small number of Valued Socio-Economic Components (VSECs) and indicators. A framework for this initial socio-economic monitoring program was described in the EIS (Baffinland 2012; Volume 4, Section 15). However, the program’s design has evolved significantly over time. This has been a result of lessons being learned, internal refinements to the program (and its indicators) being identified, and valuable feedback being obtained from monitoring stakeholders. Ongoing changes to this program have been described in Baffinland’s annual Socio-Economic Monitoring Reports. Baffinland has committed to continue to address its socio-economic monitoring requirements as the Project advances.

1.3 REPORT OBJECTIVES AND ORGANIZATION

This is the sixth annual Socio-Economic Monitoring Report prepared by Baffinland for the Project, which supersedes all previous reports. The content of this report is guided by the Project’s Socio-Economic Monitoring Plan (i.e. Baffinland 2018a). More specifically, this report will assess the socio-economic performance of the Project as it progresses from construction through operations and eventual closure.

¹ Baffinland worked with SEMWG members to revise the TOR in 2018. The existing TOR is somewhat dated (December 2012) and doesn’t fully reflect the current scope of Working Group activities. Revisions to the TOR are anticipated to be completed in 2019.

² Baffinland presented a revised Socio-Economic Monitoring Plan in the EIS Addendum for the Phase 2 Proposal in October 2018.

This report is intended to help accomplish the following objectives of the monitoring program identified in the Socio-Economic Monitoring Plan:

1. Evaluate the accuracy of selected socio-economic effect predictions presented in the Mary River Project EIS and identify any unanticipated effects.³
2. Identify areas where Baffinland's existing socio-economic mitigation and management programs may not be functioning as anticipated.
3. Assist regulatory and other agencies in evaluating Baffinland's compliance with socio-economic monitoring requirements for the Project.
4. Support adaptive management, by identifying potential areas for improvement in socio-economic monitoring and performance, where appropriate.

This report is organized in the following manner:

- Section 1 (i.e. this section) introduces the report and the scope of its contents.
- Section 2 describes the methods used in this report and how they support the findings that are provided.
- Sections 3 to 12 assess the socio-economic performance of VSECs included in the EIS.
- Section 13 provides a report summary, a summary of regional and cumulative economic effects, and comments on adaptive management for the Project.
- Appendix A includes meeting minutes from 2018 QSEMC and SEMWG meetings.

³ References to the Mary River Project EIS in this report include any subsequent addendums to the EIS that have been approved (i.e. had a Project Certificate issued) by the NIRB.

2. METHODS

2.1 OVERVIEW

This report is intended to assess the socio-economic performance of the Project on an annual basis. To help focus this assessment, monitoring indicators have been identified for VSECs in the EIS. Annually produced, community-level data have then been obtained in support of monitoring indicators where readily available. The analyses presented in this report generally focus on one of three spatial scales: The Local Study Area (LSA), Regional Study Area (RSA), or Project level. As identified in the EIS, the LSA includes the North Baffin point-of-hire communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet, in addition to Iqaluit (which is also a point-of-hire). References to the 'North Baffin LSA' include all these communities but Iqaluit. In some cases, data for the North Baffin LSA communities have been aggregated to facilitate trend analyses in this report. The RSA includes the entire territory of Nunavut.

Following the presentation of available indicator data, relevant management and mitigation measures are discussed and an assessment of residual effects predicted to occur in the EIS is made. Structuring the report in this manner allows predictions to be evaluated against current monitoring data and provides insight into the effectiveness of existing mitigation measures. A compliance assessment of Project Certificate Terms and Conditions relevant to the monitoring of each VSEC is also presented. However, the status of other socio-economic Terms and Conditions unrelated to monitoring is discussed in Baffinland's Annual Report to the NIRB.

Indicator 'trends' are discussed throughout this report and describe whether an indicator has exhibited change (and the direction of that change). A 'pre-development' trend in this report refers to the five-year period preceding Project construction (i.e. 2008 to 2012). In some cases, averaged data from this period have been compared against averaged data from previous years (i.e. 2003-2007, where available) to determine a trend. Likewise, a 'post-development' trend refers to the period after Project construction commenced (i.e. 2013 onwards). Averaged data from this period may have also been compared against averaged data from the pre-development period to determine a trend. A trend 'since previous year' refers to the two most recent years in which indicator data are available. Available data and trends may then be assessed in the context of potential Project influences on the indicator(s) in question.

Where monitoring thresholds have been identified, available data are discussed in the context of these. For example, residual effects may be assessed against some of the key parameters predicted for them in the EIS, including direction (e.g. positive, negative) and where appropriate, magnitude.⁴ Furthermore, management action may be triggered if annual performance is observed to be below a monitoring threshold. Baffinland acknowledges threshold development has been otherwise limited to-date and additional monitoring thresholds may be developed in consultation with the SEMWG in the future. Opportunities may also exist to incorporate monitoring thresholds associated with the Project's IIBA, although this would be done in consultation with the QIA.

The process of socio-economic monitoring may require many years of data to effectively discern some trends and their causality. Even then, various factors (including non-Project ones) may influence causality, and these may not be easy to individually measure or confirm. Baffinland's monitoring

⁴ Effect magnitude is only assessed in this report where quantitative metrics were provided in the EIS.

program is not intended to describe the causes of every socio-economic change that is reported on. Rather, the program is intended to identify potential areas of socio-economic concern; once identified, these areas may benefit from additional examination or a management response. More generally, successful socio-economic monitoring for the Project will require appropriate long-term data, the regular input of Project stakeholders, and a focus on continuous improvement.

2.2 SOCIO-ECONOMIC MONITORING INDICATORS

Socio-economic monitoring indicators have been developed as part of the Project's Socio-Economic Monitoring Plan (Baffinland 2018a) and are presented in Table 2-1. 'Indicators' are an important aspect of socio-economic monitoring. Indicators are metrics used to measure and report on the condition and trend of a Valued Component (VC)⁵, and help facilitate the analysis of interactions between a project and a selected VC (BCEAO 2013). Indicators can also provide an early warning of potential adverse effects and are considered the most basic tools for analyzing change (Noble 2015). Table 2-1 presents indicators and data sources for VSECs assessed in the EIS; this includes indicators for VSEC-related residual effects and for topics requested through the Project Certificate.

The structure and content of Baffinland's socio-economic monitoring program may benefit from additional refinement in the future; suggestions from reviewers on how indicators and data sources could potentially be improved are welcome. It is further acknowledged that any significant changes to the socio-economic monitoring program require discussion with the SEMWG. Likewise, Table 2-1 includes several instances where indicators haven't been identified by Baffinland for various reasons (e.g. monitoring is already conducted elsewhere, no residual effects were identified in the EIS, insufficient data availability). In some additional cases, other forms of issue tracking will take place (e.g. through the QSEMC process or community engagement conducted for the Project). Should new indicators be required for these topics in the future, they will be selected in consultation with the SEMWG.

⁵ Valued Components are typically referred to as Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) in Nunavut.

Table 2-1: Socio-Economic Monitoring Indicators for the Mary River Project

VSEC	Residual Effect or Project Certificate Term and Condition	Topic	Indicator(s)	Data Source
Population Demographics	Residual Effect	In-migration of non-Inuit Project employees into the North Baffin LSA	Known in-migrations of non-Inuit Project employees and contractors	Baffinland
			In-migration of non-Inuit to the North Baffin LSA	Limited government data currently available
		Out-migration of Inuit residents from the North Baffin LSA	Known out-migrations of Inuit Project employees and contractors	Baffinland
			Out-migration of Inuit from the North Baffin LSA	Limited government data currently available
	Project Certificate Term and Condition	Demographic change	Population estimates	NBS
		Employee changes of address, housing status, and migration intentions	Nunavut net migration	NBS
Education and Training	Residual Effect	Improved life skills among young adults	Employee and contractor changes of address, housing status, and migration intentions	Baffinland (survey data)
			Employee and contractor origin	Baffinland
			Participation in pre-employment training	Baffinland
		Incentives related to school attendance and success	LSA employment and on-the-job training	Baffinland
			Number of secondary school graduates	NBS
			Secondary school graduation rate	NBS
	Project Certificate Term and Condition	Opportunities to gain skills	Investments in school-based initiatives	Baffinland
			Hours of training completed by Inuit employees and contractors	Baffinland
			Types of training provided to Inuit employees and contractors	Baffinland
			Apprenticeships and other opportunities	Baffinland
Employee education and pre-employment status	Employee education and pre-employment status	Baffinland (survey data)		
Livelihood and Employment	Residual Effect	Creation of jobs in the LSA	Hours of Project labour performed	Baffinland
		Employment of LSA residents	Project hours worked by LSA employees and contractors	Baffinland
		New career paths	LSA employment	Baffinland
			Inuit employee promotions	Baffinland
			Inuit employee turnover	Baffinland
	Project Certificate Term and Condition	Barriers to employment for women, specifically relating to childcare availability and costs	Hours worked by female employees and contractors	Baffinland
			Re: childcare availability and costs – Topic will continue to be tracked through the QSEMC process and community engagement conducted for the Project.	
Contracting and Business Opportunities	Residual Effect	Expanded market for business services to the Project	Value of contracting with Inuit Firms	Baffinland
		Expanded market for consumer goods and services	LSA Inuit employee payroll amounts	Baffinland
			Number of registered Inuit Firms in the LSA	NTI
Human Health and Well-Being	Residual Effect	Changes in parenting	Number of youth charged	Statistics Canada
		Household income and food security	Proportion of taxfilers with employment income and median employment income	NBS

VSEC	Residual Effect or Project Certificate Term and Condition	Topic	Indicator(s)	Data Source	
			Percentage of population receiving social assistance	NBS	
		Transport of substances through Project site	Number of drug and alcohol related contraband infractions at Project sites	Baffinland	
		Affordability of substances	Number of impaired driving violations Number of drug violations	NBS	
		Attitudes toward substances and addictions			
	Absence from the community during work rotation	Topic will continue to be tracked through the QSEMC process and community engagement conducted for the Project.			
	Project Certificate Term and Condition	Prevalence of substance abuse	N/A – Monitoring already conducted through other ‘human health and well-being’ indicators		
		Prevalence of gambling issues	Topics will continue to be tracked through the QSEMC process and community engagement conducted for the Project.		
		Prevalence of family violence			
		Prevalence of marital problems			
		Rates of teenage pregnancy			
		Rates of sexually transmitted infections and other communicable diseases	Percent of health centre visits related to infectious diseases	NBS	
		High school completion rates	N/A – Monitoring already conducted through other ‘education and training’ indicators		
	Other	Crime rate	NBS		
	Community Infrastructure and Public Services	Residual Effect	Competition for skilled workers	Number of Project employees and contractors who left positions in their community	Baffinland (survey data)
Labour force capacity			Training and experience generated by the Project	Baffinland	
Project Certificate Term and Condition		Pressures on existing health and social services provided by the GN that may be impacted by Project-related in-migration of employees ⁶	Inuit employee turnover	Baffinland	
			Number of health centre visits (total and per capita)	NBS	
		Project-related pressures on community infrastructure	Number of visits to Project site medic	Baffinland	
			Baffinland use of LSA community infrastructure	Baffinland	
		Number of Project aircraft movements at LSA community airports	Baffinland		
Cultural Resources	N/A	N/A	N/A – Monitoring already conducted through Archaeology Status Update Reports		
Resources and Land Use	Residual Effect	Caribou harvesting	N/A – Potential effects will continue to be tracked through Baffinland’s environmental monitoring programs. Terrestrial and marine monitoring are reviewed bi-annually by the Terrestrial Environment Working Group (TEWG) and Marine Environment Working Group (MEWG). While not all these effects were considered residual effects in Project EIS documents, they are included here for completeness.		
		Marine mammal harvesting			
		Fish harvesting			
		Safe travel around Eclipse Sound and Pond Inlet	Number of recorded land use visitor person-days at Project sites Number of wildlife compensation fund claims	Baffinland QIA	
		Safe travel through Milne Port			
		Emissions and noise disruption at camps			
		Sensory disturbances and safety along Milne Inlet Tote Road			
	Detour around mine site for safety and travel				

⁶ Additional indicators from this table may be relevant to this topic, including those related to migration, social assistance, and health centre visits related to infectious diseases.

VSEC	Residual Effect or Project Certificate Term and Condition	Topic	Indicator(s)	Data Source
		Difficulty and safety relating to railway crossing		
		Detour around Steensby Port		
		HTO cabin closures		
		Restriction of camping locations around Steensby Port		
Cultural Well-Being	N/A	N/A	N/A – No monitoring required. No residual effects identified in the EIS.	
Economic Development and Self-Reliance	Residual Effect	N/A	N/A – As noted in the EIS, an integrated assessment of other VECs/VSECs was conducted for the Economic Development and Self-Reliance VSEC. No new residual effects specific to this VSEC were identified. Relevant monitoring of residual effects is conducted through other VECs/VSECs.	
	Project Certificate Term and Condition	Project harvesting interactions and food security, which includes broad indicators of dietary habits	Topic will continue to be tracked through the QSEMC process, community engagement conducted for the Project, and related information.	
Benefits, Royalty, and Taxation	Residual Effect	Project revenues flowing to the territorial government	Payroll and corporate taxes paid by Baffinland to the territorial government	Baffinland
Governance and Leadership	N/A	N/A	N/A – No monitoring required. No residual effects identified in the EIS.	

2.3 DATA SOURCES

Data for this report have been obtained from Company, government, Inuit organization, and other sources. Data are presented in textual, graphical, or tabular formats, with a source identified for each. Company data sources include employment, training, and contracting records; and information obtained from other Project-related records and sources. Employment data (i.e. data on employee and contractor origin/headcount, Project hours worked) generally include employees and contractors who performed Nunavut-based Project work (primarily site-based, but may include Baffinland community-based or other positions), Baffinland positions identified in the IIBA, and Inuit apprentices/trainees. Otherwise, these data do not include individuals who worked on the Project outside of Nunavut, Baffinland corporate head office staff, or off-site contractors.

In addition, Baffinland has presented selected results from its Inuit Employee Survey. Baffinland Community Liaison Officers (BCLOs) were responsible for administering the 2019 Inuit Employee Survey from January 23rd to February 6th, 2019 in each of the North Baffin LSA communities. This was done by meeting incoming and outgoing Project flights at local airports as well as traveling throughout their communities to seek survey respondents who were off-rotation.

Government data have been obtained primarily from the Nunavut Bureau of Statistics, the Government of Nunavut's central statistical agency. The Nunavut Bureau of Statistics posts current Nunavut population data, economic data, labour force and employment data, social data, census data, and Nunavut Housing Survey data on its website (<http://www.stats.gov.nu.ca/en/home.aspx>) for the public to use. Some data have also been obtained from Statistics Canada, Nunavut Tunngavik Inc. (NTI), and other sources (e.g. QIA, federal government reports, third party groups such as mining associations).

In addition, the most recent QSEMC annual meeting report (i.e. SEMCs 2018b) has been reviewed for relevant data and insights. Results from community engagement conducted for the Project are also referenced in this report. This may include comments documented during the IIBA Annual Project Review Forum (e.g. Dicta Court Reporting Inc. 2018) or annual community consultations conducted by the NIRB on the Project's monitoring programs (e.g. NIRB 2018b). Information from these source documents has been recorded in a thematic database designed for the Project's socio-economic monitoring program.

2.4 DATA LIMITATIONS

Some data limitations with the Project's socio-economic monitoring program have been identified. Notably, appropriate government indicator data (e.g. annually produced, community-level statistics) are currently unavailable for some topics described in Table 2-1. As such, these topics continue to be tracked through the QSEMC process and community engagement conducted for the Project, or related information. Should new indicators be required for these topics in the future, they will be selected in consultation with the SEMWG.⁷ Topics for which data limitations currently exist include:

- In-migration of non-Inuit Project employees into the North Baffin LSA
- Out-migration of Inuit residents from the North Baffin LSA
- Barriers to employment for women, specifically relating to childcare availability and costs

⁷ It should be noted that, for several of these topics, Baffinland is not the only 'Responsible Party' identified in the Terms and Conditions they pertain to. Project Certificate No. 005 (i.e. NIRB 2018a) should be consulted for additional details.

- Absence from the community during work rotation
- Prevalence of gambling issues
- Prevalence of family violence
- Prevalence of marital problems
- Rates of teenage pregnancy
- Project harvesting interactions and food security, which includes broad indicators of dietary habits

Some historic (i.e. 2013 and 2014) Company data have also been drawn from previous socio-economic monitoring reports prepared for the Project (e.g. BDSI 2015). However, comparisons against some of these data should be made with a degree of caution. This is because the socio-economic data collection and analysis methods employed by Baffinland have changed in some instances.⁸ Furthermore, some historic Company data presented in this report are of a limited nature or reflect information that was only available for certain periods of time (due to ongoing development of Baffinland's data management systems).

Baffinland continues to refine its socio-economic data management and reporting systems. For example, improvements to the methods used for tracking employee attendance and hours worked continue to be investigated. Where Project-related data limitations or inconsistencies may exist, the aim is to present these data conservatively and/or identify these limitations where appropriate in this report. Data from all sources in this report are also presented for the most recent year that is currently available. Lag times in data availability exist for some data sources and current year data were not available in all instances.

Finally, some limitations with the 2019 Inuit Employee Survey have been identified. Foremost, planning challenges resulted in the survey only being offered in the North Baffin LSA communities in 2019; this resulted in no surveys being offered to Inuit who reside outside of those communities (e.g. Iqaluit or non-Nunavut communities). Any individuals who were away from their communities or otherwise unavailable would also not have been captured in the survey recruitment efforts.

Some completed surveys contained unanswered questions or unclear responses. Where survey answers were not provided or were unclear, results are presented in this report as 'unknown'. However, all survey respondents with 'unknown' ethnicities in 2019 were later confirmed to be Inuit by BCLOs and then changed to 'Inuit' for reporting purposes. Four surveys were also removed from the 2019 dataset. This includes one survey where the respondent identified themselves as 'non-Inuit', and three surveys that were not completed and/or appeared to be duplicative. Furthermore, a programming issue associated with a new survey administration technique in 2019 (i.e. tablet administration) resulted in responses to two survey questions (i.e. 'current community of residence' and 'current housing type') inadvertently defaulting to the first response option provided. This issue was not identified until after the data collection phase was complete but was partly rectified by using survey metadata to ascertain which community each survey was completed in (to answer the 'current community of residence' question). Unfortunately, data on current housing type were unable to be retrieved and are not included in this report.

⁸ Figures 5-1 and 5-2 include 2013 and 2014 data from BDSI (2015). However, comparisons against these data should be made with a degree of caution. This is because some calculation methods used by Baffinland have changed and some assumptions were historically made with regard to hours worked on the Project. Hours worked by non-Inuit in 2013 in Figure 5-2 also do not add up completely (i.e. 144 hours are unaccounted for), for unknown reasons.

A modified approach to calculating a survey response rate has been used. Namely, the number of completed surveys (71) was divided by the total number of Inuit employees/contractors on staff from the North Baffin LSA in Q4 2018 (234), as reported in Section 3.1.5. This is a general, but likely conservative approximation of the survey response rate. This is because the calculation includes all Inuit employees/contractors who worked on the Project during all Q4 2018 (including community-based positions and individuals who may no longer be working for the Company), rather than only those who were available during the much shorter survey administration period. Using this method, a 30.3% response rate to the 2019 Inuit Employee Survey was achieved. Baffinland has also experienced certain planning challenges when implementing recent employee surveys. For this reason, the survey discussed in this 2018 Socio-Economic Monitoring Report was completed in January/February 2019, while the survey discussed in the 2017 Socio-Economic Monitoring Report was completed in January 2018. Baffinland is working to address this timing discrepancy moving forward.

2.5 CHANGES SINCE PREVIOUS YEAR'S REPORT

Several changes have been made to this report since the previous year. Many of these changes reflect incremental monitoring program revisions and/or improvements. Descriptions of key changes, reasons for them, and associated report references are summarized in Table 2-2.

Table 2-2: Key Changes Since Previous Year's Report

Description of Change	Reason for Change	Report Reference
The Socio-Economic Monitoring Plan has been revised.	A revised (draft) Socio-Economic Monitoring Plan was submitted to the NIRB as part of the EIS Addendum for the Phase 2 Proposal in October 2018.	Details reflected in Sections 1 and 2 See also Baffinland (2018a)
Section 2 (Methods) has been revised.	Section 2 (Methods) has been updated and re-organized to reflect the content of the revised Socio-Economic Monitoring Plan. Certain program details are now only found in the Socio-Economic Monitoring Plan.	Section 2 See also Baffinland (2018a)
Topics for which data limitations exist will now be tracked through the QSEMC process and other sources of community feedback gathered on the Project.	Data limitations were previously tracked through the QSEMC process and Baffinland's own community engagement program. They will now be tracked through the QSEMC process (e.g. SEMCs 2018b), community engagement conducted for the Project through the IIBA Annual Project Review Forum (e.g. Dicta Court Reporting Inc. 2018), and through annual community engagement conducted by the NIRB on the Project's monitoring programs (e.g. NIRB 2018b). Reports on these are produced on a reliable, annual basis and have a focus on Project monitoring. Should new indicators be required for topics with data limitations in the future, they will still be selected in consultation with the SEMWG.	Section 2.2 Section 2.3 Section 2.4 Various sections where data limitations have been identified
Format of the 2018 Socio-Economic Monitoring Report has been updated.	The format of Sections 3 to 12 has been updated for clarity. These sections were previously organized according to the 'Topics' listed in	Sections 3 to 12

	Table 2-1 but are now organized using two new sub-sections: 'Indicator Data and Analysis' and 'Effects and Compliance Assessment'.	
An indicator for the Education and Training VSEC has been renamed.	The indicator 'education and employment status prior to Project employment' has been renamed 'employee education and pre-employment status', for accurateness.	Section 2.2 Section 4.1.8
An indicator for the Livelihood and Employment VSEC has been renamed.	The indicator 'hours of Project labour performed in Nunavut' has been renamed 'hours of Project labour performed', to reflect the criteria discussed in Section 5.1.1.	Section 2.2 Section 5.1.1
An indicator for the Contracting and Business Opportunities VSEC has been renamed.	The indicator 'procurement with Inuit-owned businesses and joint ventures' has been renamed 'value of contracting with Inuit Firms', to better align with IIBA reporting. For the purposes of this report, these two reporting focuses (and the values they report on) are assumed to be the same.	Section 2.2 Section 6.1.1
An indicator for the Contracting and Business Opportunities VSEC has been renamed.	The indicator 'LSA employee payroll amounts' has been renamed 'LSA Inuit employee payroll amounts', to better align with IIBA reporting protocols.	Section 2.2 Section 6.1.2
Topics and indicators for the Resources and Land Use VSEC have been updated/re-organized.	Topics and indicators have been updated/re-organized for clarity and completeness.	Section 2.2 Section 9.2.1
The residual effect for the Benefits, Royalty, and Taxation VSEC has been renamed.	The residual effect 'payments of payroll and corporate taxes to the territorial government' has been renamed 'Project revenues flowing to the territorial government', for accurateness.	Section 2.2 Section 11.2.1
A new section for the Governance and Leadership VSEC has been added to this report.	This section was added to be consistent with the new format of the 2018 report. While no residual effects were identified in the EIS for this VSEC and no monitoring indicators have been developed, there are two Terms and Conditions in the Project Certificate pertaining to monitoring and this VSEC.	Section 12
Several tables have been converted to figures.	Some data tables containing five or more years of information were becoming visually crowded and were converted to figures for greater legibility.	Various

3. POPULATION DEMOGRAPHICS

3.1 INDICATOR DATA AND ANALYSIS

3.1.1 Population Estimates and Nunavut Net Migration

Population data are a fundamental component of many socio-economic monitoring programs. Population estimates for Nunavut and the LSA communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet, and Iqaluit are provided by the Nunavut Bureau of Statistics (2018a) and presented in Table 3-1.⁹ 2017 was the most recent year population estimates were available. In 2017, the North Baffin LSA communities had a population of 6,383, Iqaluit had a population of 8,011, and Nunavut had a population of 37,996.

Between 2012 and 2017, the North Baffin LSA communities grew from a population of 5,836 to 6,383 (or 9.3%). Iqaluit grew from a population of 7,252 to 8,011 (or 10.5%), while Nunavut grew from a population of 34,707 to 37,996 (or 9.5%). Average annual growth rates over this period for the North Baffin LSA communities (1.8%), Iqaluit (2.1%), and Nunavut (1.9%) were considerably higher than the Canadian average (1.1%) (Statistics Canada 2018a). Figure 3-1 displays the population in these locations since 2008.

Table 3-1: 2017 Population Estimates

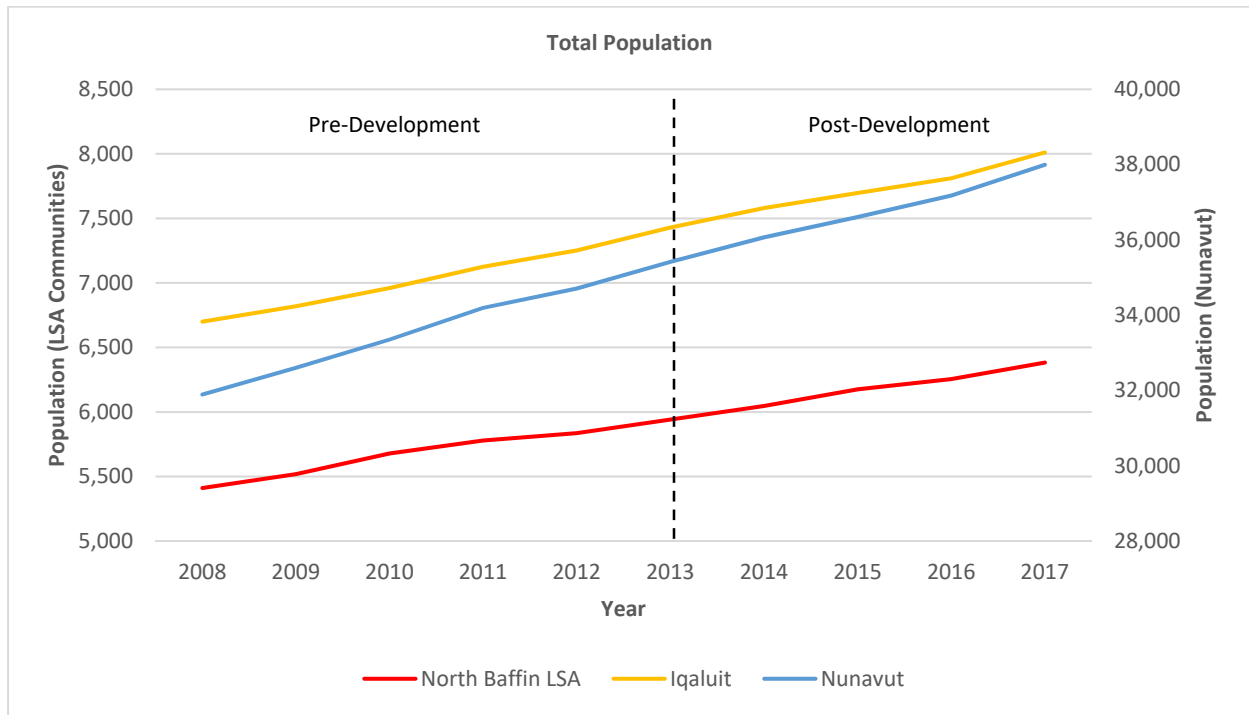
2017 Population Estimates	
Community	Total Population
North Baffin LSA	6,383
· Arctic Bay	973
· Clyde River	1,088
· Hall Beach	855
· Igloolik	1,677
· Pond Inlet	1,790
Iqaluit	8,011
Nunavut	37,996

Source: Nunavut Bureau of Statistics (2018a)

The percentage of Inuit versus non-Inuit residents in the North Baffin LSA communities remains high. An average 94.5% of North Baffin LSA residents were Inuit in the pre-development period, while an equal 94.5% were Inuit in the post-development period. Figure 3-2 displays the percentage of Inuit versus non-Inuit residents in the North Baffin LSA communities since 2008. 2016 was the most recent year data were available for this topic (Nunavut Bureau of Statistics 2016).

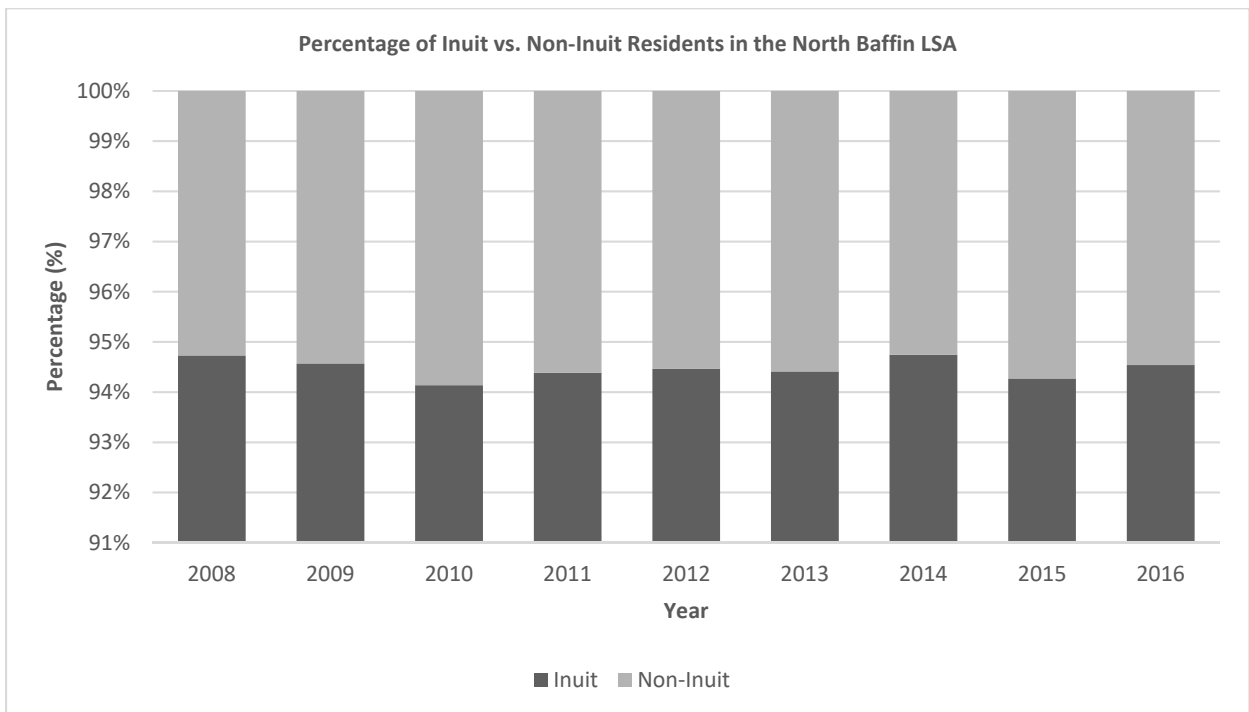
⁹ The Nunavut Bureau of Statistics (2018a) notes that community population estimates are preliminary and subject to revision. 2017 estimates, in particular, are to be viewed with some caution, as these are in early preliminary stages.

Figure 3-1: Total Population (2008 to 2017)



Source: Nunavut Bureau of Statistics (2018a)

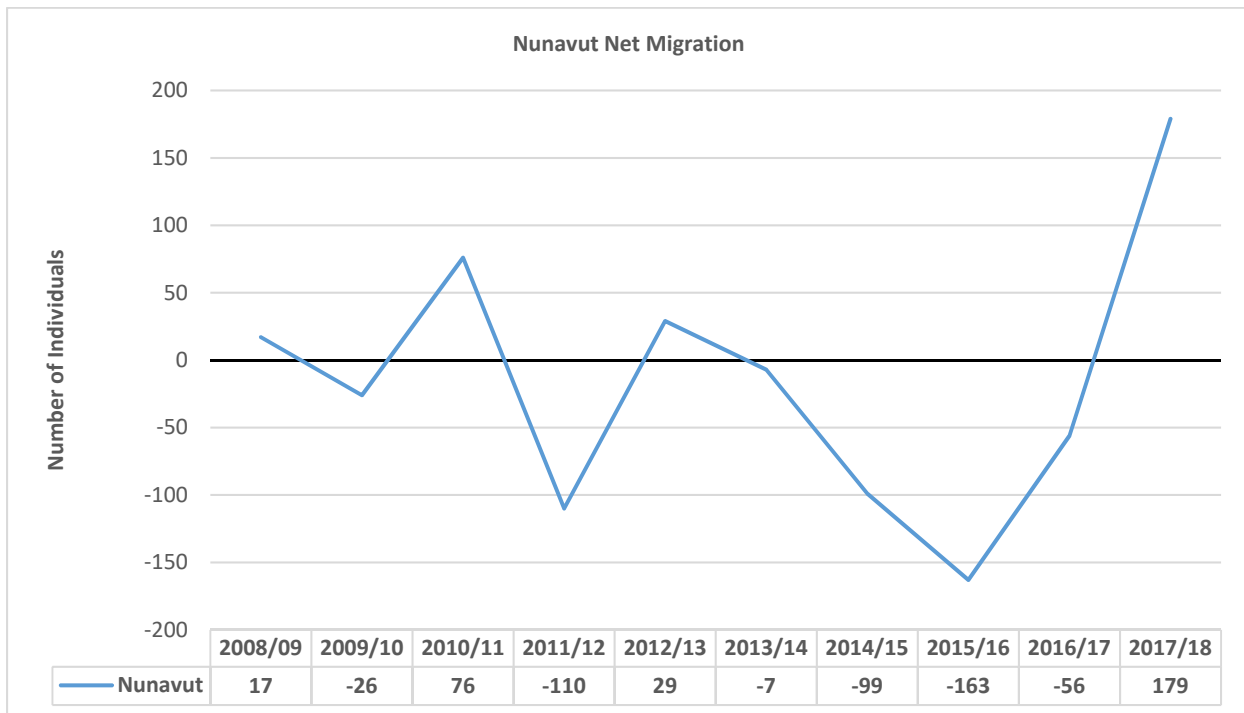
Figure 3-2: Percentage of Inuit Versus Non-Inuit Residents in the North Baffin LSA (2008 to 2016)



Source: Nunavut Bureau of Statistics (2016)

Territorial annual net migration estimates provide insight into broad migration patterns that are occurring in Nunavut. Figure 3-3 displays annual net migration estimates for Nunavut since 2008/09, which have been obtained from the Nunavut Bureau of Statistics (2018b). A net of 179 individuals migrated into Nunavut in 2017/18. Estimates for preceding years have been variable, from a net of 76 individuals migrating into Nunavut in 2010/11, to a net of -163 individuals migrating into Nunavut in 2015/16. Compared to the pre-development period average, a decreasing trend in average Nunavut net migration has occurred in the post-development period (i.e. more people have moved out of the territory than before; from -3 to -29).

Figure 3-3: Nunavut Net Migration (2008/09 to 2017/18)



Source: Nunavut Bureau of Statistics (2018b)

The populations of the North Baffin LSA communities, Iqaluit, and Nunavut have continued to grow since Project development. The percentage of Inuit versus non-Inuit residents in the North Baffin LSA communities has also remained high (and relatively constant) since that time. The Project appears unlikely to be a major influence on these trends. Population growth was occurring throughout Nunavut prior to Project development and continues to occur at high rates across the territory. The average percentage of Inuit versus non-Inuit residents in the North Baffin LSA communities was also the same during both the pre- and post-development periods. While a decreasing post-development trend in Nunavut annual net migration has occurred, net migration estimates are currently conducted at too coarse a scale (i.e. territorial) to ascertain any Project-related influences.

3.1.2 Known In-Migrations of Non-Inuit Project Employees and Contractors and Known Out-Migrations of Inuit Project Employees and Contractors

Migration data for Project employees and contractors provides insight into potential in- and out-migration trends occurring in the North Baffin LSA. Table 3-2 presents data on known in- and out-

migrations of Project employees and contractors in the North Baffin LSA. These data were provided by BCLOs located in each North Baffin LSA community. More specifically, BCLOs were asked to report on the number of Project employees and contractors they knew who had moved into and out of each of their communities during the previous year. BCLOs were also asked to identify whether the individuals were Inuit or non-Inuit and the locations where those individuals had moved to and from, if known.^{10, 11}

Table 3-2 indicates zero Inuit employees/contractors are known to have moved into the North Baffin LSA in 2018. An additional five Inuit employees/contractors moved between North Baffin LSA communities or moved back into the same community after moving away in the same year; these individuals have not been counted as North Baffin LSA in-migrants. One non-Inuit employee/contractor is known to have moved into the North Baffin LSA communities in 2018.

Eight Inuit employees/contractors are known to have moved out of the North Baffin LSA in 2018. An additional eight Inuit employees/contractors moved between North Baffin LSA communities or moved away and then back into the same community in the same year; these individuals have not been counted as North Baffin LSA out-migrants. Zero non-Inuit employees/contractors are known to have moved out of the North Baffin LSA communities in 2018.

Table 3-2 indicates a net of 13 Inuit employees/contractors are known to have out-migrated from the North Baffin LSA since 2015. A net of one non-Inuit employee/contractor is known to have in-migrated to the North Baffin LSA since 2015. For additional reference, a net of one Inuit employee/contractor is known to have out-migrated from the North Baffin LSA to Iqaluit since 2015 and a net of ten Inuit employees/contractors are known to have out-migrated from the North Baffin LSA to locations outside of Nunavut since 2015. The Project may be a contributing influence on Inuit out-migration in the North Baffin LSA, but the exact magnitude of this effect (if any) is difficult to ascertain as migration decisions can be influenced by several factors. The Project does not appear to be a major influence on non-Inuit in-migration in the North Baffin LSA.

¹⁰ Family members that may have migrated with employees and contractors were not accounted for. When the origin/destination community of a migrant was unknown in Table 3-2, it was conservatively assumed they were migrating to/from outside the North Baffin LSA. However, Iqaluit and non-Nunavut net migration calculations only include migrants whose origin and destination location were both known.

¹¹ 2013-2014 Baffinland migration data was presented in BDSI (2015). However, comparisons with this data should be made with some caution as this report did not identify whether its migration calculations included both Inuit and non-Inuit individuals and/or both employees and contractors. Furthermore, the numbers of migrating individuals were rounded and calculated using different methods than subsequent Baffinland Socio-Economic Monitoring Reports. From 2013 to 2014, BDSI (2015) notes less than five individuals moved into the North Baffin LSA from other North Baffin LSA communities. It also notes less than five individuals moved into the North Baffin LSA from Iqaluit during this period, while less than five individuals moved out of the North Baffin LSA to other North Baffin LSA communities. Five to ten individuals also moved from the North Baffin LSA to Iqaluit during this period, while less than five individuals moved from the North Baffin LSA to Ottawa.

Table 3-2: Known In- and Out-Migration of Project Employees and Contractors in the North Baffin LSA (2015 to 2018)

Known In- and Out-Migration of Project Employees and Contractors in the North Baffin LSA						
Year	In-Migration		Out-Migration		Inuit Net Migration	Non-Inuit Net Migration
	Inuit	Non-Inuit	Inuit	Non-Inuit		
2015	3	0	4	0	-1	0
2016	1	0	3	0	-2	0
2017	0	0	2	0	-2	0
2018	0	1	8	0	-8	+1
Total	4	1	17	0	-13	+1

Source: Baffinland

3.1.3 In-Migration of Non-Inuit to the North Baffin LSA and Out-Migration of Inuit from the North Baffin LSA

Community-level migration data can provide additional insight into potential Project-induced trends. However, annual in- and out-migration data for the North Baffin LSA were unavailable from the Nunavut Bureau of Statistics in 2018. Some insight into this topic can be obtained by assessing changes in the percentage of Inuit versus non-Inuit residents in the North Baffin LSA since Project development. If substantial non-Inuit in-migration and Inuit out-migration were occurring because of the Project, the ratio of Inuit to non-Inuit residents in the North Baffin LSA would be expected to noticeably decrease. As seen in Figure 3-2, however, the percentage of Inuit residents in the North Baffin LSA has remained relatively constant between 2008 and 2016 (ranging between 94.1% and 94.7% Inuit). In fact, there has been no change in the average percentage of Inuit residents between the pre-and post-development periods (94.5%). The Project does not appear to be a major influence on the percentage of Inuit/non-Inuit living in the North Baffin LSA.

3.1.4 Employee and Contractor Changes of Address, Housing Status, and Migration Intentions

Project Certificate Term and Condition No. 133 requests that Baffinland collect information on employee changes of address, housing status, and migration intentions. Baffinland has developed a voluntary Inuit Employee Survey to address this topic. The latest version of this survey was administered by BCLOs in each of the North Baffin LSA communities in January/February 2019. A total of 71 surveys were completed by Inuit employees and contractors.

Table 3-3 summarizes results pertaining to changes in employee and contractor residence and community ($n=71$). 4.2% of respondents indicated their residence had changed in the past 12 months, 74.6% indicated their residence had not changed in the past 12 months, and results were unknown for 21.1% of respondents. When 'unknown' results are removed, 5.4% of respondents indicated their residence had changed in the past 12 months and 94.6% indicated it had not. Respondents who had changed residences and moved to a different community ($n=2$) were then asked which community they had moved from; this result was compared against information provided on their current community of residence. Of these respondents, 100.0% had moved from outside the North Baffin LSA into the North Baffin LSA (or 2.8% of all survey responses).

Table 3-3: Changes in Inuit Employee and Contractor Residence and Community (2019 Inuit Employee Survey Results)

Changes in Inuit Employee and Contractor Residence and Community (Inuit Employee Survey Results)		
Type of Residence Change	Number of Respondents	Percentage of Respondents
<i>All survey respondents (n=71)</i>		
Residence changed in the past 12 months, within existing community	1	1.4%
Residence changed in the past 12 months, moved to new community	2	2.8%
Residence did not change in the past 12 months	53	74.6%
Unknown	15	21.1%
Total	71	99.9%
<i>Residence changed in the past 12 months, moved to new community (n=2)</i>		
Moved from North Baffin LSA to outside of North Baffin LSA	N/A	N/A
Moved from outside of North Baffin LSA to North Baffin LSA	2	100.0%
Moved within the North Baffin LSA	0	0.0%
Other	N/A	N/A
Unknown	0	0.0%
Total	2	100.0%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding. Because the 2019 survey was administered only in North Baffin LSA communities, Inuit residing outside of these communities (e.g. in Iqaluit or non-Nunavut communities) were not included. North Baffin LSA out-migrants were thus not captured in the results, nor were residence changes that occurred outside the North Baffin LSA.

Table 3-4 pertains to current Inuit employee and contractor housing status. Due to a survey administration error in 2019, data on the type of housing respondents lived in were unable to be collected and are not included in the table below. The most recent data on this topic are presented in JPCSL (2018). This section of the table has been retained as a placeholder for future reports. Regarding homeownership ($n=71$), 31.0% of respondents said they had considered purchasing a home in their community, 47.9% had not considered purchasing a home in their community, 4.2% already owned their own home, and results were unknown for 16.9% of respondents. When ‘unknown’ results are removed, 37.3% of respondents had considered purchasing a home in their community and 5.1% already owned their own home.

Table 3-5 summarizes results pertaining to Inuit employee and contractor migration intentions ($n=71$). 16.9% of respondents planned to move residences in the next 12 months while 64.8% did not. Migration intentions were unknown for 18.3% of respondents. When ‘unknown’ results are removed, 20.7% of respondents planned to move residences in the next 12 months and 79.3% did not. Respondents who planned to change residences and move to a different community in the next 12 months ($n=8$) were then asked which community they planned to move to; this result was compared against information provided on their current community of residence. Of these respondents, 50.0% (or 6.9% of known survey responses) planned to move out of the North Baffin LSA and 25.0% (or 3.4% of known responses) planned to move within the North Baffin LSA. The planned type of move was unknown for 25.0% (or 3.4% of known responses).

Table 3-4: Current Inuit Employee and Contractor Housing Status (2019 Inuit Employee Survey results)

Current Inuit Employee and Contractor Housing Status (Inuit Employee Survey Results)		
Current Housing Status	Number of Respondents	Percentage of Respondents
<i>What type of housing do you currently live in? (n=N/A)</i>		
Privately owned – Owned by you	–	–
Privately owned – Owned by another individual	–	–
Renting from a private company	–	–
Public housing	–	–
Government of Nunavut staff housing	–	–
Other staff housing	–	–
Other	–	–
Unknown	–	–
Total	–	–
<i>Have you ever considered purchasing a home in your community? (n=71)</i>		
Yes	22	31.0%
No	34	47.9%
I already own my own home	3	4.2%
Unknown	12	16.9%
Total	71	100.0%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding.

Table 3-5: Inuit Employee and Contractor Migration Intentions (2019 Inuit Employee Survey results)

Inuit Employee and Contractor Migration Intentions (Inuit Employee Survey Results)		
Migration Intentions	Number of Respondents	Percentage of Respondents
<i>All survey respondents (n=71)</i>		
Plan to move residences in the next 12 months, within existing community	4	5.6%
Plan to move residences in the next 12 months, to a new community	8	11.3%
Do not plan to move residences in the next 12 months	46	64.8%
Unknown	13	18.3%
Total	71	100.0%
<i>Plan to move residences in the next 12 months, to a new community (n=8)</i>		
Plan to move from North Baffin LSA to outside of North Baffin LSA	4	50.0%
Plan to move from outside of North Baffin LSA to North Baffin LSA	N/A	N/A
Plan to move within North Baffin LSA	2	25.0%
Other	N/A	N/A
Unknown	2	25.0%
Total	8	100.0%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding. Because the 2019 survey was administered only in North Baffin LSA communities, Inuit residing outside of these communities (e.g. in Iqaluit or non-Nunavut communities) were not included. Those who were planning to in-migrate to the North Baffin LSA were thus not captured in the results, nor were those who planned to move between residences outside the North Baffin LSA.

Like previous surveys, some respondents to the 2019 Inuit Employee Survey indicated they had moved to a different community in the past 12 months (3.6% in 2019, 9.9% in 2018, and 7.0% in 2017) or planned to move to a different community in the next 12 months (13.8% in 2019, 17.6% in 2018, and 16.3% in 2017). Due to a survey administration error in 2019, data on the type of housing respondents lived in were unable to be collected and compared to previous survey results (60.7% lived in public housing in 2018 and 66.7% lived in public housing in 2017). Baffinland will continue to track employee

changes of address, housing status, and migration intentions through an Inuit Employee Survey to see if future trends emerge.

3.1.5 Employee and Contractor Origin

Data on the origin, number, and ethnicity of Project employees and contractors who worked on the Project in 2018 are presented in Table 3-6 (by headcount). These data help reveal the composition of the Project's current labour force. An average of 2,054 individuals worked on the Project in 2018, of which 315 (15.3%) were Inuit. In 2018, most of the Project's known origin Inuit employees and contractors were based in LSA communities with smaller numbers residing outside of Nunavut. Most of the Project's known origin non-Inuit employees and contractors were based in Canadian locations outside of Nunavut, with Ontario having the greatest number. Small numbers of non-Inuit employees and contractors were based in Nunavut (all in Iqaluit). There were also a small number of non-Inuit international contractors, and various Inuit/non-Inuit employees and contractors whose origin was unknown. Within the North Baffin LSA, Hall Beach had the highest average number of employees and contractors (50), while Igloolik had the lowest (29). Several employees and contractors also resided in Iqaluit (59). One employee came from the Kivalliq Region, while no Project workers came from the Kitikmeot Region.

The Project employed many Inuit from the LSA communities in 2018, which likely reflects the Inuit hiring commitments Baffinland has made in those locations and the access to Project work locations provided by regular flights from LSA communities directly to site. Nearly all known origin non-Inuit individuals in 2018 came from Canadian provinces and territories other than Nunavut. A mine like Mary River requires many employees with various skill sets. Individuals with advanced mining and/or technical skill sets are in limited supply in Nunavut (e.g. Gregoire 2014, MacDonald 2014, MIHR 2014, Conference Board of Canada 2016). The large number of Project employees from outside of Nunavut is considered to at least partly reflect this skills gap. The Project's labour demand is also expected to continue to exceed the LSA Inuit labour supply (i.e. those who are 'ready, able, and willing' to work at the Project), as noted in a recent Labour Market Analysis prepared for Baffinland (Impact Economics 2018).

Table 3-6: Mary River Project Employees and Contractors by Origin and Ethnicity in 2018

Mary River Project Employees and Contractors by Origin and Ethnicity in 2018																		
Origin		Baffinland								Contractors								Yearly Average
		Inuit				Non-Inuit				Inuit				Non-Inuit				
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Nunavut	Arctic Bay	26	27	34	37	0	0	0	0	14	19	24	16	0	0	0	0	49
	Clyde River	21	27	30	28	0	0	0	0	15	19	32	21	0	0	0	0	48
	Hall Beach	13	15	18	17	0	0	0	0	24	34	45	33	0	0	0	0	50
	Igloolik	7	13	15	15	0	0	0	0	11	11	18	24	0	0	0	0	29
	Pond Inlet	17	24	25	21	0	0	0	0	15	14	23	22	0	0	0	0	40
	Iqaluit	15	22	20	26	0	0	1	0	30	31	38	29	5	9	8	3	59
	Other	0	0	3	4	0	0	0	0	0	0	5	0	0	0	0	0	3
Other Canadian Provinces and Territories	Alberta	0	0	0	0	34	55	58	55	0	0	1	1	36	29	55	46	93
	British Columbia	1	1	1	1	24	32	33	35	0	0	0	0	26	26	41	30	63
	Manitoba	0	0	0	1	11	17	15	17	0	0	0	0	3	4	10	2	20
	New Brunswick	0	1	0	0	29	42	41	42	0	0	0	0	10	12	21	16	54
	Nfld. and Labrador	1	2	2	2	60	115	117	126	0	1	1	0	24	27	78	50	152
	Northwest Territories	0	0	0	0	0	1	0	0	0	0	0	0	6	3	4	6	5
	Nova Scotia	0	1	0	1	50	92	95	102	0	0	0	0	11	13	36	20	105
	Ontario	13	14	15	18	265	377	384	357	3	6	6	3	92	100	160	121	484
	Prince Edward Island	0	0	0	0	5	11	12	13	0	0	0	0	1	1	1	0	11
	Quebec	0	3	0	1	29	57	57	54	0	1	1	1	26	24	110	63	107
	Saskatchewan	0	0	0	0	2	9	11	14	0	1	1	0	3	2	13	5	15
Yukon	0	0	0	0	0	1	1	1	0	0	0	0	0	1	3	0	2	
International	Other	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	1
Unknown	Unknown	3	0	0	0	252	1	0	0	13	10	3	35	307	487	706	845	666
Quarterly Totals		117	150	163	172	761	810	825	816	125	147	198	185	553	738	1247	1207	
Average		151				803				164				936				
AVERAGE TOTAL		2,054																

Source: Baffinland

3.2 EFFECTS AND COMPLIANCE ASSESSMENT

3.2.1 Effects Assessment

There were two residual effects for the Population Demographics VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 3-7.

Table 3-7: Effects Assessment for the Population Demographics VSEC

Residual Effect	Summary	Monitoring Results
In-Migration of Non-Inuit Project Employees to the North Baffin LSA	<p>The EIS predicted some in-migration of non-Inuit employees hired to work at the Project could occur in the North Baffin LSA (i.e. <5% change in the non-Inuit baseline population). In 2012 (the year before Project construction commenced), 5% of the North Baffin non-Inuit population would have equaled approximately 28 individuals.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Designation of Iqaluit and an additional southern location as ‘points of hire’, with free transportation provided to employees from these points of hire to the mine site 	<p>Cumulative Baffinland (i.e. BCLO survey) data since 2015 indicates a net of one non-Inuit employee/contractor is known to have in-migrated to the North Baffin LSA. Government data on changes in the percentage of Inuit versus non-Inuit residents in the North Baffin LSA have not revealed a significant Project-induced trend at this time. It is acknowledged these data present only a partial assessment of migration trends and more detailed in-migration data for the North Baffin LSA are currently unavailable from government sources. Furthermore, the factors involved in deciding to migrate can be complex and specific to an individual. While these limitations are acknowledged, available migration data appear to support the EIS predictions that were made. There is no evidence to suggest mitigation measures need to be modified at this time. Without significant in-migration to the North Baffin LSA occurring because of the Project, negative effects on local housing opportunities are considered negligible. In fact, wages earned through Project-related work may enable individuals in the North Baffin LSA to improve their housing situations over time (e.g. through greater capacity to rent and/or own their residence). Out-migration of residents may also relieve some local housing strains.</p>
Out-Migration of Inuit Residents from the North Baffin LSA	<p>The EIS predicted some out-migration of Inuit residents from the North Baffin LSA could occur (i.e. 1% to <5% of the total population). In 2012 (the year before Project construction commenced), 5% of the total North Baffin LSA population would have equaled approximately 306 individuals.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Designation of all North Baffin LSA communities as ‘points of hire’, with free transportation provided to employees from these points of hire to the mine site 	<p>Cumulative Baffinland (i.e. BCLO survey) data since 2015 indicates a net of 13 Inuit employees / contractors are known to have out-migrated from the North Baffin LSA. Government data on changes in the percentage of Inuit versus non-Inuit residents in the North Baffin LSA have not revealed a significant Project-induced trend at this time. It is acknowledged these data present only a partial assessment of migration trends and more detailed out-migration data for the North Baffin LSA are currently unavailable from government sources. Furthermore, the factors involved in deciding to migrate can be complex and specific to an individual. While these limitations are acknowledged, available migration data appear to support the EIS predictions that were made. There is no evidence to suggest mitigation measures need to be modified at this time.</p>

3.2.2 Compliance Assessment

There are five Terms and Conditions in the Project Certificate pertaining to monitoring of the Population Demographics VSEC. The status of these are summarized in Table 3-8.

Table 3-8: Terms and Conditions for Monitoring the Population Demographics VSEC

Term and Condition No.	Description	Status
129	The Proponent is strongly encouraged to engage in the work of the QSEMC 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 monitoring priorities related to the Project, communities, and the North Baffin region as a whole.	Baffinland continues to engage with the QSEMC and participates in the SEMWG, whose members include Baffinland, the GN, the Government of Canada, and QIA. A TOR for the SEMWG (which identifies socio-economic monitoring priorities and objectives for the Project) has been developed (but was being revised in 2018) and Baffinland has incorporated feedback from SEMWG members into the Project's Socio-Economic Monitoring Plan (Baffinland 2018a). Baffinland will continue to consider feedback received from Project stakeholders on its socio-economic monitoring program. This Term and Condition is more fully addressed in the following sections of this report: Section 1.2, Section 2.2, and Appendix A.
130	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.	Baffinland continues to engage with the QSEMC and SEMWG on socio-economic monitoring for the Project. In addition, Baffinland regularly engages other committees which operate under provisions of the IIBA on various socio-economic topics. This Term and Condition is more fully addressed in the following sections of this report: Section 1.2 and Appendix A.
131	The QSEMC 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.	Baffinland has provided demographic change information in the Socio-Economic Monitoring Report. Baffinland has also implemented an Inuit Employee Survey, which collects information related to employee and contractor changes of address, housing status, and migration intentions. This Term and Condition is more fully addressed in the following sections of this report: Section 3.1.1, Section 3.1.2, Section 3.1.3, Section 3.1.4, and Section 3.2.1.
133	The Proponent is encouraged to work with the QSEMC and in collaboration with the GN's Department of Health and Social Services, the NHC 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 GN's Department of Health and Social Services, the NHC and other relevant stakeholders. Non-confidential results of the survey are to be reported to the GN and the NIRB.	Baffinland has implemented an Inuit Employee Survey, which collects information related to employee and contractor changes of address, housing status, and migration intentions. Baffinland continues to engage the QSEMC and SEMWG on its socio-economic monitoring program and has solicited feedback on potential improvements to the survey from SEMWG members. Following consultation with NHC in late 2018, two additional questions on home ownership and financial literacy training were added to the most recent (2019) version of the survey. This Term and Condition is more fully addressed in the following sections of this report: Section 3.1.4 and Section 4.1.8.

<p>134</p>	<p>The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows: a. The number of Inuit and non-Inuit employees hired from each of the North Baffin communities, specifying the number from each; b. The number of Inuit and non-Inuit employees hired from each of the Kitikmeot and Kivalliq Regions, specifying the number from each; c. The number of Inuit and non-Inuit employees hired from a southern location or other province/territory outside of Nunavut, specifying the locations and the number from each; and d. The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire.</p>	<p>Baffinland has presented employee and contractor origin information in the Socio-Economic Monitoring Report. This Term and Condition is more fully addressed in the following section of this report: Section 3.1.5.</p>
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4. EDUCATION AND TRAINING

4.1 INDICATOR DATA AND ANALYSIS¹²

4.1.1 Participation in Pre-Employment Training

Participation in pre-employment training is a useful indicator of life skills development because some individuals may have lacked basic employment skills prior to participating. Baffinland successfully carried out a pre-employment training program with North Baffin LSA residents in 2012 and 2013. There were 277 graduates of the program and 150 of those graduates went on to be employed at the Project in 2013. Following that, a new Work Ready Program was developed by Baffinland and began to be offered in 2018. That year, the Work Ready Program was administered in Clyde River, Pond Inlet, Igloolik, and Hall Beach and had 59 graduates. Since 2012, there have been 336 graduates of Baffinland pre-employment training programs. Baffinland will continue to offer pre-employment training as per Article 8.12 of the IIBA.

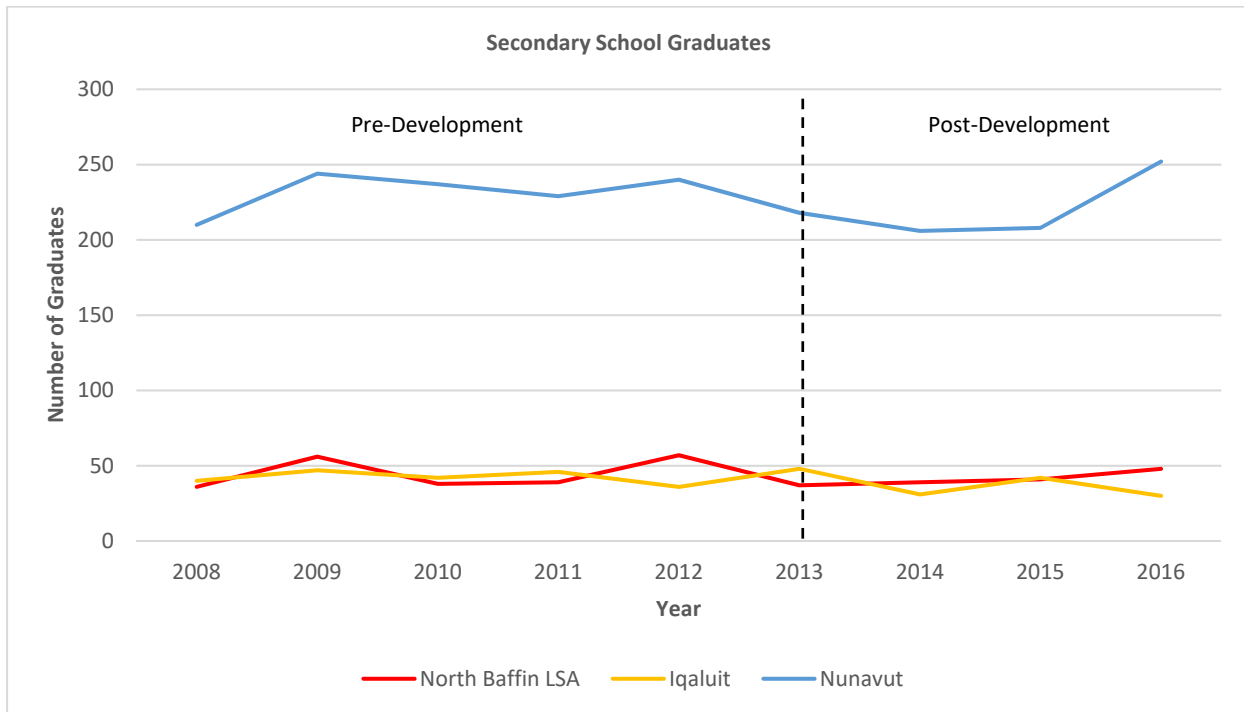
4.1.2 Number of Secondary School Graduates

The number of secondary school graduates in the LSA is a useful indicator of school attendance and success. 2016 was the most recent year data on secondary school graduates were available from the Nunavut Bureau of Statistics (2017a). Compared to the previous year data were available, there has been an increase in the number of graduates in the North Baffin LSA (from 41 to 48) and Nunavut (from 208 to 252), but a decrease in Iqaluit (from 42 to 30). Compared to pre-development period averages, there have been decreasing trends in the average number of graduates in the North Baffin LSA (from 45 to 41), Iqaluit (from 42 to 38), and Nunavut (from 232 to 221) in the post-development period. Figure 4-1 displays the number of secondary school graduates since 2008, while Table 4-1 displays average values for selected periods.

These data do not currently appear indicative of a positive Project influence, as there have been decreasing trends in the number of graduates in the LSA in the post-development period, which were not evident in the pre-development period (they were previously increasing). A comparable situation has been noted across Nunavut, which suggests broad-scale factors may be driving these trends rather than the Project. However, Baffinland predicted the Project would provide incentives related to school attendance and success in the LSA; as such, this indicator will continue to be monitored for emerging trends.

¹² Data for the indicator 'LSA employment and on-the-job training' are provided in Section 4.1.5 (hours of training completed by Inuit employees and contractors) and Section 5.1.2 (Project hours worked by LSA employees and contractors), rather than being duplicated here.

Figure 4-1: Secondary School Graduates (2008 to 2016)



Source: Nunavut Bureau of Statistics (2017a)

Table 4-1: Secondary School Graduates (Averages for Selected Periods)

Secondary School Graduates						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	34	–	32	–	168	–
Pre-Development Period (2008 to 2012)	45	+11	42	+10	232	+64
Post-Development Period (2013 onwards)	41	-4	38	-4	221	-11

Source: Nunavut Bureau of Statistics (2017a)

Notes: Some values may be affected by rounding.

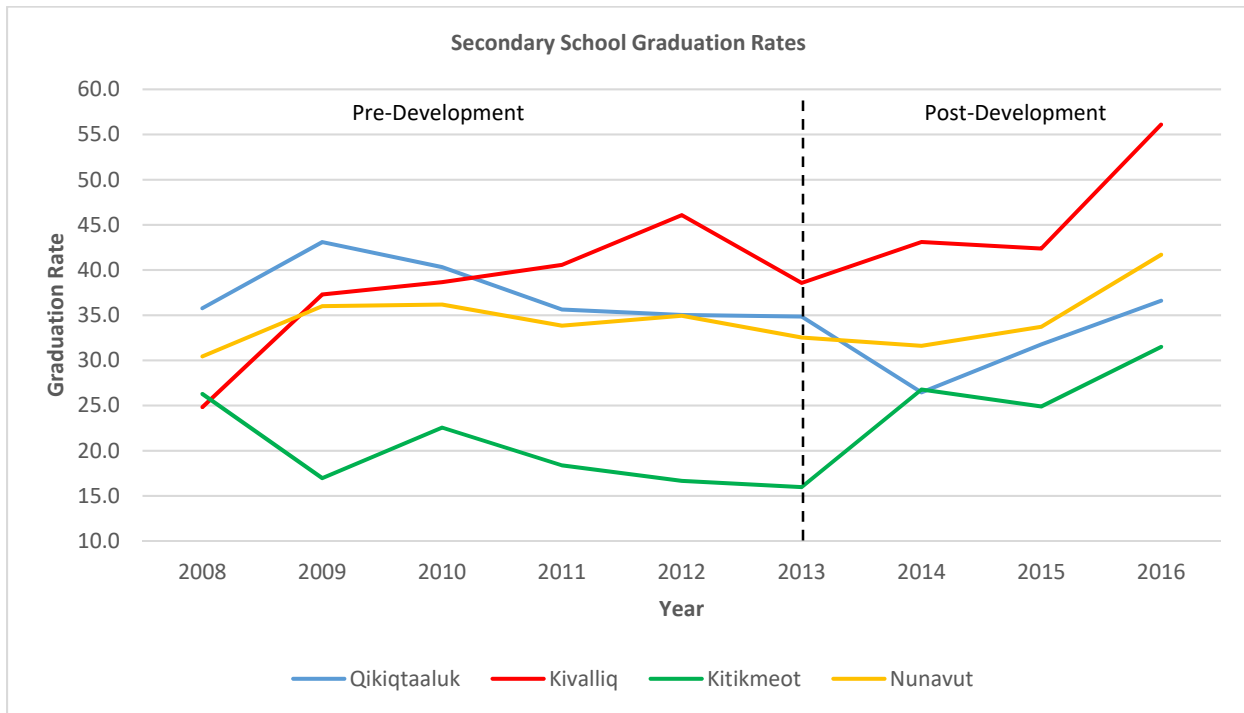
4.1.3 Secondary School Graduation Rate

Secondary school graduation rates are another useful indicator of school attendance and success.¹³ 2016 was the most recent year graduation rate data were available from the Nunavut Bureau of Statistics (2017b). However, data are only available for the Qikiqtaaluk, Kivalliq, and Kitikmeot Regions, and Nunavut as a whole. No community-level data are available. Compared to the previous year data were available, graduation rates increased in the Qikiqtaaluk Region (from 31.8 to 36.6), Kivalliq Region (from 42.4 to 56.1), Kitikmeot Region (from 24.9 to 31.5), and Nunavut (from 33.7 to 41.7). Compared to pre-development period averages, there has been a decreasing trend in average graduation rates in

¹³ The Nunavut Bureau of Statistics (2017b) notes the ‘graduation rate’ is calculated by dividing the number of graduates by the average of estimated 17 and 18 year-old populations (the typical ages of graduation). ‘Graduates’ include students who completed secondary school but excludes those who completed equivalency or upgrading programs. Due to the small population of Nunavut, however, the Nunavut Bureau of Statistics (2017b) notes that graduation rate changes from year to year and must be interpreted with caution.

the Qikiqtaaluk Region (from 38.0 to 32.4) but increasing trends in the Kivalliq Region (from 37.5 to 45.1), Kitikmeot Region (from 20.2 to 24.8), and Nunavut (from 34.3 to 34.9) in the post-development period. Figure 4-2 displays secondary school graduation rates since 2008, while Table 4-2 displays average values for selected periods.

Figure 4-2: Secondary School Graduation Rates (2008 to 2016)



Source: Nunavut Bureau of Statistics (2017b)

Table 4-2: Secondary School Graduation Rates (Averages for Selected Periods)

Secondary School Graduation Rates				
Period	Qikiqtaaluk		Nunavut	
	Average	Change in Average	Average	Change in Average
2003-2007	32.8	–	27.1	–
Pre-Development Period (2008 to 2012)	38.0	+5.1	34.3	+7.2
Post-Development Period (2013 onwards)	32.4	-5.5	34.9	+0.6

Source: Nunavut Bureau of Statistics (2017b)

Notes: Some values may be affected by rounding.

These data do not currently appear indicative of a positive Project influence, as there has been a decreasing trend in graduation rates in the Qikiqtaaluk Region in the post-development period, which was not evident in the pre-development period (it was previously increasing). Conversely, Nunavut has continued to experience an increasing trend during the post-development period (although the magnitude of this increase has notably diminished). Reasons for the lack of a similar increasing trend in the Qikiqtaaluk Region are currently unknown. It should also be noted that Baffinland’s Inuit hiring efforts to date have been focused on the LSA communities, rather than all Qikiqtaaluk Region communities. However, Baffinland predicted the Project would provide incentives related to school

attendance and success in the LSA; as such, this indicator will continue to be monitored for emerging trends.

4.1.4 Investments in School-Based Initiatives

Baffinland continued to support several school-based initiatives through its donations program and IIBA in 2018. For example:

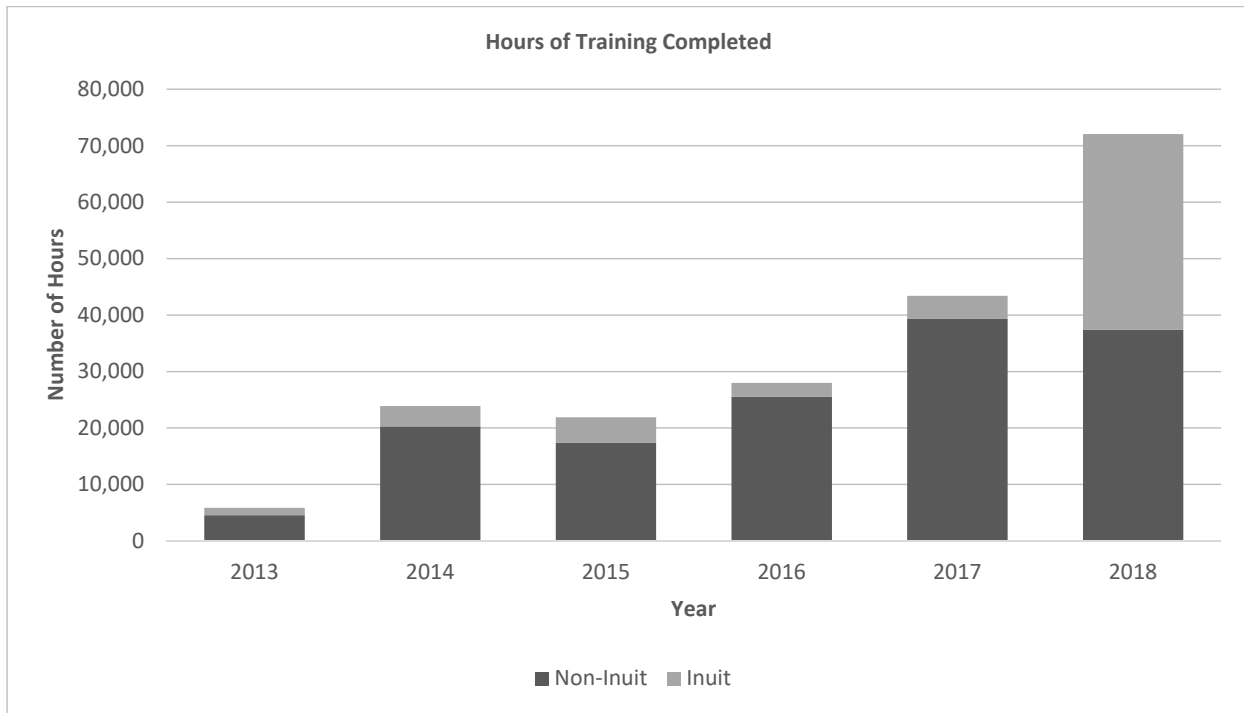
- Baffinland donated laptops to secondary school graduates in the North Baffin LSA communities to help motivate individuals to complete their high school educations. Baffinland provided 38 laptops to new grade 12 graduates in 2018 and 63 laptops in 2017.
- Per Article 8.8 of the IIBA, Baffinland continues contributing to an annual scholarship fund. Five scholarships were awarded to LSA residents in 2018, totalling \$25,000. While no scholarships were awarded in 2017 due to an administration issue, they were subsequently awarded in 2018 (i.e. an additional five scholarships totalling \$25,000 were awarded in 2018).
- Baffinland's School Lunch Program in the North Baffin LSA continued in 2018. Article 7.21 of the IIBA further commits Baffinland to a budget of \$300,000/year in support of the School Lunch Program.
- Baffinland made a \$25,000 donation to Nunavut Arctic College's Environmental Technology Program in 2018.

4.1.5 Hours of Training Completed by Inuit Employees and Contractors

The number of training hours completed by Project employees and contractors is a useful indicator of the magnitude of Baffinland's annual training efforts. Hours of training completed since 2013 by Inuit and non-Inuit are presented in Figure 4-3. In 2018, this indicator began including any training provided in support of Baffinland's Apprenticeship Program, Morrisburg Heavy Equipment Operator (HEO) Training Program, and community-based Work Ready Program, in addition to any other site-based training offered by Baffinland to employees and contractors. In 2018, 72,041 hours of training were completed, of which 34,629 hours (or 48.1%) were completed by Inuit. This represents an increase of 30,605 Inuit training hours compared to 2017. A total of 194,991 hours of training have been completed since Project development, of which 50,496 hours (or 25.9%) were completed by Inuit. These training opportunities likely reflect the commitments Baffinland has made to Inuit training through the IIBA and other initiatives such as the Inuit Human Resources Strategy (IHRS) and Q-STEP program.¹⁴

¹⁴ The IHRS (Baffinland 2018b) is a document developed by Baffinland and QIA that describes goals and initiatives that will be used to increase Inuit employment at the Project over time. Baffinland and QIA were also recently successful in securing funds through Employment and Social Development Canada's (ESDC) Skills and Partnership Fund for their Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program. Q-STEP is a four-year initiative that will be undertaken by QIA in close partnership with Baffinland 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 total value of the program is \$19 million. The Government of Canada will provide \$7.9 million, Baffinland will provide \$9.4 million of in-kind support, and Kakivak Association will provide up to \$1.6 million of in-kind support. The Government of Nunavut will also offer operational support to Q-STEP.

Figure 4-3: Hours of Training Completed (2013 to 2018)

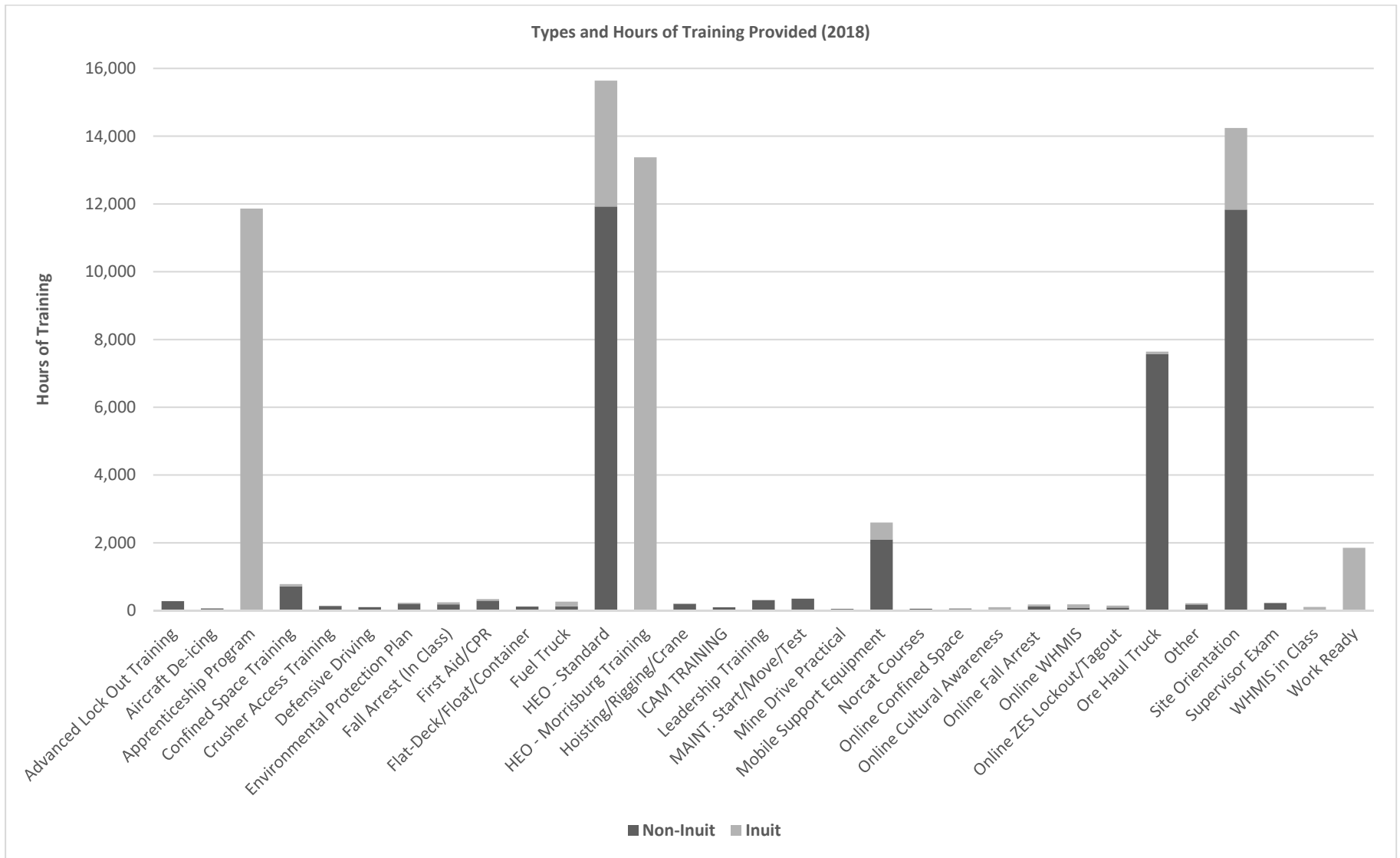


Source: Baffinland

4.1.6 Types of Training Provided to Inuit Employees and Contractors

The types of training provided by Baffinland help reveal the full scope of learning opportunities available at the Project on an annual basis. Types and hours of training provided to Inuit and non-Inuit employees and contractors in 2018 are displayed in Figure 4-4. In 2018, this indicator began including any training provided in support of Baffinland’s Apprenticeship Program, Morrisburg HEO Training Program, and community-based Work Ready Program, in addition to any other site-based training offered by Baffinland to employees and contractors. Training with the highest levels of Inuit participation in 2018 included the Morrisburg HEO Training Program (13,376 hours), Apprenticeship Program (11,862 hours), standard HEO program (3,715 hours), and site orientation (2,406 hours). These training opportunities likely reflect the commitments Baffinland has made to Inuit training through the IIBA and other initiatives such as the IHRS and Q-STEP program.

Figure 4-4: Types and Hours of Training Provided (2018)



Source: Baffinland

Notes: Training programs totalling <50 hours have been included under 'Other'.

4.1.7 Apprenticeships and Other Opportunities

In late 2017, Baffinland launched a new Apprenticeship Program. Participants of the Apprenticeship Program join Baffinland as trades assistants for six months and participate in job shadowing activities to learn about the trade and Baffinland’s operations. Upon successful completion of the six-month term, candidates write their Trades Entrance Exam. Upon successful completion of the exam, candidates are offered full-time, permanent apprenticeship positions with Baffinland. Concluding 2018, nine Inuit apprentices were employed by Baffinland in the Apprenticeship Program. Two Inuit apprentices were in their third year and seven were in the first year of their programs. In 2017, Baffinland employed one Inuit apprentice. Table 4-3 summarizes the number of Inuit apprenticeships at the Project since 2015. These opportunities likely reflect the commitments Baffinland has made to Inuit training through the IIBA and other initiatives such as the IHRS and Q-STEP program.

To further support the Apprenticeship Program and prepare trades assistants for the Trades Entrance Exam, Baffinland also started a Pre-Trades Program with Nunavut Arctic College at site in 2018. The Pre-Trades Program assists individuals in gaining a foundation in the physical sciences and improving their English and Mathematics skills, which are intended to assist these individuals when taking the Trades Entrance Exam. Nine Inuit completed the Pre-Trades Program and passed the Trades Entrance Exam in 2018. Per IIBA Article 7.20, Baffinland has also committed to develop and operate an Inuit Internship Program. This program will operate for a minimum of ten years and will offer a minimum of four internship positions per year, two of which will be for occupations outside the traditional trades and heavy equipment operation. Likewise, per IIBA Article 7.19, Baffinland makes summer employment opportunities available to Inuit students. In 2018, Baffinland hired four Inuit summer students in the communities of Arctic Bay, Hall Beach, Igloolik, and Iqaluit to assist the Northern Affairs team and gain office work experience.

Table 4-3: Inuit Apprenticeships at the Project (2015 to 2018)

Inuit Apprenticeships at the Project			
2015	2016	2017	2018
4	1	1	9

Source: Baffinland

4.1.8 Employee Education and Pre-Employment Status

Project Certificate Term and Condition No. 140 requests that Baffinland collect information on employee education and pre-employment status. Baffinland has developed a voluntary Inuit Employee Survey to address this topic. The latest version of this survey was administered by BCLOs in each of the North Baffin LSA communities in January/February 2019. A total of 71 surveys were completed by Inuit employees and contractors.

Table 4-4 summarizes results on the highest level of education obtained by survey respondents ($n=71$). 49.3% of respondents had less than a high school education. 16.9% had a high school diploma or equivalent, 4.2% had an apprenticeship or trades certificate or diploma, and 15.5% had a college or other non-university certificate or diploma. 0.0% had any type of university certificate or diploma, and 14.1% of respondents had unknown educational levels. When ‘unknown’ results are removed, 57.4% had less than a high school education, 19.7% had a high school diploma or equivalent, and 23.0% had higher than a high school diploma or equivalent.

Furthermore, 64.8% of respondents said they would attend an informational course about managing personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through their employer or local housing association; 25.4% would not; and results were unknown for 9.9% of respondents. When 'unknown' results are removed, 71.9% of respondents said they would attend such a course.

Table 4-4: Education Status (2019 Inuit Employee Survey results)

Education Status (Inuit Employee Survey Results)		
Education Status	Number of Respondents	Percentage of Respondents
<i>What is the highest education level you have obtained? (n=71)</i>		
Less than high school	35	49.3%
High school diploma or equivalent	12	16.9%
Apprenticeship or trades certificate or diploma	3	4.2%
College or other non-university certificate or diploma	11	15.5%
University certificate or diploma	0	0.0%
Unknown	10	14.1%
Total	71	100.0%
<i>Would you attend an informational course about managing your personal finances, setting up monthly bill payments, and establishing savings goals if it was offered through your employer or local housing association? (n=71)</i>		
Yes	46	64.8%
No	18	25.4%
Unknown	7	9.9%
Total	71	100.1%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding.

Table 4-5 summarizes results on the employment status of survey respondents prior to Project employment ($n=71$). 23.9% of respondents resigned from a previous job in order to take up employment with the Project, while 66.2% did not. Results were unknown for 9.9% of respondents. When 'unknown' results are removed, 26.6% resigned from a previous job in order to take up employment with the Project while 73.4% did not. Of those respondents that resigned from a previous job in order to take up employment with the Project ($n=17$), 35.3% (or 9.4% of known survey responses) had casual employment status, 17.6% (or 4.7% of known responses) had part-time employment status, and 41.2% (or 10.9% of known responses) had full-time employment status.

Table 4-6 summarizes results on the education status of survey respondents prior to Project employment ($n=71$). 7.0% of respondents were enrolled in an academic or vocational program at the time of their hire at the Project, while 77.5% were not. Results were unknown for 15.5% of respondents. When 'unknown' results are removed, 8.3% of respondents were enrolled in an academic or vocational program at the time of their hire at the Project while 91.7% were not. Of those respondents that were enrolled in an academic or vocational program at the time of their hire at the Project ($n=5$), 0.0% (or 0.0% of known survey responses) suspended or discontinued their education because they were hired to work at the Project.

Table 4-5: Employment Status Prior to Project Employment (2019 Inuit Employee Survey results)

Employment Status Prior to Project Employment (Inuit Employee Survey Results)		
Pre-Employment Status	Number of Respondents	Percentage of Respondents
<i>Did you resign from a previous job in order to take up employment with the Mary River Project? (n=71)</i>		
Yes	17	23.9%
No	47	66.2%
Unknown	7	9.9%
Total	71	100.0%
<i>If yes, what was your previous employment status? (n=17)</i>		
Casual	6	35.3%
Part-time	3	17.6%
Full-time	7	41.2%
Unknown	1	5.9%
Total	17	100.0%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding.

Table 4-6: Education Status Prior to Project Employment (2019 Inuit Employee Survey results)

Education Status Prior to Project Employment (Inuit Employee Survey Results)		
Pre-Employment Status	Number of Respondents	Percentage of Respondents
<i>Were you enrolled in an academic or vocational program at the time of your hire at the Mary River Project? (n=71)</i>		
Yes	5	7.0%
No	55	77.5%
Unknown	11	15.5%
Total	71	100.0%
<i>If yes, did you suspend or discontinue your education because you were hired to work at the Mary River Project? (n=5)</i>		
Yes	0	0.0%
No	5	100.0%
Unknown	0	0.0%
Total	5	100.0%

Source: Baffinland

Notes: Total percentages may not equal 100.0% due to rounding.

Like previous surveys, the individuals who completed Baffinland’s Inuit Employee Survey in 2019 had varied educational and pre-employment backgrounds. 57.4% had less than a high school education, 19.7% had a high school diploma or equivalent, and 23.0% had higher than a high school diploma or equivalent. By comparison, data from the 2016 Census indicate the proportion of the North Baffin LSA’s population (aged 25 to 64 years) with no certificate, diploma or degree was 50.8%; with a secondary school diploma or equivalency certificate was 14.4%; and with a postsecondary certificate, diploma, or degree was 36.0%. Likewise, the proportion of Nunavut’s population (aged 25 to 64 years) with no certificate, diploma or degree was 40.9%; with a secondary school diploma or equivalency certificate was 14.6%; and with a postsecondary certificate, diploma, or degree was 44.4% (Statistics Canada 2017a, b, c, d, e, f, g).

Like previous surveys, some respondents to the 2019 Inuit Employee Survey also indicated they resigned from a previous job in order to take up employment with the Project (26.6% in 2019, 31.4% in 2018, and 20.9% in 2017). For greater reference, Nunavut’s Inuit population participation rate, employment rate, and unemployment rate in December 2018 were 58.1%, 46.0%, and 20.8% respectively (Nunavut Bureau

of Statistics 2019).¹⁵ Likewise, few or no respondents continue to indicate they suspended or discontinued their education because they were hired to work at the Project (0.0% in 2019, 3.1% in 2018, and 0.0% in 2017). Baffinland will continue to track employee education and pre-employment status through an Inuit Employee Survey to see if additional trends emerge.

4.2 EFFECTS AND COMPLIANCE ASSESSMENT

4.2.1 Effects Assessment

There were three residual effects for the Education and Training VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 4-7.

Table 4-7: Effects Assessment for the Education and Training VSEC

Residual Effect	Summary	Monitoring Results
Improved Life Skills Among Young Adults	<p>The EIS predicted positive effects on life skills development among young adults in the LSA would arise from the Project. This would occur primarily through access to industrial work supported by pre-employment preparation and on-the-job training.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Pre-employment training (e.g. Work Ready Program) • On-the-job training • Creation of a supportive work environment • A no drugs/no alcohol policy on site • Inuit Internship Program • Summer student employment • Measures included in the IIBA and IHRS to enhance Inuit employment, training, and skills development at the Project 	<p>In 2018, Baffinland continued to provide various opportunities for life skills development among LSA residents. This included a Work Ready Program (59 graduates) and employment (379,956 hours worked by LSA residents) and training opportunities (34,629 hours of training completed by Inuit). Since Project development, there have been 336 graduates of Baffinland pre-employment training programs, 1,833,574 hours have been worked by LSA residents, and 50,496 hours of training have been provided to Inuit. These opportunities are notable, especially when considering the lack of employment and training opportunities that have historically existed in the LSA. Furthermore, Baffinland strives to maintain a healthy and supportive work environment and provides access to counselling and support resources. While not all individuals who received pre-employment training, employment, and other training opportunities from Baffinland can be considered ‘youth’, it can reasonably be assumed that: a) some youth were included in this group, and b) some other individuals stood to benefit from the life skills development opportunities that were provided. It is further acknowledged that life skills development for some individuals can take time to be achieved. However, there are indications that</p>

¹⁵ These are 3-month moving averages ending in December 2018. The Nunavut Bureau of Statistics (2009) defines the ‘participation rate’ as the total labour force expressed as a percentage of the population aged 15 years and over. The ‘labour force’ is defined as the civilian non-institutional population 15 years of age and over who were employed or unemployed. ‘Employment rate’ is defined as the number of employed persons expressed as a percentage of the population 15 years of age and over. ‘Employed persons’ are defined as those who (a) did any work at all at a job or business, that is paid work in the context of an employer-employee relationship, or self-employment; or (b) had a job but were not at work due to factors such as own illness or disability, personal or family responsibilities, vacation, labour dispute or other reasons (excluding persons on layoff, between casual jobs, and those with a job to start at a future date). The ‘unemployment rate’ is defined as the number of unemployed persons expressed as a percentage of the labour force. ‘Unemployed persons’ are defined as those who (a) were on temporary layoff with an expectation of recall and were available for work; or (b) were without work, had actively looked for work in the past four weeks, and were available for work; or (c) had a new job to start within four weeks and were available for work.

		positive effects on life skills development among young adults in the LSA continue to result from the Project, as predicted in the EIS. There is no evidence to suggest mitigation measures need to be modified at this time.
Incentives Related to School Attendance and Success	<p>The EIS predicted the Project would have a positive effect on education and skills development across the LSA by providing incentives related to school attendance and success. While there is some potential that individuals may drop out of school or forego further education to work at the Project, the overall effect of the Project will be to increase the value of education and thereby the ‘opportunity cost’ of dropping out of school.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • The establishment of a minimum age (i.e. 18) for Project employment • Priority hiring for Inuit • Investments in school-based initiatives (e.g. laptop donations, scholarships, school lunch program) • Measures included in the IIBA and IHRS to enhance Inuit employment, training, and skills development at the Project 	Monitoring data on secondary school graduates and graduation rates are currently not consistent with the presence of positive Project effects, as decreasing numbers of secondary school graduates in the LSA and decreasing graduation rates in the Qikiqtaaluk Region have occurred since Project development. However, school attendance and success can be influenced by many socio-economic factors. Correlations between Project effects and school attendance and success may only come to light with the analysis of additional data. Regardless, Baffinland continues to make investments in various school-based initiatives (e.g. laptop donations to secondary school graduates, scholarships, school lunch program) which are believed to provide incentives in this area. Project employment opportunities may motivate individuals to complete their educations to improve their chances at obtaining a desired career. Project employment may also contribute to role-modelling behaviour in communities. There is no evidence to suggest mitigation measures need to be modified at this time. However, this indicator will continue to be monitored for emerging trends.
Opportunities to Gain Skills	<p>The EIS predicted the Project would have a positive effect on education and skills development, by providing opportunities for training and skills acquisition among LSA residents.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Provision of various training programs • Upgrading and career development opportunities • Career counselling to employees • Measures included in the IIBA and IHRS to enhance Inuit employment, training, and skills development at the Project • Commitment to contribute \$10 million toward the Baffinland Inuit Training Centre 	In 2018, Baffinland continued providing training and skills development opportunities to Inuit. This included 34,629 hours of training in dozens of training programs. Nine Inuit apprentices were also employed by Baffinland and four Inuit summer students were hired. A total of 50,496 hours of training have been provided to Inuit since Project development. Furthermore, Project employees are regularly exposed to various ‘informal’ training and skills development opportunities through contact with more experienced coworkers and the process of everyday work. Several other initiatives have (or are expected to) contribute to the development of a more experienced Inuit workforce including training opportunities identified in the IIBA, IHRS, and Q-STEP program. This includes the delivery of pre-employment training, employee skills upgrading courses (e.g. GED, literacy and numeracy), training in apprenticeships and heavy equipment operation, and various career advancement programs for existing employees. The opportunities provided by the Project are notable, particularly when considering the existing skills gaps and limited employment options in many parts of Nunavut. Available information suggests the Project has had a positive effect on education and skills development among LSA residents, as was predicted in the EIS. There is no evidence to suggest mitigation measures need to be modified at this time.

4.2.2 Compliance Assessment

There is one Term and Condition in the Project Certificate pertaining to monitoring of the Education and Training VSEC. The status of this is summarized in Table 4-8.

Table 4-8: Terms and Conditions for Monitoring the Education and Training VSEC

Term and Condition No.	Description	Status
140	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.	Baffinland has implemented an Inuit Employee Survey, which collects information related to current education levels of employees and contractors, and their employment and education status prior to taking up employment with the Project. This Term and Condition is more fully addressed in the following section of this report: Section 4.1.8.

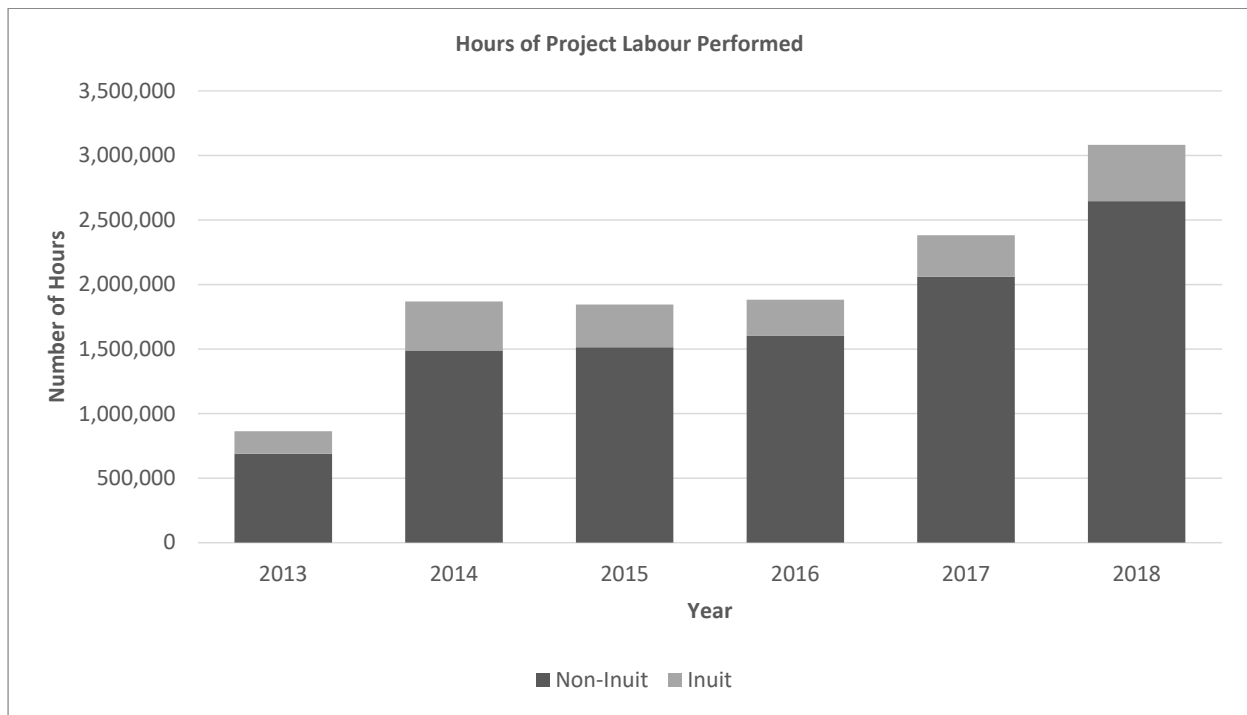
5. LIVELIHOOD AND EMPLOYMENT

5.1 INDICATOR DATA AND ANALYSIS

5.1.1 Hours of Project Labour Performed

The total hours of Project labour performed each year is a useful indicator of the Project's overall labour demand. It also helps reveal the extent to which new job opportunities have become available to LSA residents. Figure 5-1 presents the hours of Project labour performed by employees and contractors since 2013. In 2018, 3,081,740 hours of labour were performed, which is equal to approximately 1,529 full time equivalent (FTE) positions.¹⁶ There were 700,750 more hours of labour performed in 2018 than in 2017. A total of 11,919,376 hours of labour have been performed since Project development.

Figure 5-1: Hours of Project Labour Performed (2013 to 2018)



Source: Baffinland

5.1.2 Project Hours Worked by LSA Employees and Contractors

When disaggregated, data on hours worked on the Project can provide insight into the varying labour contributions of LSA and non-LSA employees and contractors. Table 5-1 summarizes the number and percentage of hours worked by individuals on the Project in 2018. Table 5-1 also includes information on the origin and ethnicity of these individuals, where applicable. In 2018, 379,956 hours were worked by LSA residents (both Inuit and non-Inuit), representing 12.3% of total hours worked on the Project (i.e. 3,081,740) or approximately 188 FTEs. Of this, 287,040 hours were worked by North Baffin LSA

¹⁶ FTEs are calculated assuming 2,016 hours of employment per person annually, which reflects a typical 2-week on/2-week off rotation (i.e. 24 weeks multiplied by 84 hours per week; this calculation also assumes 2 weeks holidays are taken by each employee).

residents (representing 9.3% of the total) and 92,916 hours were worked by Iqaluit residents (representing 3.0% of the total). Project hours worked by North Baffin LSA residents increased (by 57,382 hours) from 2017, as did Project hours worked by Iqaluit residents (by 9,506 hours). Inuit individuals worked 435,908 hours in 2018, representing 14.1% of total hours worked on the Project or approximately 216 FTEs; this is 114,882 hours more than 2017. These LSA employment opportunities likely reflect the commitments Baffinland has made to Inuit employment through the IIBA and other initiatives such as the IHRS.

Table 5-1: Hours of Project Labour Performed (2018)

Hours of Project Labour Performed (2018)		
Employee Ethnicity & Origin	Hours Worked	% of Total (3,081,740)
Inuit – North Baffin LSA	287,040	9.3%
Inuit – Iqaluit	81,432	2.6%
Inuit – Other	67,436	2.2%
Inuit (Total)	435,908	14.1%
Non-Inuit – North Baffin LSA Communities	0	0.0%
Non-Inuit – Iqaluit	11,484	0.4%
Non-Inuit – Other	2,634,348	85.5%
Non-Inuit (Total)	2,645,832	85.9%
TOTAL	3,081,740	100.0%

Source: Baffinland

5.1.3 Inuit Employee Promotions

The number of Inuit employee promotions is an important indicator of career progression at the Project. Data on Baffinland Inuit employee promotions (not including contractors) since 2014 are presented in Table 5-2. In 2018, six Inuit employee promotions occurred, which is three more promotions than occurred in 2017.

To guide current employee progression planning, Baffinland has a ‘Lines of Progression Policy’. The purpose of this policy is to ensure employees and managers/supervisors clearly understand the interrelationship between roles, the pathways for promotion, and accompanying policies and procedures. Furthermore, Article 7.15 of the IIBA commits Baffinland to developing career path development plans for every Inuk employee and developing career paths for each department. Baffinland is in the process of developing these in collaboration with the Mining Industry Human Resources Council and IIBA Employment Committee. Outcomes in this area will continue to be monitored.

Table 5-2: Baffinland Inuit Employee Promotions (2014 to 2018)

Baffinland Inuit Employee Promotions	
Year	Number of Promotions
2014	9
2015	14
2016	14
2017	3
2018	6

Source: Baffinland

Notes: Includes temporary promotions.

5.1.4 Inuit Employee Turnover

Inuit employee turnover data provide additional insight into Inuit career progression at the Project. The term ‘turnover’ is inclusive of many different components including resignation, layoff, termination, end of contract, and retirement. High turnover suggests fewer individuals are maintaining stable employment; this may reduce opportunities for career advancement. Low turnover, conversely, suggests a greater number of individuals are maintaining stable employment; this may increase opportunities for career advancement. Table 5-3 displays information on Baffinland employee departures since 2013 (not including contractors).

Table 5-3: Baffinland Employee Departures (2013 to 2018)

Baffinland Employee Departures				
Year	Inuit Employees		Non-Inuit Employees	
	Number of Departures	Turnover Rate (Approximate)	Number of Departures	Turnover Rate (Approximate)
2013	9	—	—	—
2014	45	—	—	—
2015	41	—	165	—
2016	44	45%	210	39%
2017	42	45%	211	31%
2018	45	30%	221	28%

Source: Baffinland

Notes: 2013-2014 numbers are for indeterminate employees only and information for non-Inuit employees was unavailable. Comparable employee turnover rates for 2013-2015 are not provided, due to differences in how employee numbers and departures were previously calculated by Baffinland.

In 2018, there were 45 Inuit employees whose employment with Baffinland ended for various reasons. This equates to an approximate 30% Inuit employee turnover rate, which is higher than the approximate 28% non-Inuit employee turnover rate documented for 2018.¹⁷ Common reasons Inuit employees had for resigning in 2018 included work-life balance, organizational culture, compensation/better employment prospects, parental leave (not returning), and position closer to home. Some of these reasons were similar to those identified in 2017 (i.e. family/personal issues, obtaining a job in their home community, finding rotational work difficult (particularly on family life), and the work/camp environment). Common reasons for Inuit turnover due to dismissal by Baffinland or for involuntary terminations in 2018 included workplace conduct, performance, absenteeism, unfit for duty, and end of contract. Some of these reasons were similar to those identified in 2017 (i.e. absenteeism, safety-related occurrences, being unfit for duty/performance, and not passing probation).

High rates of employee turnover have been an issue for other Nunavut organizations in the past, including the Government of Nunavut and Agnico Eagle Mines Limited (e.g. Bell 2012, Government of Nunavut 2014, Stratos 2017). Baffinland continues to monitor employee turnover causes and outcomes and has committed to reducing turnover and increasing Inuit employment as the Project advances. Baffinland has developed several initiatives to reduce Inuit turnover at the Project through its IHRS, including (but not limited to) instituting a mid-probationary review program to evaluate new employee

¹⁷ The employee turnover rate has been calculated using guidance provided by Taylor (2002). For example, the 2018 Inuit employee turnover rate was calculated by dividing the total number of Inuit employee departures in the calendar year (45) by the average number of Inuit employees employed in the same calendar year (151 – see Table 3-6), multiplied by 100. However, this method may provide a conservative (i.e. higher than actual) estimation of turnover because the number of departures reported by Baffinland may include head office staff who are not captured in Table 3-6.

performance and identify potential issues, consideration of alternative rotation schedules better aligned with familial and community activities, placing greater emphasis upon cultural awareness training and cultural activities, providing formalized support systems for Inuit employees, and implementing effective employee concern and workplace conditions review processes.

In 2018, Baffinland began tracking the rehiring of Inuit at the Project. A rehire constitutes an employee who departed the Project workforce voluntarily or involuntarily and was rehired as an employee of Baffinland. These data do not include rehiring that may have been carried out by contractors. In 2018, 22 Inuit were rehired by Baffinland.

5.1.5 Hours Worked by Female Employees and Contractors

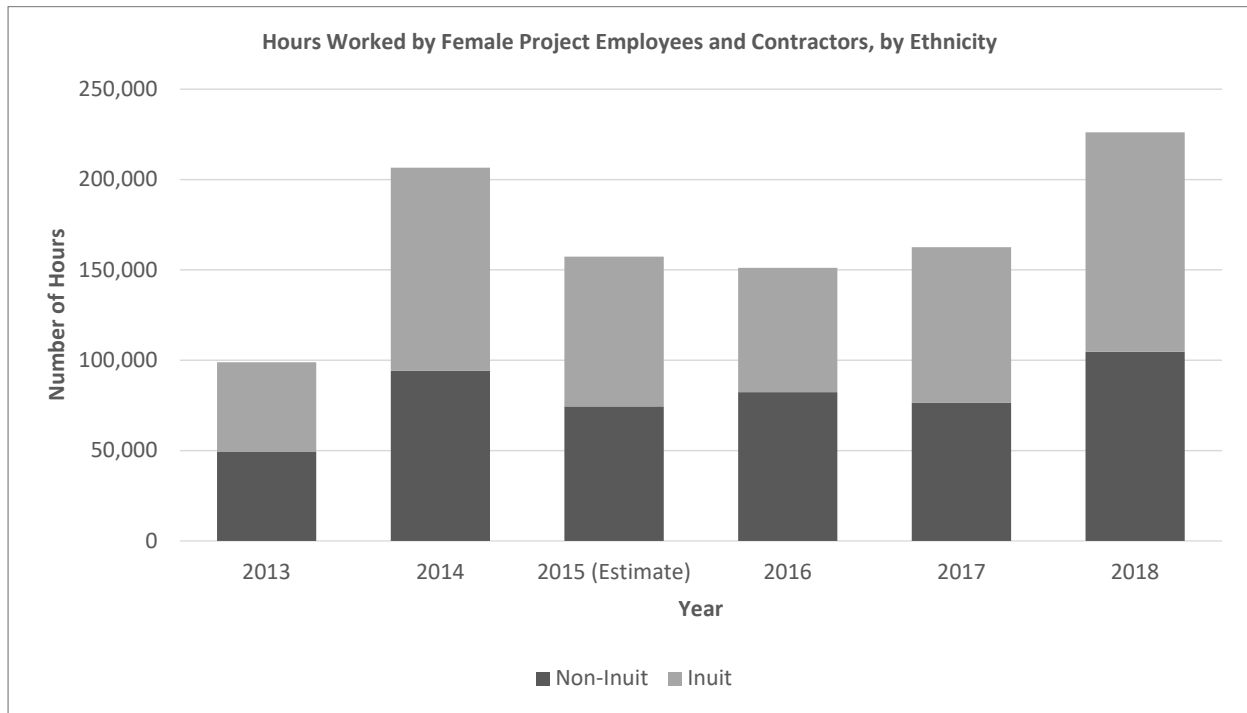
The number of hours worked by female employees and contractors on the Project provides insight into potential employment barriers females may face compared to their male counterparts. Table 5-4 displays the hours (and percentage of hours) worked by women and men on the Project in 2018, while Figure 5-2 displays total hours worked by women on the Project since 2013. In 2018, 226,080 hours (or 7.3% of total hours worked on the Project) were worked by women, which is 63,530 hours more than documented for 2017. The percentage of hours worked by Inuit and non-Inuit women in 2018 were similar (3.9% and 3.4%, respectively). However, the percentage of hours worked by Inuit women compared to Inuit men on the Project (approximately 27.8% of this total) was much higher than non-Inuit women compared to non-Inuit men (approximately 3.9% of this total) in 2018. A similar trend was noted from 2013 to 2017.

Table 5-4: Hours Worked by Project Employees and Contractors, by Ethnicity and Gender (2018)

Hours Worked by Project Employees and Contractors, by Ethnicity and Gender (2018)		
Employee Ethnicity and Gender	Hours Worked	% of Total (3,081,740)
Inuit	Male	314,530
	Female	121,378
Non-Inuit	Male	2,541,130
	Female	104,702
Total	3,081,740	100.0%

Source: Baffinland

Figure 5-2: Hours Worked by Female Project Employees and Contractors, by Ethnicity (2013 to 2018)



Source: Baffinland

Notes: In 2015, gender data were only available for Q4; 2015 annual information is thus an estimate and has been calculated by multiplying Q4 data by 4.

Women remain under-represented in the Canadian mining industry as a whole. The Mining Industry Human Resources Council (2016) notes women comprise only 17% of the total Canadian mining workforce, which is significantly lower than the total participation of women in the general Canadian workforce, at 48%. Indigenous women are also less likely than non-Indigenous women to be employed in Canada (Arriagada 2016). Baffinland has committed to developing several measures that encourage Inuit female employment and retention at the Project. Goals and priorities in this area were finalized with the QIA in the IHRS and through renegotiation of the IIBA in 2018. For example, Article 7.17 of the IIBA obligates Baffinland to implement human resources policies that ensure equal access to employment for Inuit men and women. Likewise, Article 11.5 of the IIBA addresses affirmative steps Baffinland will take for attracting female employees. The success of IHRS and IIBA initiatives on Inuit female employment and retention will continue to be tracked by Baffinland.

5.1.6 Childcare Availability and Costs

It has been noted that securing access to adequate childcare is an issue for some individuals in Nunavut and can act as a barrier to employment for women (e.g. Pauktuutit et al. 2014; Sponagle 2016). The national non-profit organization representing Inuit women in Canada, Pauktuutit (undated), further notes “an additional barrier for [Inuit] women attaining lasting, full-time employment is inadequate childcare facilities for rotational work schedules”. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process and community engagement conducted for the Project. Comments on the lack of childcare in LSA communities and the barriers to employment it may create have been made previously by Project

stakeholders (e.g. JPCSL 2017, 2018). Some stakeholder comments on childcare were also expressed in 2018:

But I think I saw this last year. But there's... no progress regarding daycare concern. We need daycare... when our wives leave, we need babysitters to look after our children that we've left behind... I'm a senior myself if I -- like, for Baffinland, if they're not giving out monies for daycare purposes, there's -- the Inuit employment is increasing, yes, but the other benefits are not coming into play... I think we need to make a recommendation... for the communities to be looked after properly. And Baffinland -- there's a barrier... that cannot be broken. [2018 IIBA Annual Project Review Forum Participant]

Iqaluit has seen some in-migration from other communities. Some have partners working at the mine and they hope to find employment and childcare. [2018 QSEMC Meeting Participant]

Not enough jobs available in Grise Fiord, we have no daycare. The daycare closed and now we are really hoping we can get another daycare opened. [2018 QSEMC Meeting Participant]

Inadequate access to childcare in Nunavut and the barriers to employment for women it can create are acknowledged. The Project has helped address some issues associated with childcare costs. For one, Project incomes can provide families with enhanced financial capacity that may make childcare more accessible. A subsidy for daycare for Qikiqtani families was also announced by the QIA that is funded indirectly and in part by the Mary River Project, through the *QIA Legacy Fund* and *QIA Benefits Fund*.¹⁸ The subsidy provides assistance for approximately 200 childcare spaces, is worth up to \$2,500/child per year in savings to parents, and represents a total investment of nearly \$500,000/year by QIA. The subsidy will be offered on a trial basis until March 2020 (QIA 2018).

Baffinland also directly supports two funds established under the IIBA, which could potentially be accessed to provide additional supports to community daycares or childcare services in the LSA. While Baffinland makes significant financial contributions to these funds, they are administered solely and exclusively by the QIA. The funds include the Ilagiktunut Nunalinnullu Pivalliajutisait Kiinaujat (INPK) Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin) and the Business Capacity and Start-Up Fund (which provides up to \$275,000/year to Inuit Firms to assist with locating start-up capital and financing, management development, ongoing business management, financial management, contracts and procurement, and human resources management).

¹⁸ As noted in QIA (2017), the *QIA Legacy Fund* is designed to invest money for the future and help reduce Inuit reliance on outside funding over time by creating an internal pool of revenue for benefits and programs. It has been designed to ensure revenues placed in it are not used for QIA operational purposes, thereby protecting long-term benefits for Inuit. Money QIA invests into the Legacy Fund includes IIBA payments from major projects such as the Mary River Project, money received from NTI from the mining of Inuit owned minerals, money received from sand and gravel projects on Inuit owned land, dividends from Qikiqtaaluk Corporation and the Nunasi Corporation, money received from any investments of the Legacy Fund, and surplus revenues from the QIA's Economic Development Fund, which is designed to receive money from licenses and leases on Inuit Owned Land. The *QIA Benefits Fund* is used to deliver programs to Inuit. As the Legacy Fund grows, revenues from it go to the Benefits Fund to increase programs for Inuit. The Benefits Fund is designed to receive annual payments from the Legacy Fund so QIA can ensure a stable base of funding to run programs even if revenues change over time. The fund also allows for programs to expand in the future as the invested money grows.

5.3 EFFECTS AND COMPLIANCE ASSESSMENT

5.2.1 Effects Assessment

There were three residual effects for the Livelihood and Employment VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 5-5.

Table 5-5: Effects Assessment for the Livelihood and Employment VSEC

Residual Effect	Summary	Monitoring Results
Creation of Jobs in the LSA	<p>The EIS predicted the Project would have a positive effect on wage employment in the LSA (i.e. a 5%+ change in baseline labour) by introducing new job opportunities and assisting local residents to access these jobs. Under baseline conditions, the labour markets of the North Baffin LSA and Iqaluit were estimated to generate a labour demand of 2.0 million and 4.7 million hours per year, respectively. 5% of these values would equal 335,000 hours per year (i.e. 100,000 hours in the North Baffin LSA and 235,000 hours in Iqaluit). The Project was predicted to generate a total labour demand of approximately 0.9 million hours per year during ERP operations. With the addition of the 18 Mt/a phase, annual labour demand would increase to 2.9 million hours. Labour demand during construction would average roughly 4.1 million hours per year over a six-year period but peak at approximately 7.3 million hours per year. Closure phase labour demand estimates do not currently exist but will be developed by Baffinland in the future.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Designation of all LSA communities as points-of-hire 	<p>In 2018, the Project continued to generate substantial labour demand and employment opportunities. The generation of 3,081,740 hours of Project labour in 2018 is in line with the EIS prediction of a 5%+ change in baseline labour (i.e. at least 335,000 hours created per year). As such, the positive effect on LSA job creation predicted to occur in the EIS is confirmed.</p>
Employment of LSA Residents	<p>The EIS predicted the Project would have a positive effect on wage employment in the LSA (i.e. a 5%+ change in baseline labour) by introducing new job opportunities and assisting local residents to access these jobs. This equates to at least 335,000 hours of new employment being created per year, in a baseline environment that was estimated to create 6.7 million hours of labour per year. The Project was predicted to result in the employment of an estimated 300 LSA residents each year. These residents would supply approximately 342,000 hours of labour per year to the Project, of which 230,000 hours would be provided by North Baffin LSA residents and 112,000 hours would be provided by Iqaluit residents.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Management commitments and Company policies related to Inuit employment and 	<p>In 2018, a total of 379,956 hours were worked by LSA residents on the Project. 287,040 hours were worked by North Baffin LSA residents and 92,916 hours were worked by Iqaluit residents. While 2018 LSA employment numbers are largely consistent with EIS predictions, Iqaluit employment was somewhat less than predicted. Baffinland has committed to improving its Inuit employment levels over time. This is expected to occur through ongoing implementation of IIBA provisions on Inuit employment and retention, and implementation of Baffinland's IHRS. This document describes several goals and initiatives to increase Inuit employment at the Project. Likewise, Baffinland's Apprenticeship Program, Morrisburg HEO Training Program, Inuit Internship Program, Work Ready Program, and other initiatives are anticipated to improve Inuit employment levels over time. Ongoing monitoring of employment levels against EIS predictions and the</p>

	<p>retention, including commitments made in the IIBA and IHRS</p> <ul style="list-style-type: none"> • Designation of all LSA communities as points-of-hire • Training-to-employment programs such as Baffinland’s Apprenticeship Program, Morrisburg HEO Training Program, Inuit Internship Program, and Work Ready Program • Hiring of Inuit Recruiters • Creation of a supportive work environment (e.g. EFAP, Cultural Advisors, Human Resource Advisors – Inuit Relations, on-site cultural initiatives) 	<p>IIBA’s MIEG will provide a means of tracking the success of Baffinland’s efforts in this area. Comments shared during community engagement for the Project have highlighted the importance of employment opportunities in the LSA and the desire for this Project benefit to continue. Insights such as these, combined with the data presented above, confirm the Project has had positive effects on employment of LSA residents. However, it could take several years to fully realize the Project’s Inuit employment potential and for the success of mitigation measures to ultimately be determined.</p>
New Career Paths	<p>The EIS predicted the Project would have a positive effect on the ability of LSA residents to progress in their jobs and careers. This effect would occur because of new career paths introduced to the region, from entry-level through step-by-step advancement to higher-level jobs.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Management commitments and Company policies related to Inuit employment and retention, including commitments made in the IIBA and IHRS • Training-to-employment programs such as Baffinland’s Apprenticeship Program, Morrisburg HEO Training Program, Inuit Internship Program, and Work Ready Program • Career support and advancement initiatives, including career path development plans for every Inuk employee and career paths for each Baffinland department (in development) • A ‘Lines of Progression Policy’ • Creation of a supportive work environment (e.g. EFAP, Cultural Advisors, Human Resource Advisors – Inuit Relations, on-site cultural initiatives) 	<p>Six Inuit were promoted to new positions in 2018. Some Project careers represent an opportunity for individuals to improve their existing employment status (e.g. from unemployed to employed, from part-time to full-time, from lower-skilled to higher-skilled positions) and/or may form the basis of future promotion and advancement at the Project. The career opportunities introduced to the region represent a positive effect of the Project and likely reflect the commitments and mitigation measures Baffinland has developed in this area. However, there were several Baffinland Inuit employee departures in 2018 (45 individuals) and high turnover has been documented in previous years (although 22 Inuit were also rehired in 2018). High rates of employee turnover have also been an issue for other Nunavut organizations in the past. Baffinland continues to monitor employee turnover causes and outcomes and has committed to reducing turnover, increasing Inuit employment, and providing opportunities for Inuit career advancement where feasible. However, it could take several years to fully realize the Project’s Inuit employment potential and for the success of mitigation measures to ultimately be determined.</p>

5.2.2 Compliance Assessment

There is one Term and Condition in the Project Certificate pertaining to monitoring of the Livelihood and Employment VSEC. The status of this is summarized in Table 5-6.

Table 5-6: Terms and Conditions for Monitoring the Livelihood and Employment VSEC

Term and Condition No.	Description	Status
145	The Proponent is encouraged to work with the GN and the QSEMC to monitor the barriers to employment for women, specifically with respect to childcare availability and costs.	Baffinland has presented information on hours worked by female employees and contractors on the Project in the Socio-Economic Monitoring Report. Some information on childcare availability and costs is also presented. Employment levels can be influenced by many factors, including the existence of barriers faced by certain demographic groups. Inadequate access to childcare in the LSA may be

		<p>creating some barriers to increased employment of women at the Project. However, the new employment opportunities being created for women in the LSA because of the Project should be acknowledged. Baffinland is also developing measures that encourage Inuit female employment and retention at the Project. Goals and priorities in this area were finalized with the QIA in the IHRS and through renegotiation of the IIBA in 2018. The success of IIBA and IHRS initiatives will continue to be tracked by Baffinland. This Term and Condition is more fully addressed in the following sections of this report: Section 5.1.5 and Section 5.1.6.</p>
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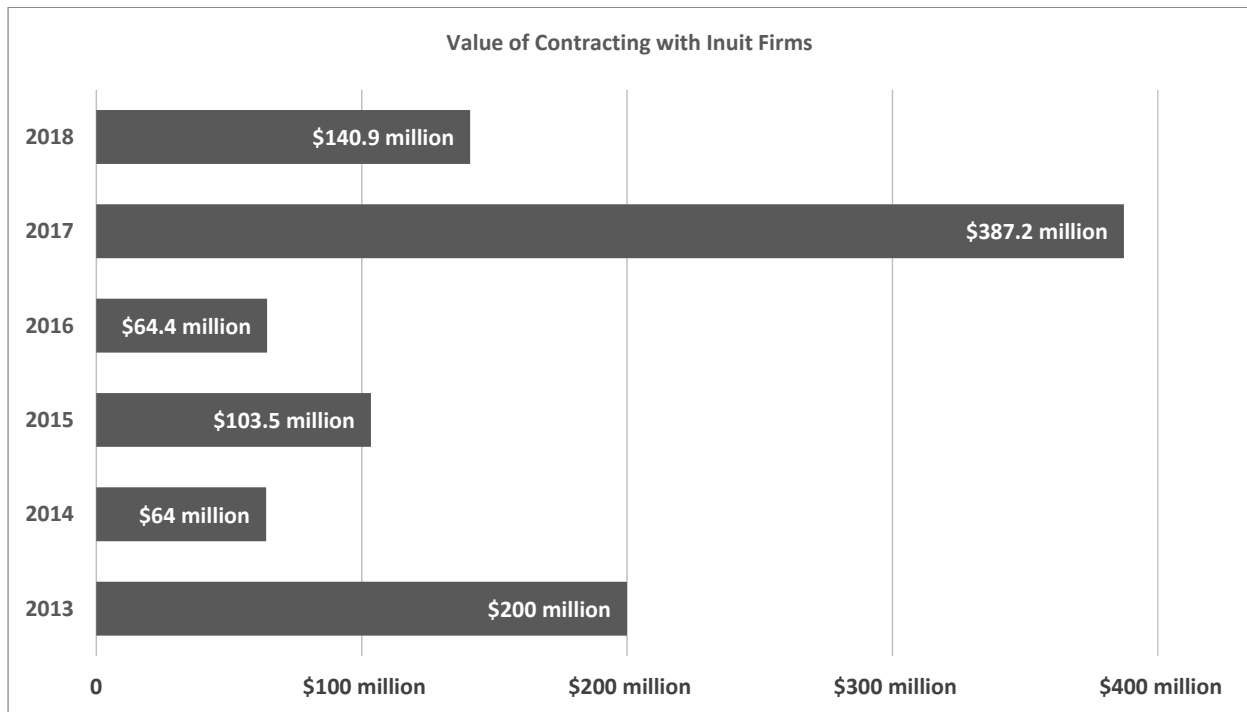
6. CONTRACTING AND BUSINESS OPPORTUNITIES

6.1 INDICATOR DATA AND ANALYSIS

6.1.1 Value of Contracting with Inuit Firms

The value of contracting with Inuit Firms is a useful indicator of the business opportunities created by the Project. Figure 6-1 displays the value of contracting that has occurred with Inuit Firms since 2013. Approximately \$140.9 million in contracts were awarded to Inuit Firms in 2018; of this, \$123.1 million in contracts were awarded to Inuit Firms in the LSA. Overall Inuit Firm contracting values in 2018 were lower than in 2017 by \$246.3 million. Contract values with Inuit Firms were noted by Baffinland to be lower in 2018 partially due to several large construction contracts awarded to Inuit Firms in 2017. Total contracting (with Inuit and non-Inuit firms) in 2018 totaled \$415.1 million. Since Project development, a total of \$960.0 million worth of contracts has been awarded to Inuit Firms. These contracting opportunities likely reflect the commitments Baffinland has made on Inuit Firm procurement through the IIBA and other initiatives such as the IPCS. The differing values in Figure 6-1 also reflect the construction activities that have occurred at various times on site. Contract awards are higher during years when construction projects are being undertaken at the Project.

Figure 6-1: Contracting with Inuit Firms (2013 to 2018)



Source: Baffinland

Notes: 1) Values may be inclusive of amounts committed to through existing contracts, but not yet spent. 2) Prior to 2018, reporting was focused on 'value of procurement with Inuit-owned businesses and joint ventures'. This reporting focus was changed in 2018 to 'value of contracting with Inuit Firms' to better align with IIBA reporting. For the purposes of this figure, these two reporting focuses (and the values they report on) are assumed to be the same. 3) Per the IIBA, 'Inuit Firm' means an entity that qualifies as an 'Inuit Firm' within the meaning of Article 24 of the Nunavut Agreement and further: (i) Is enrolled in the Inuit Firm Registry of Nunavut Tunngavik Inc. maintained pursuant to Section 24.7.1 of the Nunavut Agreement; and (ii) Carries out the majority of its business in the Nunavut Settlement Area.

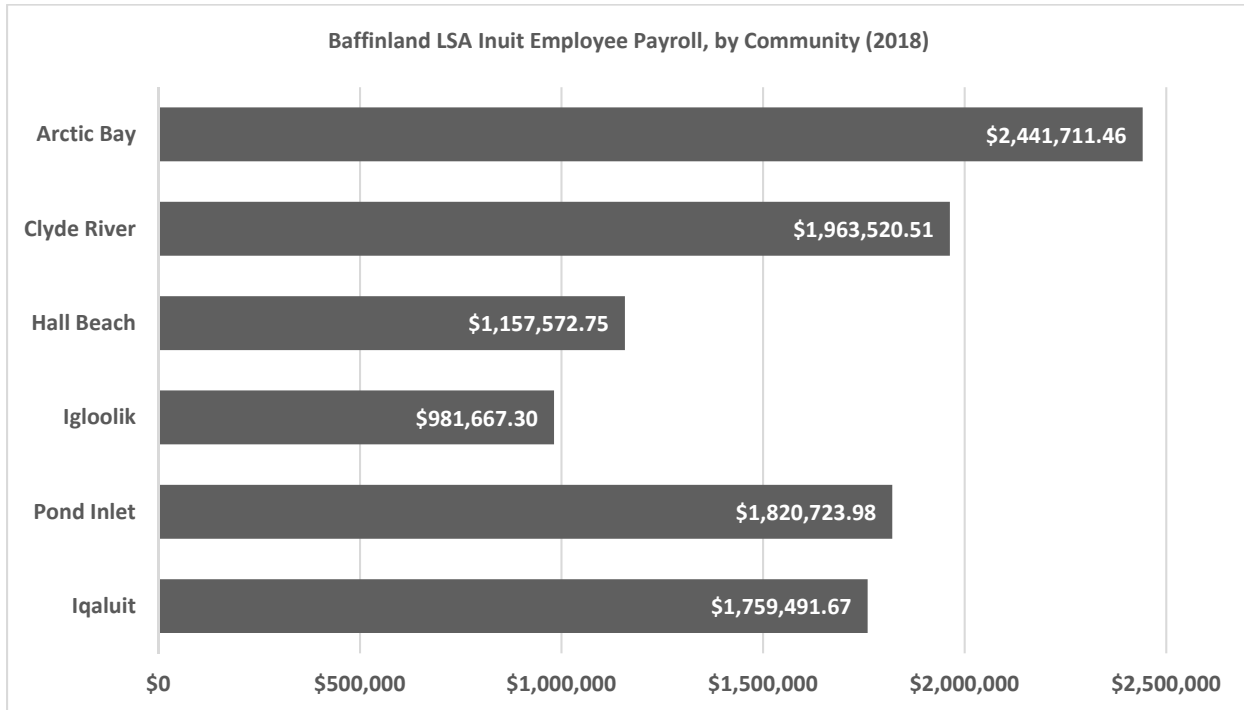
6.1.2 LSA Inuit Employee Payroll Amounts

Payroll expenditures to LSA Inuit employees are a useful indicator of the degree to which an expanded market for consumer goods and services has been created by the Project. Through the creation of employment opportunities in the LSA, the Project has created new sources of economic wealth for LSA residents. It is reasonable to expect that some of this new wealth becomes available for residents to spend on consumer goods and services. Figure 6-2 displays the proportion of Baffinland's Inuit employee payroll earned by each LSA community in 2018 (in Canadian dollars). While contractor wages are not included in these amounts, the value of contracting with Inuit Firms in 2018 was nevertheless substantial and represents another important benefit provided by the Project (see Section 6.1.1). Inuit employee payroll expenditures can be summarized as follows:

- LSA Inuit employee payroll expenditures totaled \$10,124,687.67 in 2018. Compared to 2017, this was an increase of \$3,132,229.53 (however, 2017 values included both Inuit and non-Inuit employees).
- The top three LSA Inuit payroll recipient communities in 2018 (in descending order) were Arctic Bay, Clyde River, and Pond Inlet (in 2017 they were Pond Inlet, Arctic Bay, and Clyde River). The highest earning community (Arctic Bay) received \$2,441,711.46, while the lowest earning community (Igloolik) received \$981,667.30 in 2018.
- Baffinland's total Inuit employee payroll (including Inuit from LSA and non-LSA communities) totaled \$11,952,480.06 in 2018.
- Since 2014, Baffinland has provided \$45,213,845.65 in payroll to Inuit employees.

These Inuit payroll expenditure amounts likely reflect the Inuit employment commitments Baffinland has made through the IIBA and other initiatives like the IHRS.

Figure 6-2: Baffinland LSA Inuit Employee Payroll, by Community (2018)



Source: Baffinland

6.1.3 Number of Registered Inuit Firms in the LSA

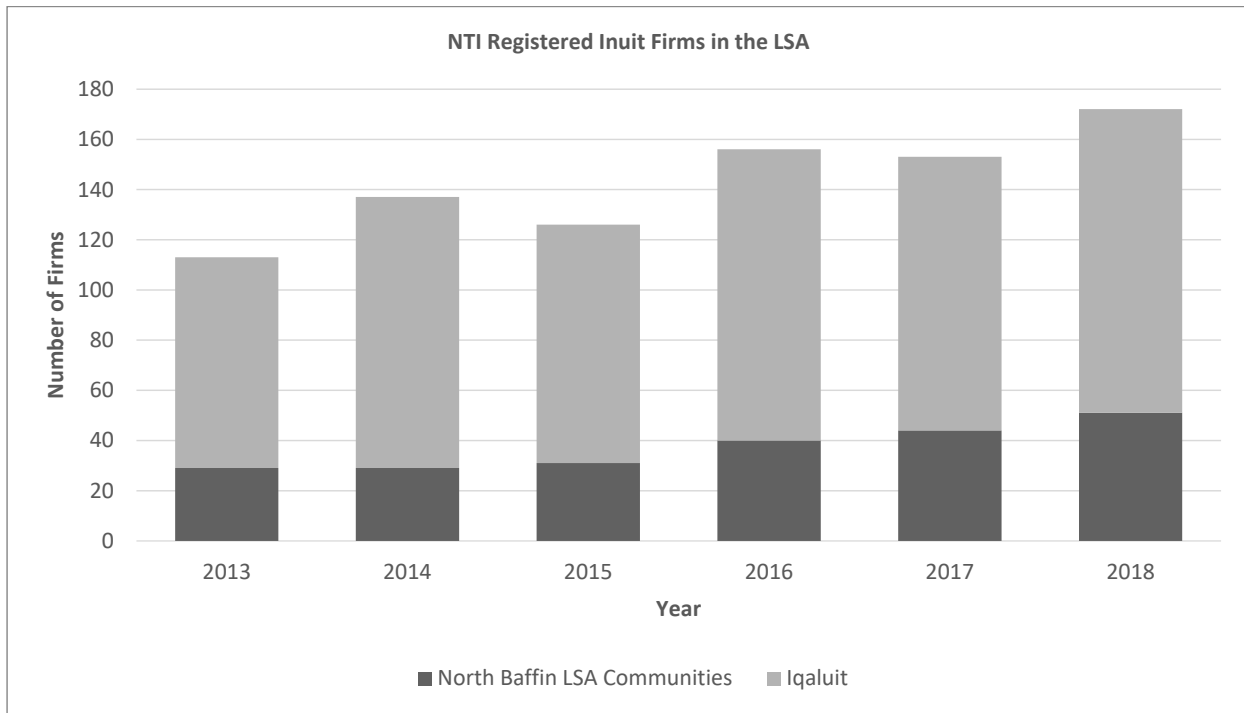
The number of registered Inuit Firms in the LSA may be another useful indicator of the degree to which an expanded market for consumer goods and services has been created by the Project. This is because new Project-generated consumer discretionary income is expected to result in increased demand for (and spending on) local goods and services. Subsequently, the number and offerings of local businesses may increase to meet this demand.

Nunavut Tunngavik Inc. (NTI) maintains an Inuit Firm Registry database for Nunavut.¹⁹ This database (i.e. NTI 2018) provides the name of each registered Inuit Firm, describes each firm’s area of business operations, and location where the firm is based. The number of registered Inuit Firms in the LSA since 2013 are presented in Figure 6-3. Information for 2013 to 2015 was obtained from NTI personnel (E. Eegeesiak 2016, personal communication), while information for 2016 onwards was obtained directly from the NTI database (i.e. NTI 2018).

In 2018, a total of 172 active Inuit Firms were registered in the LSA. 51 of these firms were based in the North Baffin LSA communities and 121 were based in Iqaluit. The number of active Inuit Firms registered in the North Baffin LSA communities has increased by 22 since 2013, while the number of active Inuit Firms registered in Iqaluit has increased by 59 since 2013.

¹⁹ As noted by NTI (2018), ‘Inuit Firm’ means an entity which complies with the legal requirements to carry on business in the Nunavut Settlement Area, and which is a limited company with at least 51% of the company’s voting shares beneficially owned by Inuit, or a cooperative controlled by Inuit, or an Inuk sole proprietorship or partnership.

Figure 6-3: NTI Registered Inuit Firms in the LSA (2013 to 2018)



Source: Nunavut Tunngavik Inc.

While it is acknowledged that many factors may contribute to the decision to start (or not start) a new business, these data are consistent with a potential positive Project effect. Anecdotal evidence shared with Baffinland by its suppliers indicates at least some new Inuit Firms were registered because of Project-related contracting opportunities; as such, some of the increase may be due to Project-specific rather than consumer-based expenditures.

Baffinland expects its direct engagement with Inuit Firms to increase in 2019 in part due to new commitments contained in the amended IIBA. The Company will be carrying out an annual Contracting and Procurement Information Tour in LSA communities with QIA, as well as a biannual newsletter specific to Inuit Firms. The Company will also carry out its first annual Inuit Firm survey in 2019 with the goal of uncovering ways it can improve its processes to further develop business relationships with Inuit Firms.

6.2 EFFECTS AND COMPLIANCE ASSESSMENT

6.2.1 Effects Assessment

There were two residual effects for the Contracting and Business Opportunities VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 6-1.

Table 6-1: Effects Assessment for the Contracting and Business Opportunities VSEC

Residual Effect	Summary	Monitoring Results
Expanded Market for Business Services to the Project	<p>The EIS predicted the Project would have a positive effect on creating market opportunities for businesses in the LSA and RSA to supply goods and services to the Project.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Implementation of several Inuit contracting policies, and the development of the IPCS. These have been designed to give Inuit firms preferential treatment and assistance in the contract bidding process. • Baffinland’s IIBA with the QIA includes several provisions related to Inuit contracting. In addition, a Business Capacity and Start-Up Fund has been created to assist Inuit Firms. Baffinland contributes \$275,000 annually to the fund, which assists with locating start-up capital and financing, management development, ongoing business management, financial management, contracts and procurement, and human resources management. 	<p>Since Project development, a total of \$960.0 million worth of contracts has been awarded to Inuit Firms. \$140.9 million in contracts was awarded to Inuit Firms in 2018; of this, \$123.1 million in contracts was awarded to Inuit Firms in the LSA. Baffinland contracting data confirms the Project has had a positive effect on creating market opportunities for businesses in the LSA and RSA to supply goods and services to the Project. There is no evidence to suggest mitigation measures need to be modified at this time.</p>
Expanded Market for Consumer Goods and Services	<p>The EIS predicted the Project would expand the market for consumer (i.e. non-Project related) goods and services across the LSA. This would result in a positive effect.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Company commitments related to Inuit employment and contracting (e.g. in the IIBA, IHRS, and IPCS) which support the development of an expanded market for consumer goods and services in the LSA. This is because of the increased purchasing power local residents are expected to have due to Project-induced direct and indirect employment income. 	<p>Since monitoring began, Baffinland has provided approximately \$45.2 million in payroll to its Inuit employees and \$960.0 million worth of contracts to Inuit Firms. The Project continued to expand the market for consumer goods and services across the LSA in 2018. Considerable amounts were spent on Baffinland’s LSA Inuit employee payroll (approximately \$10.1 million) and contracting with Inuit Firms (approximately \$140.9 million) in 2018. These new contributions to the Nunavut economy are a direct result of Project development and represent a positive effect. This is because increased income from direct and indirect Project employment can provide LSA residents with a greater capacity to purchase local goods and services. Increased income may also stimulate business growth (e.g. existing businesses may expand to meet increased consumer demand or new businesses may emerge, wealth generated through employment may increase an individual’s ability to start a new business). The number of Inuit Firms registered in the LSA communities has also increased (by 81) since 2013, which is consistent with a potential positive Project effect. It’s possible that continued monitoring may uncover additional positive Project effects (e.g. it may take an extended period for some businesses to respond to emerging commercial opportunities). There is no evidence to suggest mitigation measures need to be modified at this time.</p>

6.2.2 Compliance Assessment

There are no Terms and Conditions in the Project Certificate pertaining to monitoring of the Contracting and Business Opportunities VSEC.

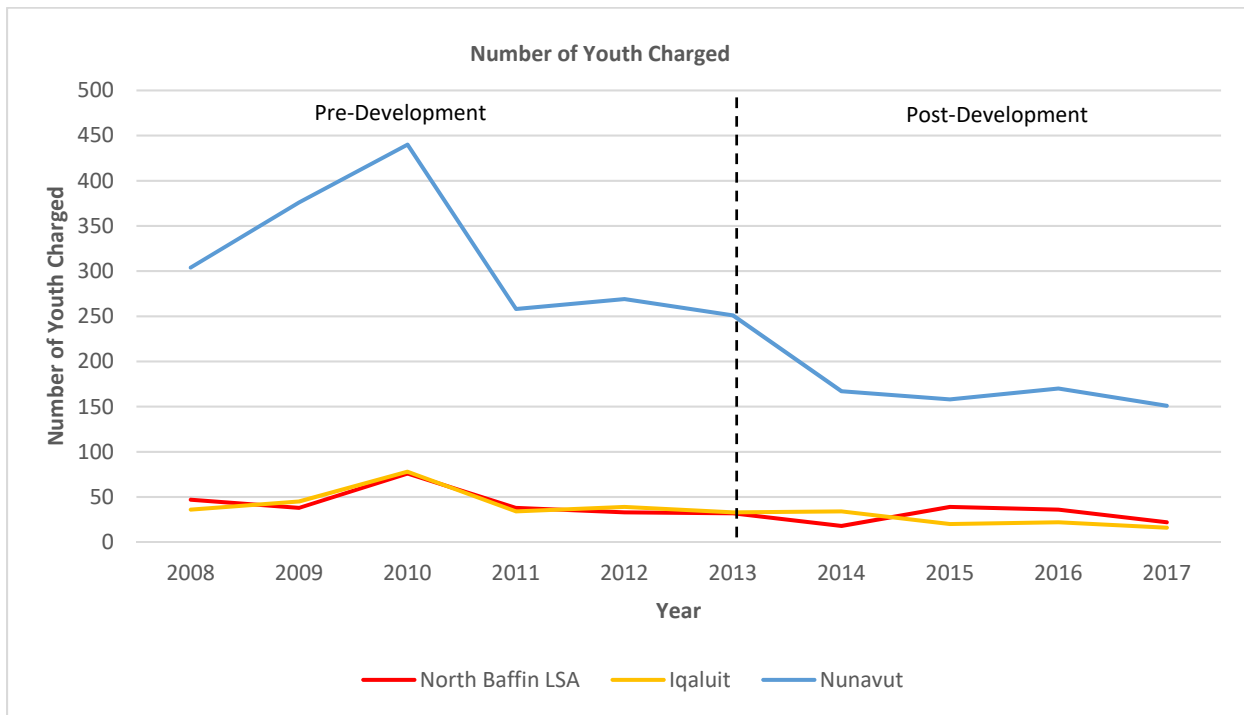
7. HUMAN HEALTH AND WELL-BEING

7.1 INDICATOR DATA AND ANALYSIS

7.1.1 Number of Youth Charged

The number of youth charged may be one indicator of youth well-being in the LSA communities. 2017 was the most recent year data on the number of youth charged were available from Statistics Canada (2018b). Compared to the previous year data were available, there has been a decrease in the number youth charged in the North Baffin LSA (from 36 to 22), Iqaluit (from 22 to 16), and Nunavut (from 170 to 151). Compared to pre-development period averages, there have been decreasing trends in the average number of youth charged in the North Baffin LSA (from 46.4 to 29.4), Iqaluit (from 46.4 to 25.0), and Nunavut (from 329.4 to 179.4) in the post-development period. Figure 7-1 displays the number of youth charged since 2008, while Table 7-1 displays average values for selected periods.

Figure 7-1: Number of Youth Charged (2008 to 2017)



Source: Statistics Canada (2018b)

Table 7-1: Number of Youth Charged (Averages for Selected Periods)

Period	Number of Youth Charged					
	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	53.0	–	67.8	–	397.0	–
Pre-Development Period (2008 to 2012)	46.4	-6.6	46.4	-21.4	329.4	-67.6
Post-Development Period (2013 onwards)	29.4	-17.0	25.0	-21.4	179.4	-150.0

Source: Statistics Canada (2018b)

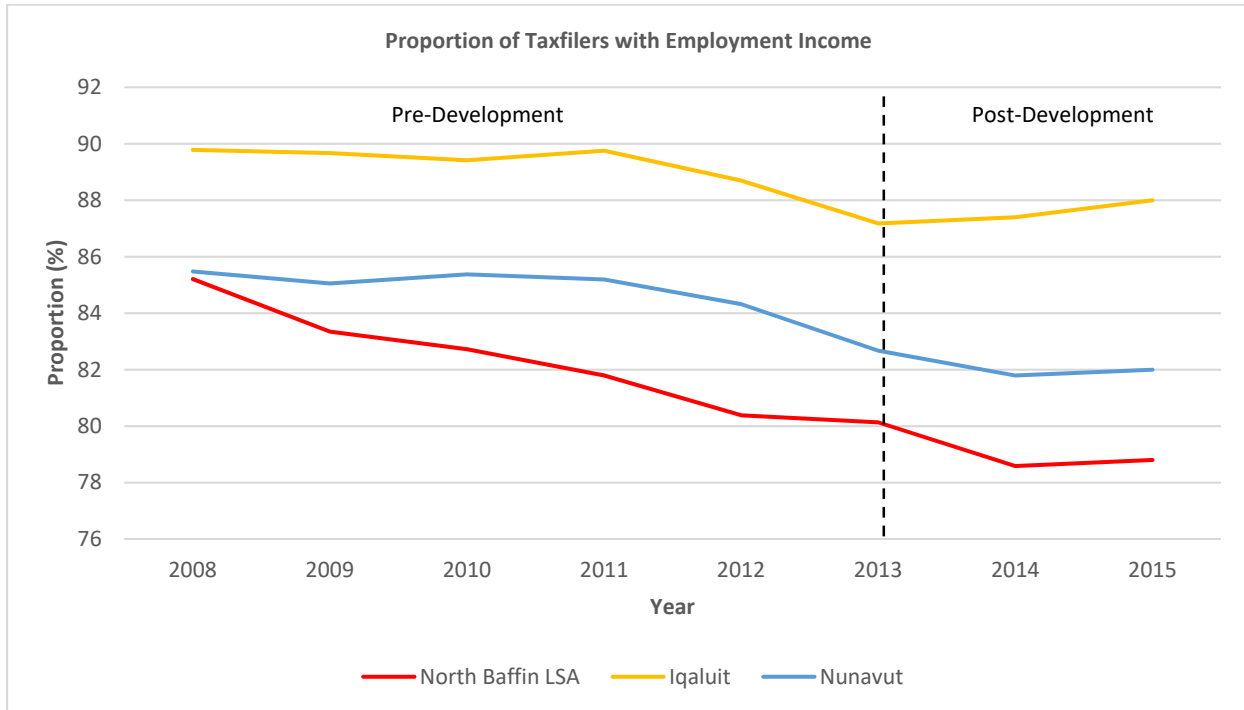
These data may be indicative of a positive Project influence, as the average number of youth charged has declined in the LSA since Project development. The change in average number of youth charged in the North Baffin LSA (-17.0) has also more than doubled since the pre-development (or baseline) period (-6.6). However, decreasing trends in the LSA were also evident in the pre-development period and a comparable situation has been noted across Nunavut. This suggests longer-term and/or broad-scale factors may be driving these trends, rather than the Project. Crime rates can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.2 Proportion of Taxfilers with Employment Income and Median Employment Income

Employment income indicators are useful for tracking household financial performance in the LSA communities. 2015 was the most recent year data on the proportion of taxfilers with employment income were available from the Nunavut Bureau of Statistics (2017c). Compared to the previous year data were available, there have been increases in the average proportion of taxfilers with employment income in the North Baffin LSA (from 78.6% to 78.8%), Iqaluit (from 87.4% to 88.0%), and Nunavut (from 81.8% to 82.0%). Compared to pre-development period averages, there have been decreasing trends in the average proportion of taxfilers with employment income in the North Baffin LSA (from 82.7% to 79.2%), Iqaluit (from 89.5% to 87.5%), and Nunavut (from 85.1% to 82.2%) in the post-development period. Figure 7-2 displays the proportion of taxfilers with employment income since 2008, while Table 7-2 displays average values for selected periods.

These data do not currently appear indicative of a positive Project influence, as decreasing trends in the proportion of taxfilers with employment income have been noted in the LSA since Project development. However, a decreasing post-development trend was also noted throughout Nunavut, and prior to Project development in the North Baffin LSA. This suggests longer-term (in the case of the North Baffin LSA) and/or broad-scale factors may be driving these trends rather than the Project. However, Baffinland predicted the Project could improve household income in the LSA over time; as such, this indicator will continue to be monitored for emerging trends.

Figure 7-2: Proportion of Taxfilers with Employment Income (2008 to 2015)



Source: Nunavut Bureau of Statistics (2017c)

Table 7-2: Proportion of Taxfilers with Employment Income (Averages for Selected Periods)

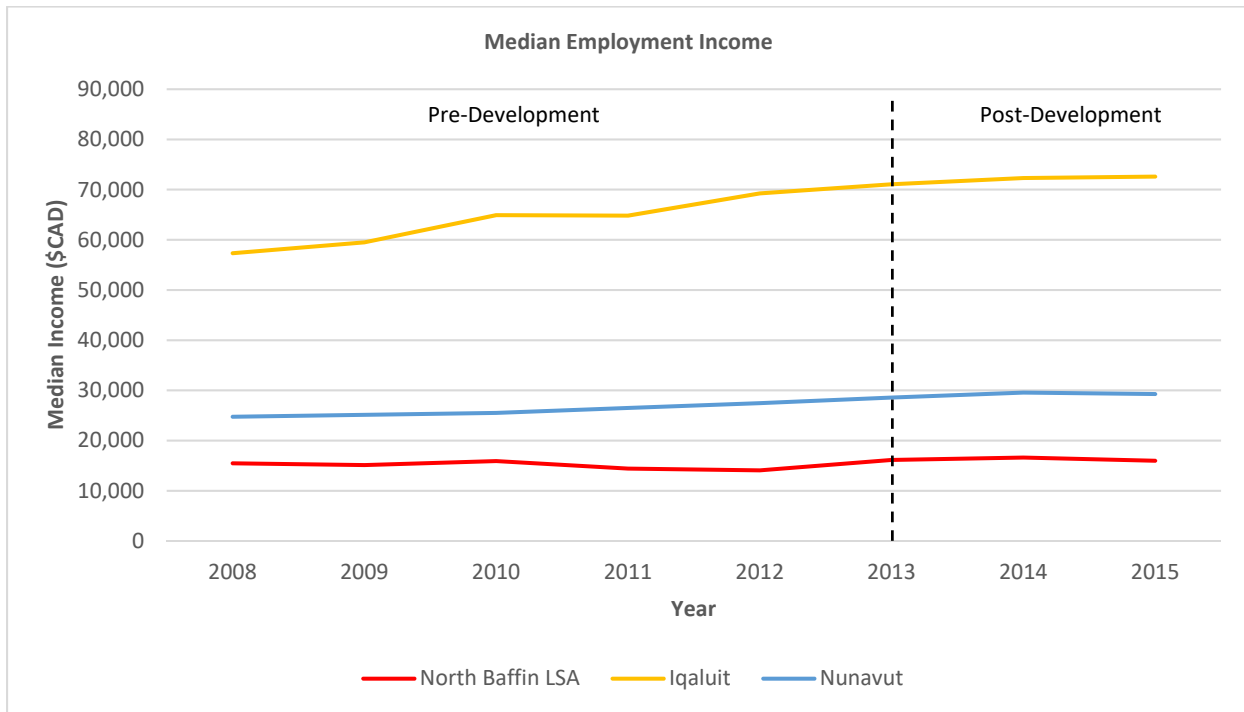
Proportion of Taxfilers with Employment Income						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2006-2007	83.8%	–	89.4%	–	84.7%	–
Pre-Development Period (2008 to 2012)	82.7%	-1.1	89.5%	+0.1	85.1%	+0.4
Post-Development Period (2013 onwards)	79.2%	-3.5	87.5%	-1.9	82.2%	-2.9

Source: Nunavut Bureau of Statistics (2017c)

Notes: Some values may be affected by rounding.

Likewise, 2015 was the most recent year data on median employment income were available from the Nunavut Bureau of Statistics (2017c). Compared to the previous year data were available, there have been decreases in median employment income in the North Baffin LSA (from \$16,620 to \$15,998) and Nunavut (from \$29,550 to \$29,270), but an increase in Iqaluit (from \$72,310 to \$72,580). Compared to pre-development period averages, there have been increasing trends in average median employment income in the North Baffin LSA (from \$15,007 to \$16,251), Iqaluit (from \$63,166 to \$71,990), and Nunavut (from \$25,876 to \$29,133) in the post-development period. Figure 7-3 displays median employment income since 2008, while Table 7-3 displays average values for selected periods.

Figure 7-3: Median Employment Income (2008 to 2015)



Source: Nunavut Bureau of Statistics (2017c)

Table 7-3: Median Employment Income (Averages for Selected Periods)

Period	Median Employment Income					
	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2006-2007	\$14,649	–	\$53,880	–	\$23,755	–
Pre-Development Period (2008 to 2012)	\$15,007	+\$358	\$63,166	+\$9,286	\$25,876	+\$2,121
Post-Development Period (2013 onwards)	\$16,251	+\$1,244	\$71,990	+\$8,824	\$29,133	+\$3,257

Source: Nunavut Bureau of Statistics (2017c)

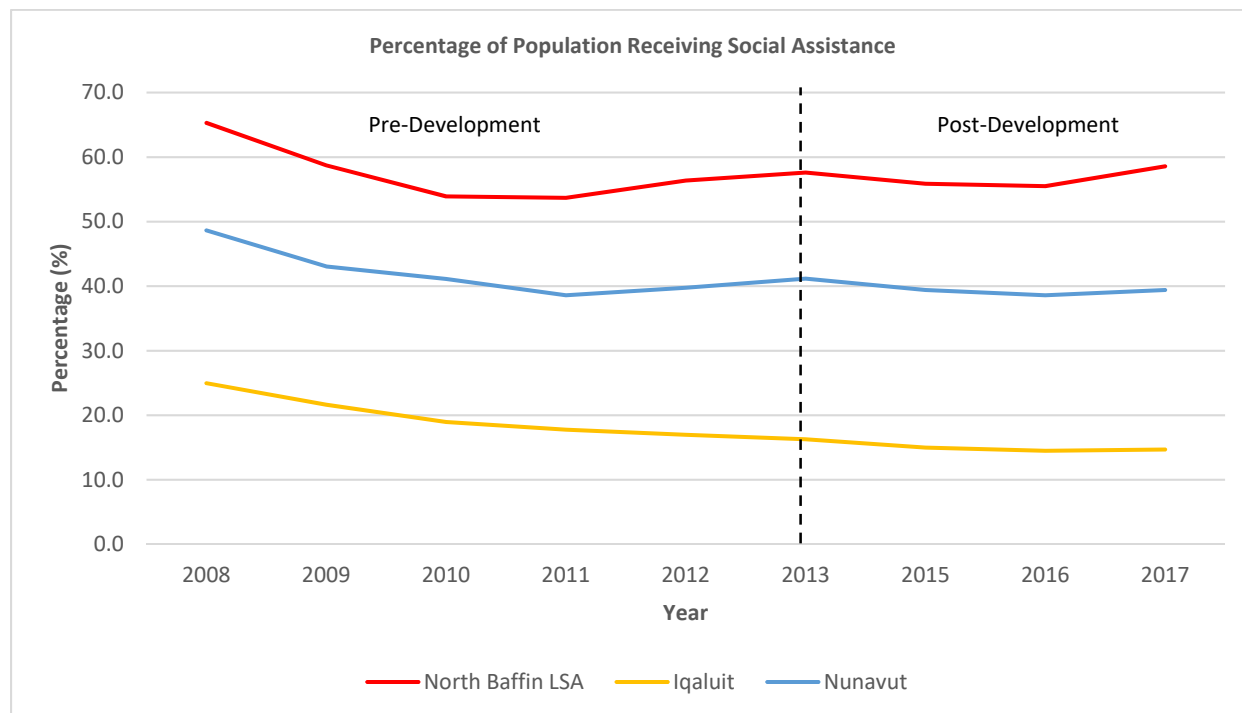
These data may be indicative of a positive Project influence, as average median employment income has increased in the LSA since Project development. Furthermore, the change in average median employment income in the North Baffin LSA (+\$1,244) has more than tripled the pre-development (or baseline) period change in average (+\$358), which suggests a potential positive Project effect. However, increasing trends in the LSA were also evident in the pre-development period and a comparable situation has been noted across Nunavut. This suggests longer-term and/or broad-scale factors may be driving these trends rather than the Project. Income levels can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.3 Percentage of Population Receiving Social Assistance

The percentage of the population receiving social assistance is another useful indicator of household financial performance. 2017 was the most recent year data on the percentage of social assistance recipients were available from the Nunavut Bureau of Statistics (2018c). Note that no data are available

for 2014. Compared to the previous year data were available, there has been an increase in the percentage of the population receiving social assistance in the North Baffin LSA (from 55.5% to 58.6%), Iqaluit (from 14.5% to 14.7%), and Nunavut (from 38.6% to 39.4%). Compared to pre-development period averages, there have been decreasing trends in the average percentage of the population receiving social assistance in the North Baffin LSA (from 57.6% to 56.9%), Iqaluit (from 20.1% to 15.1%), and Nunavut (from 42.2% to 39.7%) in the post-development period. Figure 7-4 displays the percentage of the population receiving social assistance since 2008, while Table 7-4 displays average values for selected periods.

Figure 7-4: Percentage of Population Receiving Social Assistance (2008 to 2017)



Source: Nunavut Bureau of Statistics (2018c)

Notes: No data available for 2014.

Table 7-4: Percentage of Population Receiving Social Assistance (Averages for Selected Periods)

Percentage of Population Receiving Social Assistance						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2005-2007	59.7%	–	21.4%	–	44.0%	–
Pre-Development Period (2008 to 2012)	57.6%	-2.1%	20.1%	-1.4%	42.2%	-1.8%
Post-Development Period (2013 onwards)	56.9%	-0.7%	15.1%	-5.0%	39.7%	-2.6%

Source: Nunavut Bureau of Statistics (2018c)

Notes: Some values may be affected by rounding.

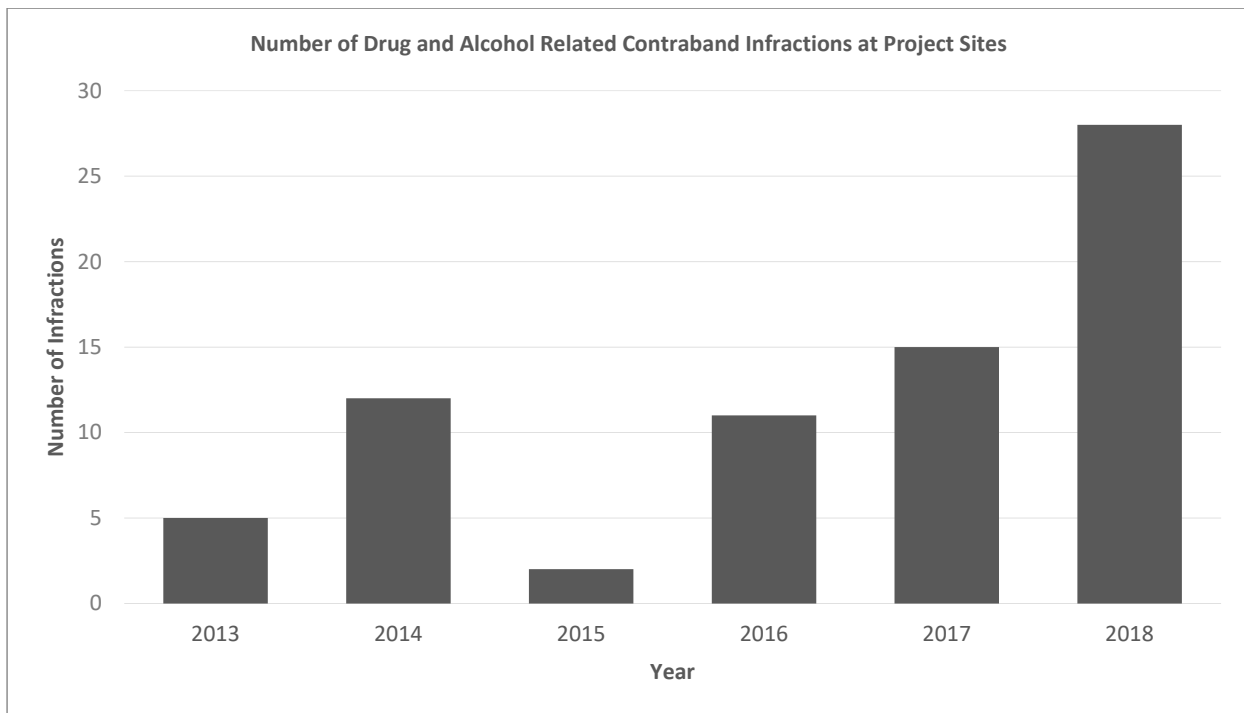
These data may be indicative of a positive Project influence, as there have been decreasing trends in social assistance recipients in the post-development period in the LSA. However, these trends were also evident in the pre-development period and a comparable situation has been noted across Nunavut, which suggests longer-term and/or broad-scale factors may be driving these trends rather than the

Project. Social assistance levels can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.4 Number of Drug and Alcohol Related Contraband Infractions at Project Sites

The number of drug and alcohol related contraband infractions at Project sites is a useful indicator for the transport of substances that may be occurring at the Project. Figure 7-5 displays the number of drug and alcohol related contraband infractions at Project sites since 2013. This includes confiscated drugs, alcohol, or related paraphernalia. In 2018, 28 drug and alcohol-related contraband infractions occurred at Project sites among employees and contractors. This was 13 infractions higher than in 2017. Reasons for the increase in 2018 are unknown but may be linked to the increased average number of employees and contractors working on site compared to 2017 (2,054 vs. 1,572; see Section 3.1.5). This topic will continue to be monitored for emerging trends.

Figure 7-5: Number of Drug and Alcohol Related Contraband Infractions at Project Sites (2013 to 2018)



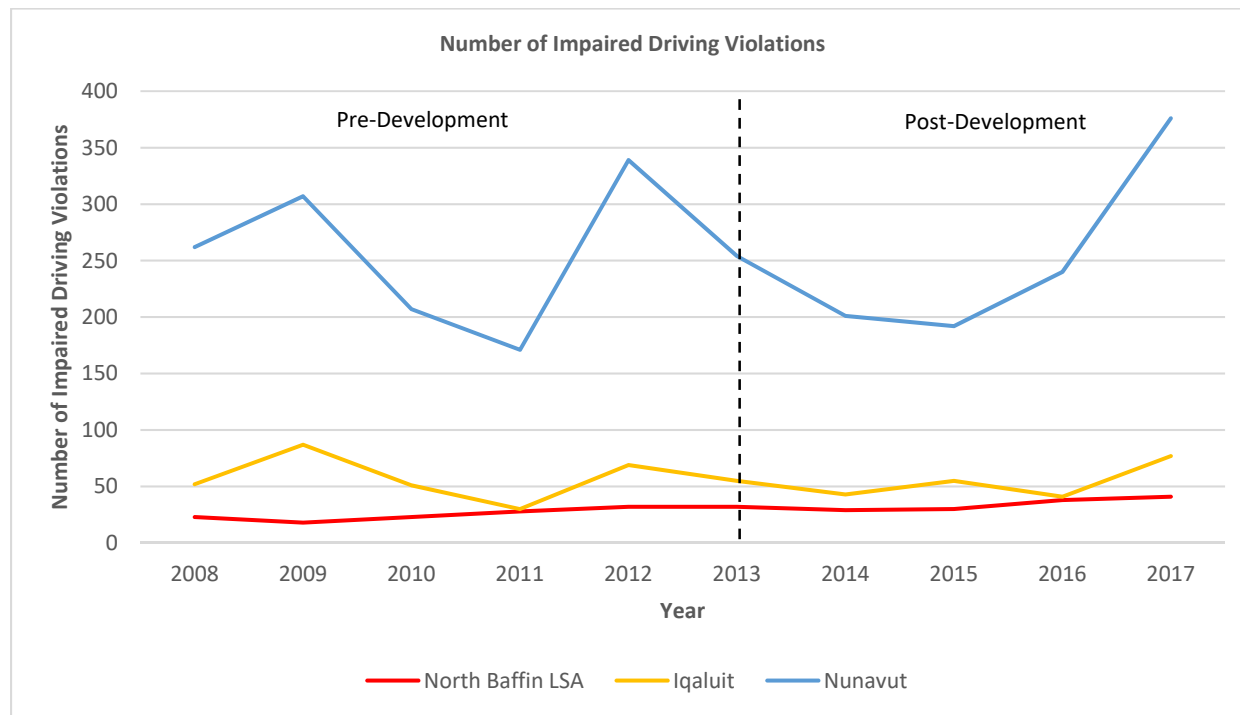
Source: Baffinland

7.1.5 Number of Impaired Driving Violations

The number of impaired driving violations in the LSA may provide insight into whether rates of alcohol abuse are changing. 2017 was the most recent year data on the number of impaired driving violations were available from the Nunavut Bureau of Statistics (2018d). Compared to the previous year data were available, there has been an increase in the number of impaired driving violations in the North Baffin LSA (from 38 to 41), Iqaluit (from 41 to 77) and Nunavut (from 240 to 376). Compared to pre-development period averages, there has been an increasing trend in the average number of impaired driving violations in the North Baffin LSA (from 24.8 to 34.0) and decreasing trends in Iqaluit (from 57.8 to 54.2) and Nunavut (from 257.2 to 252.6) in the post-development period. Figure 7-6 displays the

number of impaired driving violations since 2008, while Table 7-5 displays average values for selected periods.

Figure 7-6: Number of Impaired Driving Violations (2008 to 2017)



Source: Nunavut Bureau of Statistics (2018d)

Table 7-5: Number of Impaired Driving Violations (Averages for Selected Periods)

Number of Impaired Driving Violations						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	15.8	–	54.6	–	220.8	–
Pre-Development Period (2008 to 2012)	24.8	+9.0	57.8	+3.2	257.2	+36.4
Post-Development Period (2013 onwards)	34.0	+9.2	54.2	-3.6	252.6	-4.6

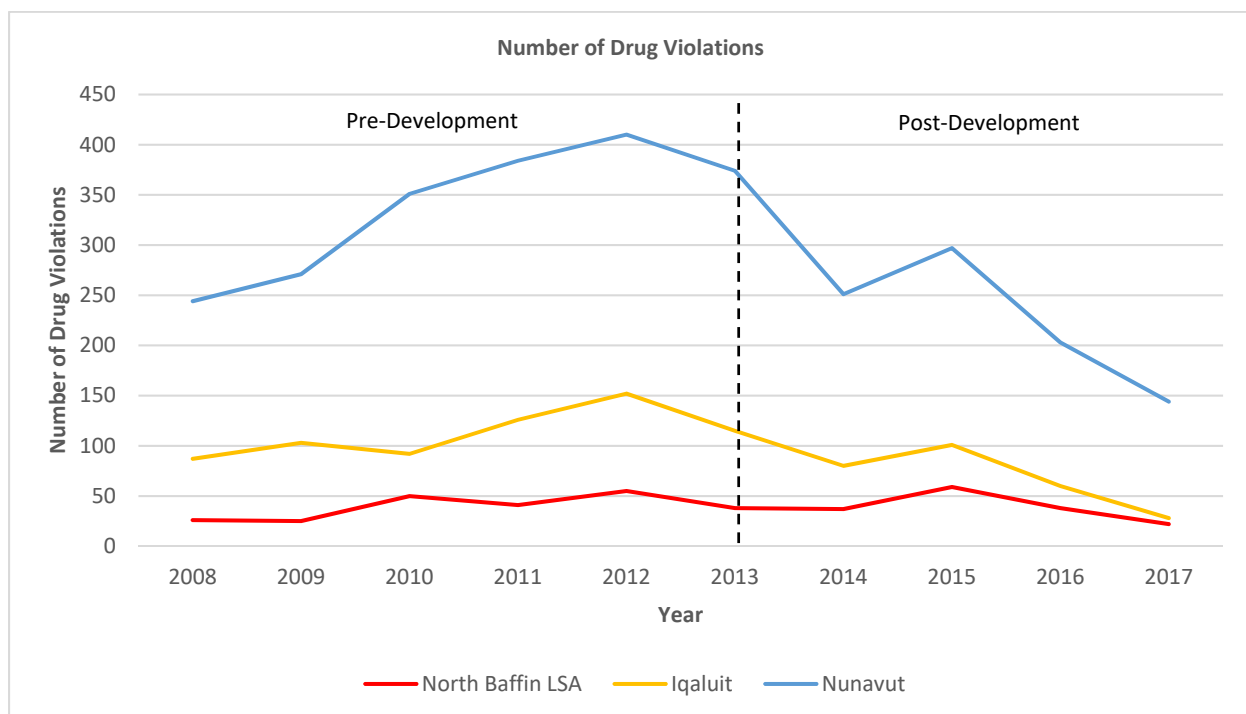
Source: Nunavut Bureau of Statistics (2018d)

These data may be indicative of a negative Project influence, as the average number of impaired driving violations has increased in the North Baffin LSA since Project development. However, this trend was also evident prior to Project development and the change in average number of impaired driving violations (+9.2) remains similar to the pre-development (or baseline) period change in average (+9.0). Conversely, decreasing trends have occurred in Iqaluit and Nunavut in the post-development period and were not evident prior to Project development (they were previously increasing). Reasons for the lack of a similar trend reversal in the North Baffin LSA are currently unknown. While it’s possible the Project may be a contributing factor, current trends could also be a continuation of pre-development trends. Substance use issues can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.6 Number of Drug Violations

The number of drug violations in the LSA may provide insight into whether rates of drug abuse are changing. 2017 was the most recent year data on the number of drug violations were available from the Nunavut Bureau of Statistics (2018d). Compared to the previous year data were available, there has been a decrease in the number of drug violations in the North Baffin LSA (from 38 to 22), Iqaluit (from 60 to 28), and Nunavut (from 203 to 144). Compared to pre-development period averages, there has been a decreasing trend in the average number of drug violations in the North Baffin LSA (from 39.4 to 38.8), Iqaluit (from 112.0 to 76.8), and Nunavut (from 332.0 to 253.8) in the post-development period. Figure 7-7 displays the number of drug violations since 2008, while Table 7-6 displays average values for selected periods.

Figure 7-7: Number of Drug Violations (2008 to 2017)



Source: Nunavut Bureau of Statistics (2018d)

Table 7-6: Number of Drug Violations (Averages for Selected Periods)

Period	Number of Drug Violations					
	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	23.0	–	91.8	–	231.4	–
Pre-Development Period (2008 to 2012)	39.4	+16.4	112.0	+20.2	332.0	+100.6
Post-Development Period (2013 onwards)	38.8	-0.6	76.8	-35.2	253.8	-78.2

Source: Nunavut Bureau of Statistics (2018d)

These data do not currently appear indicative of a negative Project influence, as the average number of drug violations have declined in the LSA since Project development, unlike prior to Project development (they were previously increasing). A comparable situation has also been noted across Nunavut, which

suggests broad-scale factors may be driving these trends rather than the Project. However, Baffinland's 2017 Socio-Economic Monitoring Report (JPCSL 2018) showed an increasing post-development trend in the North Baffin LSA (suggestive of a negative Project influence at the time); the change to a decreasing trend in this 2018 report is a positive reversal. Substance use can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.7 Absence from the Community During Work Rotation

Baffinland has acknowledged the absence of workers from communities during their work rotations may lead to some negative effects on community processes (e.g. local coaching, politics, and social organizations) in the LSA. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process and community engagement conducted for the Project.

Some general stakeholder comments on this topic were expressed in 2017 (JPCSL 2018). For example, challenges for rotational workers with children were noted and some turnover was said to occur for reasons including lack of childcare and homesickness. However, specific effects from worker absence on community processes were not identified. In 2018, some general comments were again recorded on the challenges associated with rotational work for families and relationships. However, specific effects from worker absence on community processes were not identified.

The potential for negative effects to arise on community processes due to workers being absent during their work rotations is acknowledged. However, the Project's overall effect remains unclear. The INPK Fund that Baffinland contributes to supports various community wellness initiatives that may assist in this area. Baffinland also continues to use a two week in/two week out rotation that allows employees to spend considerable time in their home communities. Pre-employment training programs also review strategies for successful rotational work with prospective employees, so they can come better prepared to deal with challenges that may arise. Furthermore, Baffinland's IHRS notes the Company will consider adopting alternative rotation schedules that are better aligned with familial and community activities. Baffinland conducted a one week in/one week out pilot program in 2017. Employees who participated in the program told Baffinland it was more disruptive to family life than the two week in/two week out rotation. Baffinland has committed to continue investigating potential alternative work schedules. Per IIBA Article 7.15.12, the needs and preferences of Inuit will be considered in schedule planning, provided the Company's labour force requirements are accommodated. This topic will continue to be monitored for emerging trends.

7.1.8 Prevalence of Gambling Issues

Gambling issues are an acknowledged concern in Nunavut and some observers note resource development activities can have negative effects in this area. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this issue continues to be tracked through the QSEMC process and community engagement conducted for the Project. No comments on this topic were identified in 2017 (JPCSL 2018). One comment related to this topic was recorded in 2018:

The self-reported gambling numbers might be a little low. [2018 QSEMC Meeting Participant]²⁰

The Project's overall effect remains unclear. Gambling is a complex issue that can be influenced by several factors and appropriate statistical data are currently unavailable. It should be noted that Baffinland continues to provide its permanent employees and their dependents with access to an EFAP and has established on-site Cultural Advisors to provide counsel and support to all Inuit Project employees. Per Article 11.7 of the IIBA, a Community Counsellor Program will also be established by Baffinland in the North Baffin LSA communities. Gambling-related or other forms of personal assistance may be obtained through these programs, as needed. Furthermore, gambling is not permitted at Project sites. This topic will continue to be monitored for emerging trends.

7.1.9 Prevalence of Family Violence

Family violence is an acknowledged concern in Nunavut and some observers note resource development activities can have negative effects in this area. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this issue continues to be tracked through the QSEMC process and community engagement conducted for the Project. No comments on this topic were identified in 2017 (JPCSL 2018). A comment related to the prevalence of family violence was recorded in 2018:

In Iqaluit we had two murder suicides and an Elder wanted to put on a program on "what is love?" vs. "what is abuse?" She would like to find training for a program like this and turn it into something more Inuit culturally appropriate. [2018 QSEMC Meeting Participant]²¹

Some data on this topic are available at the territorial level. Burczycka and Conroy (2018) note there were 982 incidents of police-reported family violence in Nunavut in 2016, which equates to a rate of 2,649 incidents per 100,000 population. This is substantially higher than the Canadian rate of 239 incidents per 100,000 population.

The Project's overall effect remains unclear. Family violence is a complex issue that can be influenced by several factors and available statistical data are limited (at the territorial scale only). It should be noted that Baffinland continues to provide its permanent employees and their dependents with access to an EFAP and has established on-site Cultural Advisors to provide counsel and support to all Inuit Project employees. Per Article 11.7 of the IIBA, a Community Counsellor Program will also be established by Baffinland in the North Baffin LSA communities. Family-related and other forms of personal assistance may be obtained through these programs, as needed. This topic will continue to be monitored for emerging trends.

7.1.10 Prevalence of Marital Problems

Marital problems can arise for several reasons, but some observers note resource development activities can have negative effects in this area. However, appropriate community-level indicator data

²⁰ Please note, this was a comment made at the 2018 QSEMC in relation to a presentation delivered by the QIA on their Inuusiuq Asijiqpalianninganiq Ujjiqsurniq community survey and was not necessarily about the Project.

²¹ Please note, this was a comment made at the 2018 QSEMC in relation to a presentation delivered by the Embrace Life Council and was not necessarily about the Project.

are currently unavailable for this topic. As such, this issue continues to be tracked through the QSEMC process and community engagement conducted for the Project. Comments on this topic have previously been made by Project stakeholders (e.g. JPCSL 2017, 2018). In some cases, Project employment was believed to play a role in marital problems that had developed (e.g. infidelity and/or breakups initiated by the worker or individual at home). Some comments on this topic were also recorded in 2018:

Whenever there's something needed, we are usually silent... when we're serious, we become very silent. So the QIA staff, for example... when they're put on night shifts, they keep them in night schedules. But the QIA usually alternate day shift and night shift, but the other communities have to stay night shift... for instance, if their wife or husband is working under subcontract, then they have to alternate because, during Christmas, they have to stay on site and the other has to stay at home; and same with the summertime. It becomes a burden for the families because they can't be together on special occasions, when both of them are working at the same time. And there's no negotiation on that... it became a deterrent to hire Inuit in these communities. [2018 IIBA Annual Project Review Forum Participant]

... in Milne Inlet, there needs to be a counselor available, 24/7. If there could be a counselor that could assist in the stress levels of the employees, because they get homesick and miss their family and children. So that's a need there. That's the void that is lacking. They need a psychologist or counselors up there to help them... it would benefit the employees a lot if there could be a counselor there. [2018 IIBA Annual Project Review Forum Participant]

Concern that spouses in Igloodik are not being asked about effects of having their spouse away from home on shiftwork and potential problems this is causing. [2018 NIRB Public Information Meeting]

We are seeing some family issues with regards to rotational work. It takes a strong relationship at home to make it work but as of yet I haven't heard of any major issues concerning that aspect of the schedule. [2018 QSEMC Meeting Participant]

Federal Census data on marital status are available (see Table 7-7). Between 2011 and 2016, for example, the percentage of individuals in the North Baffin LSA who were married or living common law decreased (from 53.9% to 53.3%), while those who were separated or divorced increased (from 2.8% to 3.7%). In Iqaluit, the percentage of individuals who were married or living common law increased (from 53.3% to 53.8%), while those who were separated or divorced decreased (from 5.9% to 5.4%). In Nunavut, the percentage of individuals who were married or living common law decreased (from 53.4% to 53.2%), while those who were separated or divorced remained the same (at 3.5%).

Table 7-7: Marital Status of Individuals 15 Years and Over (2011 and 2016)

Marital Status of Individuals 15 Years and Over				
Location	2011		2016	
	% Married or Living with a Common-Law Partner	% Separated or Divorced	% Married or Living with a Common-Law Partner	% Separated or Divorced
North Baffin LSA	53.9%	2.8%	53.3%	3.7%
Iqaluit	53.3%	5.9%	53.8%	5.4%
Nunavut	53.4%	3.5%	53.2%	3.5%
Canada	57.7%	8.6%	57.6%	8.6%

Source: Statistics Canada (2012a, b, c, d, e, f, g); Statistics Canada (2017a, b, c, d, e, f, g)

The Project’s overall effect remains unclear. Marital problems are a complex issue that can be influenced by several factors and available statistical data are limited (for five-year Census periods only). While the percentage of individuals who are separated or divorced increased in the North Baffin LSA between 2011 and 2016, this percentage (conversely) decreased in Iqaluit over the same period for unknown reasons. As Project construction only began in 2013, there are minimal post-development data currently available. A more detailed analysis of trends may require additional years of Census data.

It should be noted that Baffinland continues to provide its permanent employees and their dependents with access to an EFAP and has established on-site Cultural Advisors to provide counsel and support to all Inuit Project employees. Per Article 11.7 of the IIBA, a Community Counsellor Program will also be established by Baffinland in the North Baffin LSA communities. Family-related or other forms of personal assistance may be obtained through these programs, as needed. This topic will continue to be monitored for emerging trends.

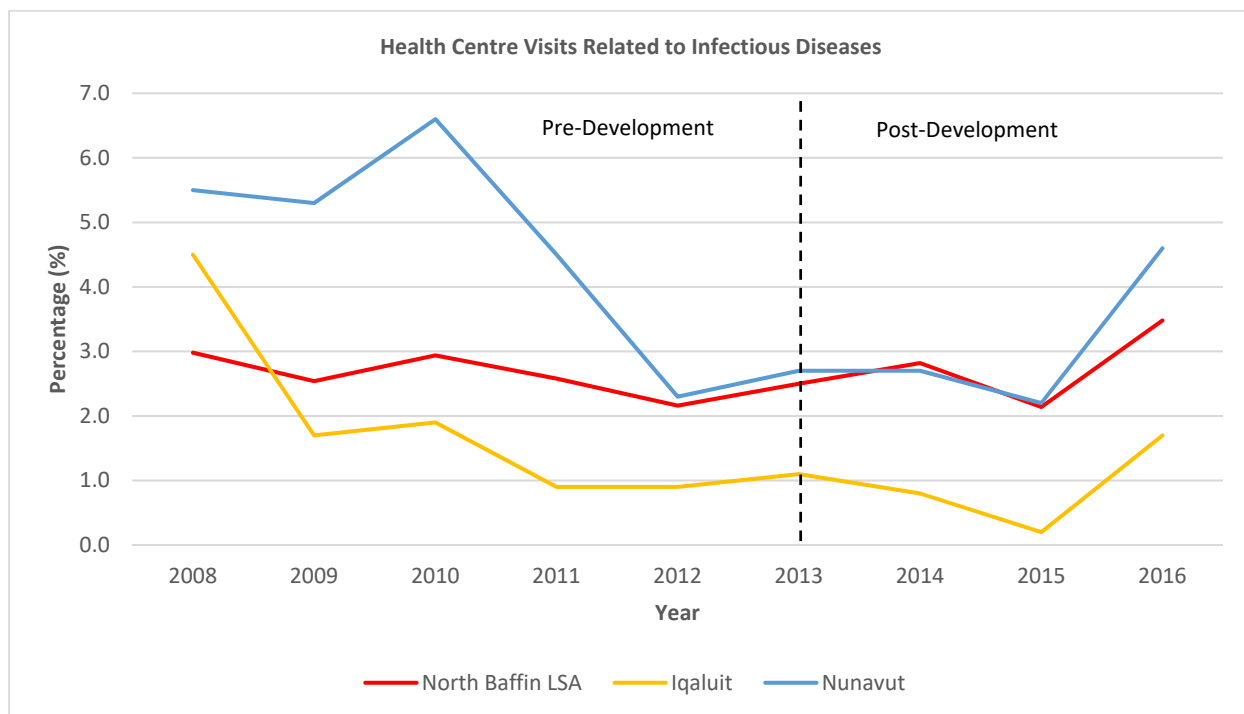
7.1.11 Percent of Health Centre Visits Related to Infectious Diseases

Community health centre visit data can help identify health issues occurring in a community. Information on how the Project may affect rates of sexually transmitted infections and other communicable diseases in the LSA has been specifically requested in the Project Certificate. As such, indicator data on the percentage of health centre visits by the diagnostic group ‘infectious diseases’ is tracked through Baffinland’s monitoring program.

2016 was the most recent year data on the percentage of health centre visits related to infectious diseases were available from the Nunavut Bureau of Statistics (2018e).²² Compared to the previous year data were available, there was an increase in the percentage of health centre visits related to infectious diseases in the North Baffin LSA (from 2.1% to 3.5%), Iqaluit (from 0.2% to 1.7%), and Nunavut (from 2.2% to 4.6%). Compared to pre-development period averages, there has been an increasing trend in the average percentage of health centre visits related to infectious diseases in the North Baffin LSA (from 2.6% to 2.7%) and decreasing trends in Iqaluit (from 2.0% to 1.0%) and Nunavut (from 4.8% to 3.1%) in the post-development period. Figure 7-8 displays the percentage of health centre visits related to infectious diseases since 2008, while Table 7-8 displays average values for selected periods.

²² The Nunavut Bureau of Statistics (2018e) notes that only visits to Iqaluit’s community health centre are reported on, while visits to Iqaluit’s hospital are not.

Figure 7-8: Percent of Health Centre Visits Related to Infectious Diseases (2008 to 2016)



Source: Nunavut Bureau of Statistics (2018e)

Table 7-8: Percent of Health Centre Visits Related to Infectious Diseases (Averages for Selected Periods)

Percent of Health Centre Visits Related to Infectious Diseases						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	3.5%	–	28.8%	–	4.9%	–
Pre-Development Period (2008 to 2012)	2.6%	-0.8%	2.0%	-26.9%	4.8%	0.0%
Post-Development Period (2013 onwards)	2.7%	+0.1%	1.0%	-1.0%	3.1%	-1.8%

Source: Nunavut Bureau of Statistics (2018e)

Notes: Some values may be affected by rounding.

These data may be indicative of a negative Project influence, as the average percentage of health centre visits related to infectious diseases has increased in the North Baffin LSA since Project development. This trend was not evident in the pre-development period (it was previously decreasing). Conversely, the decreasing or stable trends that were evident in Iqaluit and Nunavut prior to Project development are all decreasing in the post-development period. Reasons for the lack of a similar trend in the North Baffin LSA are currently unknown. However, the change in average percentage of health centre visits related to infectious diseases in the North Baffin LSA is small (+0.1%) and the current average (2.7%) is similar to that documented in the pre-development (or baseline) period (2.6%). Likewise, Figure 7-8 shows a notable spike in health centre visits across Nunavut in 2016, which suggests the occurrence of a territory-wide infectious disease issue that may have influenced monitoring results.

Health-related issues can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge. However, the Government of Nunavut remains responsible for

health care delivery and data collection on this topic in the LSA communities. It is unknown if the Government of Nunavut has information that would provide additional clarity on the trends observed. A Memorandum of Understanding (MOU) has also been signed between Baffinland and the Government of Nunavut's Department of Health regarding site health services and medevac procedures. This MOU describes the health care staff and services Baffinland will provide on site, including procedures Baffinland will follow during medevac situations, for pre-employment medical examinations, and for the reporting and management of communicable diseases, among other topics. The MOU also describes how Baffinland will pay for and/or reimburse the Department of Health for costs associated with the medical transportation of employees and for conducting pre-employment medical exams. More generally, the Project continues to provide all workers with regular access to a site medic, with whom they can confidentially address health-related (including sexual health) issues.

7.1.12 Rates of Teenage Pregnancy

Teenage pregnancy rates can be a result of several factors, but some observers note resource development activities can have negative effects in this area. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this issue continues to be tracked through the QSEMC process and community engagement conducted for the Project. No comments on this topic were identified in 2017 (JPCSL 2018) or 2018.

Some data on this topic are available at the territorial level. Statistics Canada (2018c) notes 17.7% of all Nunavut live births in 2017 (the most recent year data were available) were to mothers under the age of 20. By comparison, only 2.1% of all Canadian live births in 2017 were to mothers under the age of 20. Boulet and Badets (2017) provide additional information on the topic of early motherhood (i.e. having become a mother before the age of 20) among Inuit, off-reserve First Nations, and Métis women, derived primarily from the 2012 Aboriginal Peoples Survey. Boulet and Badets (2017: 2) note:

"...taking care of a child as a teenager may represent a challenge given the responsibilities associated with motherhood, which can hinder a young woman's progress towards earning a high school diploma and possibly pursuing postsecondary education... among women aged 18 to 44 years, 38% of Inuit women... dropped out of high school due to pregnancy or to take care of a child. Given their lower education level, these young women may be at greater risk for unemployment or dependence on social assistance."

Boulet and Badets (2017) also note 45% of Inuit women, 28% of First Nations women living off reserve, and 20% of Métis women (aged 20 to 44), became mothers before the age of 20; this compared to 6% of non-Indigenous women in the same age group. Likewise, Indigenous early mothers were less likely to have a high school diploma; among Inuit women, 40% of those who became mothers in their teenage years had a high school diploma, compared with 59% of Inuit women who had children later in life (Boulet and Badets 2017).

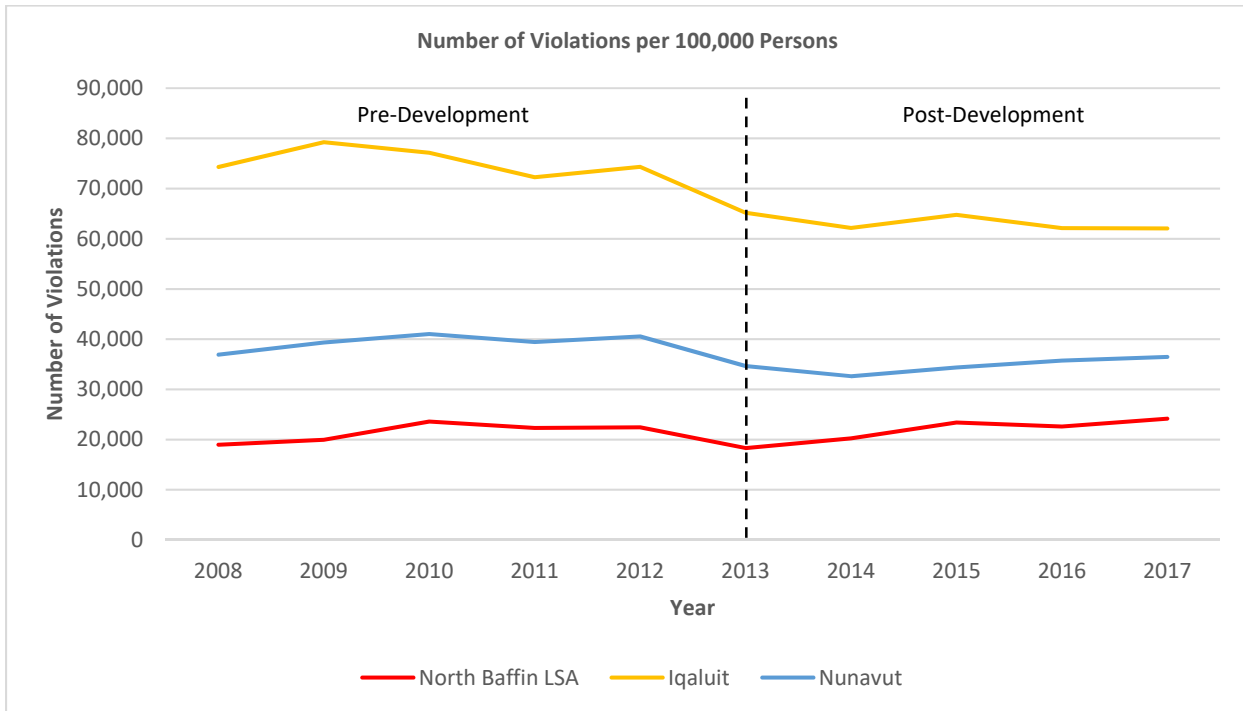
The Project's overall effect remains unclear. Teenage pregnancy is a complex issue that can be influenced by several factors and available statistical data are limited (at the territorial scale, for the entire Inuit population, and/or for limited time periods only). This topic will continue to be monitored for emerging trends.

7.1.14 Crime Rate

Project Certificate Term and Condition No. 154 states other indicators should be monitored “as deemed appropriate”. Members of the SEMWG previously requested that community crime rate data be included in Baffinland’s socio-economic monitoring program. These data are useful for indicating whether crime is increasing or decreasing in an area.

2017 was the most recent year crime rate data were available from the Nunavut Bureau of Statistics (2018f). Compared to the previous year data were available, there was an increase in the number of violations per 100,000 persons in the North Baffin LSA (from 22,610 to 24,169) and Nunavut (from 35,740 to 36,485), and a decrease in Iqaluit (from 62,143 to 62,065). Compared to pre-development period averages, there has been an increasing trend in average crime rates in the North Baffin LSA (from 21,458 to 21,749) and decreasing trends in Iqaluit (from 75,459 to 63,273) and Nunavut (from 39,459 to 34,775) in the post-development period. Figure 7-9 displays the number of violations per 100,000 persons since 2008, while Table 7-9 displays average values for selected periods.

Figure 7-9: Number of Violations per 100,000 Persons (2008 to 2017)



Source: Nunavut Bureau of Statistics (2018f)

Table 7-9: Number of Violations per 100,000 Persons (Averages for Selected Periods)

Number of Violations per 100,000 Persons						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	20,398	–	62,689	–	35,350	–
Pre-Development Period (2008 to 2012)	21,458	+1,060	75,459	+12,771	39,459	+4,109
Post-Development Period (2013 onwards)	21,749	+291	63,273	-12,186	34,775	-4,684

Source: Nunavut Bureau of Statistics (2018f)

Notes: Some values may be affected by rounding.

These data may be indicative of a negative Project influence, as average crime rates have increased in the North Baffin LSA since Project development. Conversely, a decreasing post-development trend has been noted in Iqaluit that was not evident prior to Project development (it was previously increasing) and a comparable situation has been noted across Nunavut. Reasons for the lack of a similar trend reversal in the North Baffin LSA are currently unknown. However, the current North Baffin LSA increasing trend was also evident prior to Project development, and the post-development change in average (+291) is less than the pre-development (or baseline) period change in average (+1,060). While it's possible the Project may be a contributing factor, North Baffin LSA post-development trends could also be a continuation of pre-development trends. Crime issues can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

7.1.15 Number of Times Baffinland's EFAP is Accessed

Project Certificate Term and Condition No. 154 states other indicators should be monitored “as deemed appropriate”. Members of the SEMWG previously requested that data on the number of times Baffinland's EFAP is accessed be included in Baffinland's socio-economic monitoring program. These data are useful for assessing annual usage of the EFAP.

Baffinland's benefit plan includes an EFAP, which offers all permanent employees and their dependents professional short-term counselling on an as-needed basis. Baffinland implemented its EFAP in 2015. The EFAP provider, Homewood Health Solutions (Homewood), provides access to a network of certified professionals who deliver personal and mental health and financial wellness programs. The EFAP is a free and confidential program. Homewood offers counselling and support related to a wide variety of health programs such as depression, addictions, family, and work-life balance. The EFAP provides both telephone and online services. Telephone services are offered in both English and Inuktitut.

In 2018 there were a total of 41 EFAP cases, whose geographic distribution is summarized in Table 7-10. This is three cases more than in 2017. Employees and their families who reside in Nunavut accounted for 36.6% of annual EFAP use in 2018.

Table 7-10: Number of Times Baffinland’s EFAP is Accessed Annually (2015 to 2018)

Number of Times Baffinland’s Employee and Family Assistance Program (EFAP) is Accessed Annually			
Year	Nunavut	Other Locations	Total
2015	7	12	19
2016	10	8	18
2017	12	26	38
2018	15	26	41

Source: Baffinland

Notes: Records are only available from 2015 onwards.

The EFAP continues to provide services to Baffinland’s permanent employees and their dependents on an as-needed basis. Likewise, employees and their families who reside in Nunavut remain important users of the EFAP and the number of times Nunavummiut have accessed the EFAP has continued to grow since 2015. On-site Cultural Advisors are also available for all Inuit Project employees to meet with and all employees have regular access to an on-site Project medic. Per Article 11.7 of the IIBA, a Community Counsellor Program will also be established by Baffinland in the North Baffin LSA communities. Various forms of personal assistance may be obtained through these programs, as needed. This topic will continue to be monitored for emerging trends.

7.2 EFFECTS AND COMPLIANCE ASSESSMENT

7.2.1 Effects Assessment

There were six residual effects for the Human Health and Well-Being VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 7-11.

Table 7-11: Effects Assessment for the Human Health and Well-Being VSEC

Residual Effect	Summary	Monitoring Results
Changes in Parenting	<p>The EIS predicted the Project would have a positive effect on parenting (particularly as it applies to well-being of children) in the LSA communities (e.g. from increased confidence and financial independence gained through employment, improved mental well-being from having a job and income). The EIS also predicted the Project could have some negative effects on parenting.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • A predictable rotational schedule • Meaningful employment and incomes • Work readiness training • Counselling and support resources (e.g. EFAP for permanent employees and their dependents, on-site Cultural Advisors, Community Counsellor Program in the North Baffin) • Contributions to the INPK Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin LSA) 	<p>Monitoring data on the number of youth charged are currently consistent with the presence of positive Project effects, as the average number of youth charged in the LSA have declined since Project development. However, crime rates can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge. There are other 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 also provides counselling and support resources for individuals who may require family-related or other forms of personal assistance. There is no direct evidence to suggest mitigation measures need to be modified at this time.</p>

<p>Household Income and Food Security</p>	<p>The EIS predicted the Project would have a positive effect on increased household income and food security (particularly as they apply to well-being of children) in the LSA.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Meaningful employment and incomes • Work readiness training • Financial literacy training • Contributions to the INPK Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin LSA) • Other contributions and initiatives related to food security in the LSA 	<p>Monitoring data on median employment income and social assistance levels are currently consistent with the presence of positive Project effects, as increasing income levels and decreasing social assistance rates have occurred in the LSA since Project development. Monitoring data on the proportion of taxfilers with employment income are currently not consistent with the presence of positive Project effects, as decreasing trends in the LSA have occurred since Project development. However, income levels can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge. It's also possible that some Project-related trends will take time to emerge. Regardless, there are positive indications the Project makes contributions to improved household income and food security in the LSA. This has occurred by providing LSA residents with meaningful employment opportunities and through related contributions and initiatives. Employment income facilitates the purchase of food and other family goods, while also providing a means to participate in harvesting if desired. Additional discussion on food security and Baffinland initiatives in this area is provided in Section 10.1 (e.g. Table 10-1). There is no direct evidence to suggest mitigation measures need to be modified at this time.</p>
<p>Transport of Substances Through Project Site</p>	<p>The EIS predicted the Project could increase availability of substances such as alcohol and illegal drugs in the North Baffin LSA due to their possible transportation through Project sites, resulting in a negative effect.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • A no drugs/no alcohol policy on site • Baggage searches for all employees and contractors arriving at site 	<p>Baffinland notes that all contraband infractions are of concern and are taken seriously. The infractions that have occurred to date appear to represent 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. This management response supports Baffinland's goal of 'Safety First, Always' while also preventing further transport of contraband substances through Project sites. While relevant mitigation measures are in place, an increasing trend in contraband infractions has been noted and will continue to be monitored.</p>
<p>Affordability of Substances and Attitudes Toward Substances and Addictions</p>	<p>The EIS predicted increased income from employment at the Project could increase the ability of LSA residents to afford substances such as alcohol and illegal drugs. However, the EIS also predicted the Project could improve attitudes toward substances and addictions in the LSA (i.e. by providing positive incentives for individuals to reduce substance abuse). The overall effect of the Project on substance abuse was expected to be determined by the balance between these two effects. The EIS predicted a negative outcome may be noticeable during a transitional period of adaptation. Over the medium-term and extending beyond Project termination an overall positive effect was anticipated.</p>	<p>Monitoring data on impaired driving violations are currently consistent with the presence of negative Project effects in the North Baffin LSA, as the average number of impaired driving violations has increased since Project development. However, this increasing trend was also evident prior to Project development, and the change in average number of impaired driving violations (+9.2) has remained similar to the pre-development (or baseline) period change in average (+9.0). While it's possible the Project may be a contributing factor, current trends could also be a continuation of pre-development trends or the result of other factors. Conversely, monitoring data on drug violations are currently not consistent with the presence of negative Project effects, as the average number of drug violations</p>

	<p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • A no drugs/no alcohol policy • Baggage searches for all employees and contractors arriving at site • Counselling and support resources (e.g. EFAP for permanent employees and their dependents, on-site Cultural Advisors, Community Counsellor Program in the North Baffin LSA) • Contributions to the INPK Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin LSA) 	<p>have declined in the LSA since Project development. Substance use concerns raised by Project stakeholders are acknowledged. Substance use issues can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge. There are additional positive indications the Project contributes to improved attitudes toward substances and addictions in the LSA, by providing LSA residents with meaningful employment opportunities within a drug- and alcohol-free environment. Baffinland also provides (or supports) various counselling, support, and well-being programs that may be relevant to drug- and alcohol-related issues. There is no direct evidence to suggest mitigation measures need to be modified at this time.</p>
<p>Absence from the Community During Work Rotation</p>	<p>The EIS predicted the absence of workers from communities during their work rotations may lead to some negative effects on community processes (e.g. local coaching, politics, and social organizations) in the LSA. However, it was also predicted that organizations and activities would be able to adapt and carry on their functions in light of these effects.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • A two week in/two week out rotation that allows employees to spend considerable time in their home communities • Contributions to the INPK Fund (which provides up to \$1.1 million/year for community wellness-focused projects in the North Baffin LSA) • Pre-employment training that reviews strategies for successful rotational work with prospective employees, so they can come better prepared to deal with challenges that may arise • Consideration of alternative rotation schedules that are better aligned with familial and community activities 	<p>The potential for some negative effects on community processes to arise as a result of workers being absent during their work rotations is acknowledged. However, the Project's overall effect remains unclear. This is because appropriate community-level indicator data are currently unavailable for this topic. Relevant mitigation is in place and there is no direct evidence to suggest mitigation measures need to be modified at this time. This topic will continue to be monitored for emerging trends through the QSEMC process and community engagement conducted for the Project.</p>

7.2.2 Compliance Assessment

There is one Term and Condition in the Project Certificate pertaining to monitoring of the Human Health and Well-Being VSEC. The status of this is summarized in Table 7-12.

Table 7-12: Terms and Conditions for Monitoring the Human Health and Well-Being VSEC

Term and Condition No.	Description	Status
154	The Proponent shall work with the GN and the QSEMC 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	Baffinland has presented information (where available) 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.

	<p>diseases, rates of teenage pregnancy, high school completion rates, and others as deemed appropriate.</p>	<p>crime rates, EFAP usage) in the Socio-Economic Monitoring Report. This Term and Condition is more fully addressed in the following sections of this report: Section 4.1.2, Section 4.1.3, Section 7.1.5, Section 7.1.6, Section 7.1.8, Section 7.1.9, Section 7.1.10, Section 7.1.11, Section 7.1.12, Section 7.1.13, and Section 7.1.14.</p>
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8. COMMUNITY INFRASTRUCTURE AND PUBLIC SERVICES

8.1 INDICATOR DATA AND ANALYSIS²³

8.1.1 Number of Project Employees and Contractors Who Left Positions in their Community

Data on the number of Project employees and contractors who left positions in their community can provide insight into potential competition for local workers being created because of the Project. Results from the 2019 Inuit Employee Survey presented in Section 4.1.8 indicate 17 individuals (or 26.6% of known survey responses) resigned from a previous job in order to take up employment with the Project. Of these individuals, nine were in casual/part-time positions and seven were in full-time positions (one was unknown). Survey results continue to indicate the Project may be having some effect on competition for workers in local communities. The highest recorded number and percentage of survey respondents who left positions in their communities to work at the Project (22, or 31.4%) occurred in 2018 (JPCSL 2018). However, some of the positions departed were also of a casual/part-time nature (7), rather than full-time, permanent employment. Some of the positions departed may have also been in communities outside the North Baffin LSA; for example, some individuals (5) listed their current community of residence as being outside of the North Baffin LSA during this survey.

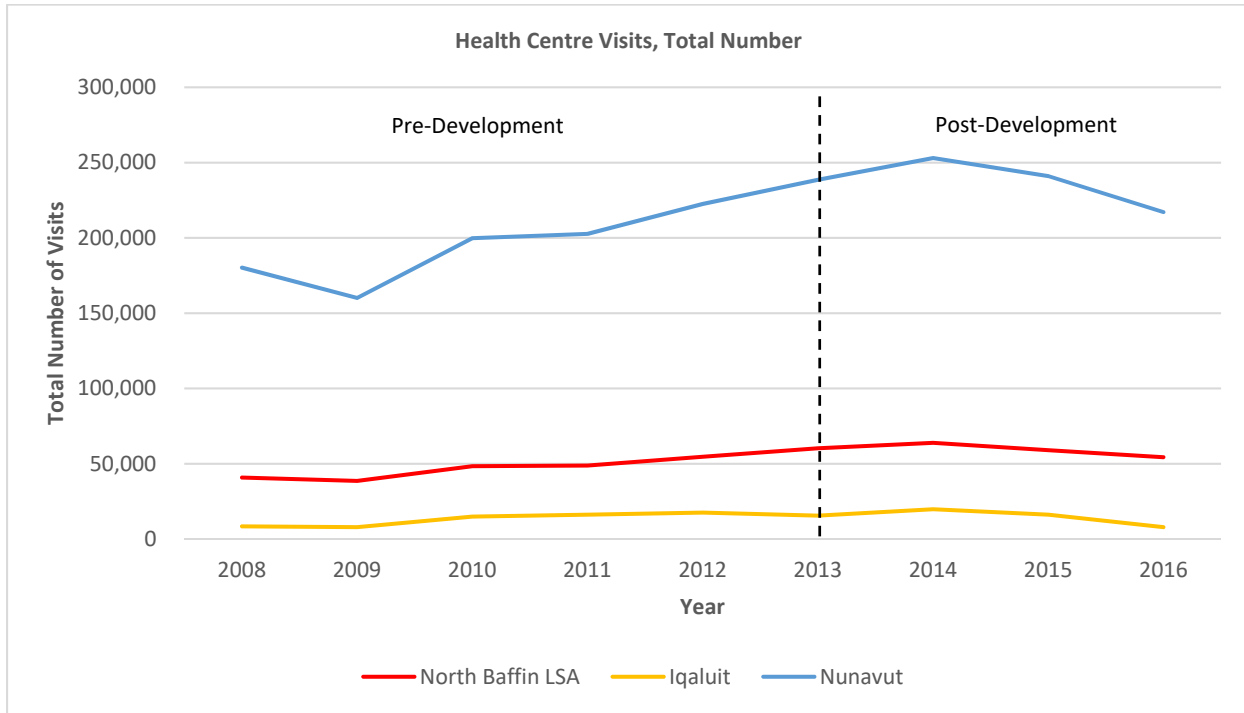
8.1.2 Number of Health Centre Visits (Total and Per Capita)

Health centre utilization data can be used to track changes to demands placed on community health services. 2016 was the most recent year data on the total number of health centre visits were available from the Nunavut Bureau of Statistics (2018e).²² Compared to the previous year data were available, the number of health centre visits have decreased in the North Baffin LSA (from 59,027 to 54,360), Iqaluit (from 16,233 to 7,953), and Nunavut (from 241,082 to 217,168). Compared to pre-development period averages, there have been increasing trends in the average number of health centre visits in the North Baffin LSA (from 46,264 to 59,402), Iqaluit (from 13,020 to 14,876), and Nunavut (from 193,066 to 237,453) in the post-development period. Figure 8-1 displays the number of health centre visits since 2008, while Table 8-1 displays average values for selected periods.

These data may be indicative of a negative Project influence, as there have been increasing trends in the total number of health centre visits in the LSA in the post-development period. However, these trends were also evident in the pre-development period and a similar situation has been noted throughout Nunavut, which suggests longer-term and/or broad-scale factors may be driving these trends rather than the Project. Health centre visits can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge. As noted previously, the Government of Nunavut remains responsible for health care delivery and data collection in the LSA communities. It is unknown if the Government of Nunavut has information that would provide additional clarity on the trends observed. An MOU has also been signed between Baffinland and the Government of Nunavut's Department of Health regarding site health services and medevac procedures.

²³ Data for the indicator 'training and experience generated by the Project' are provided in Section 4.1.5 (Hours of training completed by Inuit employees and contractors), Section 5.1.1 (Hours of Project labour performed), and Section 5.1.2 (Project hours worked by LSA employees and contractors), rather than being duplicated here. Likewise, data for the indicator 'Inuit employee turnover' are provided in Section 5.1.4 (Inuit employee turnover), rather than being duplicated here.

Figure 8-1: Total Number of Health Centre Visits (2008 to 2016)



Source: Nunavut Bureau of Statistics (2018e)

Table 8-1: Total Number of Health Centre Visits (Averages for Selected Periods)

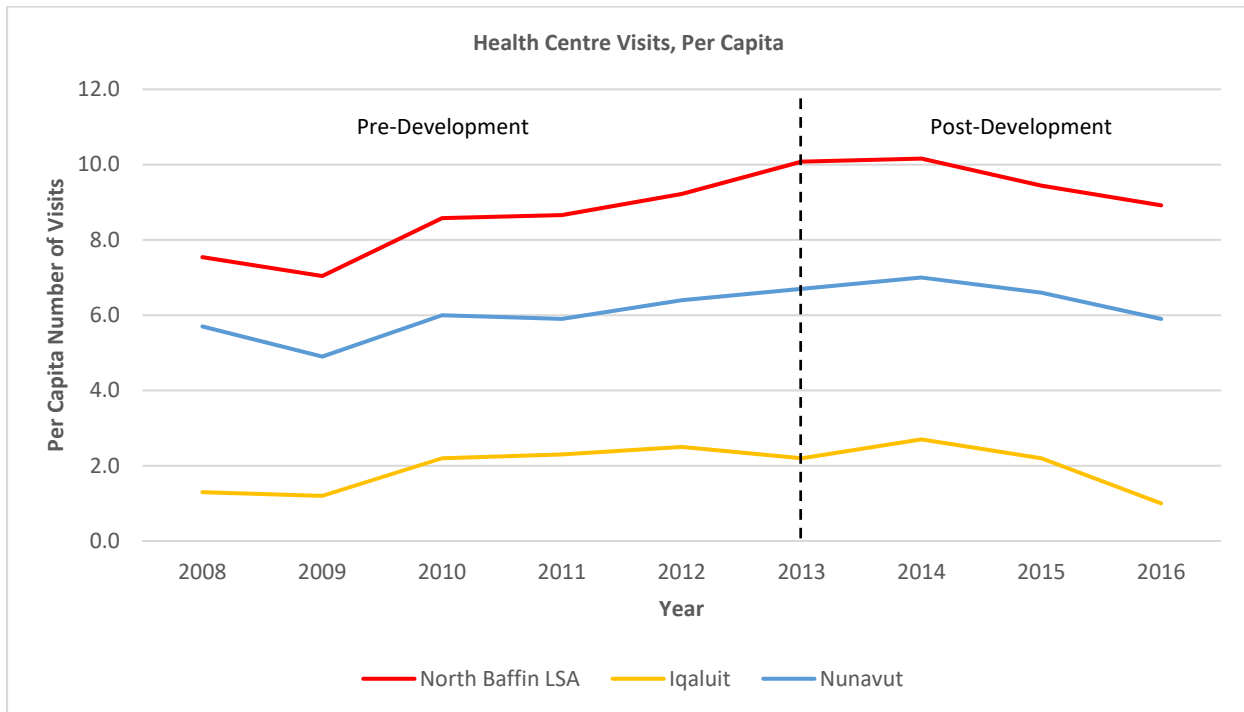
Total Number of Health Centre Visits						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	39,915	–	7,009	–	186,579	–
Pre-Development Period (2008 to 2012)	46,264	+6,348	13,020	+6,011	193,066	+6,487
Post-Development Period (2013 onwards)	59,402	+13,138	14,876	+1,856	237,453	+44,387

Source: Nunavut Bureau of Statistics (2018e)

Notes: Some values may be affected by rounding.

2016 was also the most recent year data on per capita number of health centre visits were available from the Nunavut Bureau of Statistics (2018e).²² Compared to the previous year data were available, the per capita number of health centre visits have decreased in the North Baffin LSA (from 9.4 to 8.9), Iqaluit (from 2.2 to 1.0), and Nunavut (from 6.6 to 5.9). Compared to pre-development period averages, there have been increasing trends in the average per capita number of health centre visits in the North Baffin LSA (from 8.2 to 9.7), Iqaluit (from 1.9 to 2.0), and Nunavut (from 5.8 to 6.6) in the post-development period. Figure 8-2 displays the per capita number of health centre visits since 2008, while Table 8-2 displays average values for selected periods.

Figure 8-2: Per Capita Number of Health Centre Visits (2008 to 2016)



Source: Nunavut Bureau of Statistics (2018e)

Table 8-2: Per Capita Number of Health Centre Visits (Averages for Selected Periods)

Per Capita Number of Health Centre Visits						
Period	North Baffin LSA		Iqaluit		Nunavut	
	Average	Change in Average	Average	Change in Average	Average	Change in Average
2003-2007	8.0	–	1.1	–	6.2	–
Pre-Development Period (2008 to 2012)	8.2	+0.2	1.9	+0.8	5.8	-0.4
Post-Development Period (2013 onwards)	9.7	+1.4	2.0	+0.1	6.6	+0.8

Source: Nunavut Bureau of Statistics (2018e)

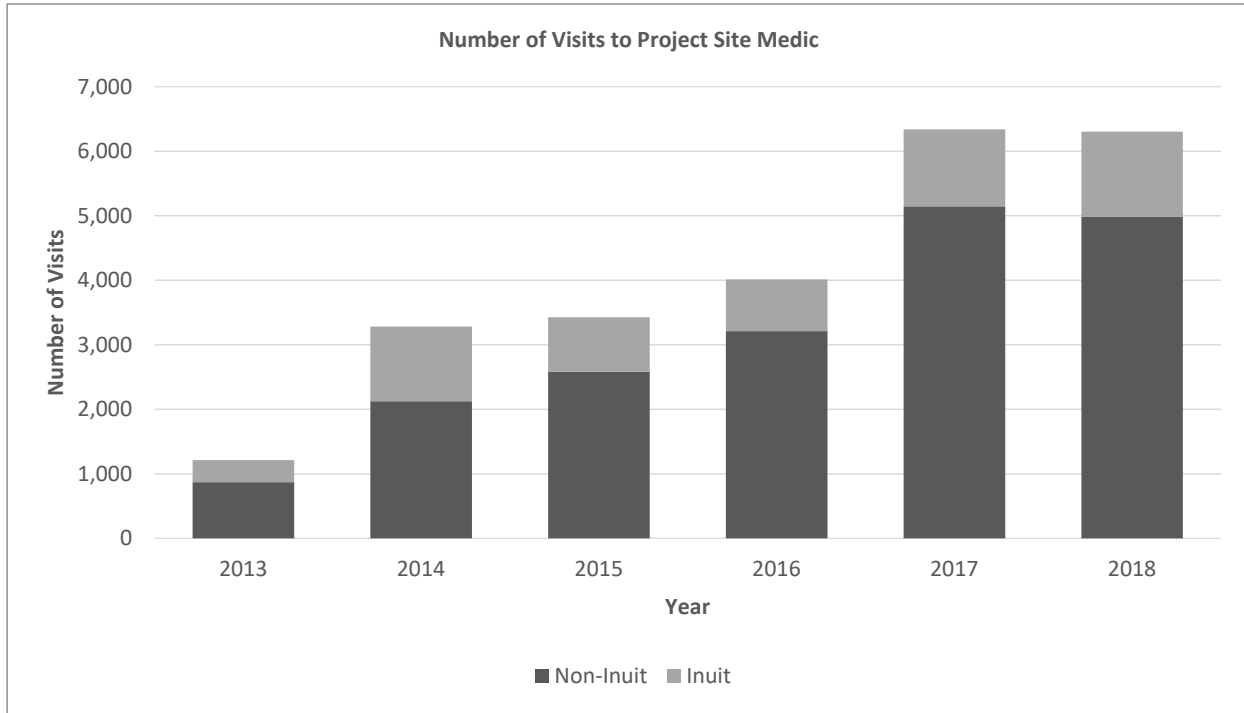
These data may be indicative of a negative Project influence, as there have been increasing trends in the per capita number of health centre visits in the LSA in the post-development period. However, these trends were also evident in the pre-development period. An increasing post-development trend has also been experienced throughout Nunavut, which suggests longer-term and/or broad-scale factors may be driving these trends rather than the Project. Health centre visits can be influenced by several factors and Baffinland will continue to monitor this topic for new insights that may emerge.

8.1.3 Number of Visits to Project Site Medic

Project site medic visit data can be used to track demands placed on Project health services. These data also provide insight into the role the Project may have in reducing demands placed on community health services (e.g. visits to the Project site medic may supplant some community health centre visits). Baffinland provides all employees with regular access to an on-site medic. In 2018, there were 6,301 recorded visits to the site medic, a decrease of 36 visits from 2017. 1,315 of these visits were by Inuit,

an increase of 122 visits from 2017. Figure 8-3 displays the number of recorded visits to the Project site medic since 2013.

Figure 8-3: Number of Visits to Project Site Medic (2013 to 2018)



Source: Baffinland

8.1.4 Baffinland Use of LSA Community Infrastructure

Baffinland continued to utilize some LSA community infrastructure to support ongoing Project development in 2018. This included full-time rental of five offices for BCLOs in the North Baffin communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet, and one office for Baffinland’s Northern Affairs team in Iqaluit. This also included short-term use of meeting rooms and other local services for meetings and events held in various LSA communities, examples of which are provided in Table 8-3. The use of LSA community airport infrastructure, specifically, is addressed in Section 8.1.5.

Additional details on stakeholder meetings and events Baffinland has participated in may be found in the Company’s Annual Reports to the NIRB. Like previous years, Baffinland has continued to use some LSA community infrastructure to support ongoing Project development. This use is small in comparison to other ongoing community uses but does add some incremental pressure on LSA facilities. However, 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 and short-term in nature. Furthermore, the use of these spaces is a positive contribution of the Project to local economies (e.g. through payments of rental fees, purchase of related goods and services).

Table 8-3: Meetings and Events Held in LSA Communities (2018)

Meetings and Events Held in LSA Communities in 2018	
Month	Meeting or Event
January	<ul style="list-style-type: none"> Meeting of the IIBA Joint Executive Committee (Iqaluit)
March	<ul style="list-style-type: none"> Meetings with the Hamlet and HTO (Pond Inlet)
April	<ul style="list-style-type: none"> Exploration program consultation meeting with the Hamlet and HTO (Hall Beach and Igloodik) IIBA Annual Project Review Forum (Hall Beach)
June	<ul style="list-style-type: none"> 6 MT application – Shipping management meeting with the HTO (Pond Inlet) Freight dock construction and offset – Marine monitoring programs meeting with the HTO (Pond Inlet) 6 MT application meeting with the Hamlet (Pond Inlet) Phase 2 impacts and mitigation meetings with Hamlets and HTOs (North Baffin communities)
August	<ul style="list-style-type: none"> Public meetings with the NIRB (Igloodik) Meeting with the GN Department of Economic Development and Transportation (Iqaluit) Meeting of the IIBA Joint Executive Committee (Iqaluit)
September	<ul style="list-style-type: none"> Employment and training opportunity community tour (North Baffin communities)
October	<ul style="list-style-type: none"> Baffinland President and QIA President met to sign the amended IIBA (Iqaluit) Meeting with QIA, NAC, Hatch, and the HTO regarding the Pond Inlet Training Center (Pond Inlet) Contracting and procurement information tour (North Baffin communities)
November	<ul style="list-style-type: none"> Meetings with Hamlets and HTOs to provide a Phase 2 information session (Pond Inlet and Arctic Bay) Baffinland President and QIA President meeting (Iqaluit) Meeting with the HTO to discuss the end of shipping and marine monitoring season (Pond Inlet) Meeting with DFO (Iqaluit) Meeting with QIA to discuss Phase 2 (Iqaluit) Meeting with the GN to discuss Phase 2 (Iqaluit) Meeting with CIRNAC to discuss Phase 2 (Iqaluit)
December	<ul style="list-style-type: none"> Q-STEP Project Advisory Committee meeting (Iqaluit) IIBA Employment Committee meeting (Iqaluit) Holiday community feast tour (North Baffin communities)

8.1.5 Number of Project Aircraft Movements at LSA Community Airports

To support the movement of workers, freight, and other materials to/from the Project, Baffinland is required to utilize community airport infrastructure in the LSA. This is due to the remote location of the Project and lack of viable alternative transportation methods (aside from seasonal marine re-supply). In 2018, there were 1,802 Project aircraft movements at LSA community airports, which is 174 more aircraft movements than in 2017.²⁴ This includes fixed-wing aircraft (e.g. passenger, cargo, and ‘combi’ type) and rotary-wing aircraft (e.g. helicopters used for site activities). Table 8-4 provides information on the number of Project aircraft movements at LSA community airports since 2014.

Project-related aircraft movements add some incremental pressure on LSA community airport facilities. However, LSA community airports regularly accommodate various non-Project passenger, cargo, and other aircraft (both scheduled and charter). In 2017 (the most recent year data were available) there were a total of 24,859 aircraft movements in the LSA. This includes 6,572 aircraft movements at North Baffin LSA airports (Statistics Canada 2018d) and 18,287 aircraft movements at the Iqaluit airport

²⁴ An aircraft movement is defined as a takeoff or landing at an airport. For example, one aircraft arrival and one departure are counted as two movements.

(Statistics Canada 2018e). Project-related aircraft movements at LSA community airports in 2017 represent a small portion (6.5%) of this total.

Table 8-4: Number of Project Aircraft Movements at LSA Community Airports (2014 to 2018)

Number of Project Aircraft Movements at LSA Community Airports					
Community	2014	2015	2016	2017	2018
Arctic Bay	122	126	120	138	124
Clyde River	114	112	112	144	132
Hall Beach	130	122	122	152	154
Igloolik	118	106	114	122	120
Pond Inlet	212	136	134	162	170
Iqaluit	876	708	652	910	1,102
Total	1,572	1,310	1,254	1,628	1,802

Source: Baffinland

Notes: Records are available from 2014 onwards. 2014-2016 records are for fixed-wing aircraft movements only. Records for 2017 onwards are for fixed-wing and rotary-wing aircraft.

8.2 EFFECTS AND COMPLIANCE ASSESSMENT

8.2.1 Effects Assessment

There were two residual effects for the Community Infrastructure and Public Services VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 8-5.

Table 8-5: Effects Assessment for the Community Infrastructure and Public Services VSEC

Residual Effect	Summary	Monitoring Results
Competition for Skilled Workers	<p>The EIS predicted the Project could negatively affect the ability of hamlets to maintain their staff in the short-term, due to increased competition for skilled workers created because of the Project.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> Provision of ongoing skills training to local residents, combined with work experience generated by the Project. These measures are expected to increase the pool of skilled workers in the local labour force in the medium- to long-term and negate any short-term, negative Project effects. 	<p>Inuit Employee Survey results continue to indicate the Project may be having some negative effect on competition for workers in local communities. Results from the 2019 survey indicate 17 individuals (or 26.6% of known respondents) resigned from a previous job in order to take up employment with the Project. Of these individuals, nine were in casual/part-time positions and seven were in full-time positions (one was unknown). The highest recorded number and percentage of survey respondents who left positions in their communities (22, or 31.4%) occurred in the 2018 survey; however, not all these individuals were in full-time positions or necessarily all located in the North Baffin LSA. Ongoing training and experience generated by the Project (see Section 8.1.2), in addition to regular employee turnover (see Section 8.1.3), are expected to continue increasing the pool of skilled workers in the local labour force and may negate negative Project effects over time. Community engagement also continues to indicate a high demand for new employment opportunities exists in the LSA. However, this topic will continue to be monitored for emerging trends. There is no direct evidence to suggest mitigation measures need to be modified at this time.</p>

Labour Force Capacity	<p>The EIS predicted the Project could positively affect the ability of hamlets to maintain their staff in the medium- to long-term, due to increased labour force capacity created because of the Project.</p> <p>Relevant mitigation measures include:</p> <ul style="list-style-type: none"> • Provision of ongoing skills training to local residents, combined with work experience generated by the Project. Together, these are expected to increase the overall pool of skilled workers in the local labour force from which hamlets (and other local and regional organizations) can draw upon. 	<p>The Project continues to generate substantial training and experience opportunities for its employees (see Section 4.1.5, Section 5.1.1, and Section 5.1.2). Employee turnover also continues to occur at the Project (see Section 5.1.4), which ensures at least some previous Project employees become available for employment elsewhere. Together, these help to increase the overall pool of skilled workers in the local labour force from which hamlets (and other local and regional organizations) can draw upon. There is no direct evidence to suggest mitigation measures need to be modified at this time.</p>
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8.2.2 Compliance Assessment

There are two Terms and Conditions in the Project Certificate pertaining to monitoring of the Community Infrastructure and Public Services VSEC. The status of these are summarized in Table 8-6.

Table 8-6: Terms and Conditions for Monitoring the Community Infrastructure and Public Services VSEC

Term and Condition No.	Description	Status
158	<p>The Proponent is encouraged to work with the GN 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 GN 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.</p>	<p>Baffinland continues to engage the QSEMC and SEMWG on its socio-economic monitoring program; the GN actively participates in both these groups. An MOU was also signed with the GN Department of Health in 2013 and subsequently updated in 2017 regarding site health services and medevac procedures. This MOU describes the health care staff and services Baffinland will provide on site, including procedures Baffinland will follow during medevac situations, for pre-employment medical examinations, and for the reporting and management of communicable diseases, among other topics. The MOU also describes how Baffinland will pay for and/or reimburse the GN Department of Health for costs associated with the medical transportation of employees and for conducting pre-employment medical exams.</p> <p>Baffinland monitors health and social services provided by the GN that may be affected by Project-related in-migration of employees through indicators in its Socio-Economic Monitoring Report (e.g. percentage of the population receiving social assistance, percent of health centre visits related to infectious diseases, total and per capita number of health centre visits, number of visits to Project site medic). In-migration of workers is one way the Project could negatively affect health and social service provision in the LSA. Company monitoring data suggest North Baffin LSA in-migration is not occurring in any significant manner (see Sections 3.1.2 and 3.1.3). Company monitoring data for</p>

		<p>Iqaluit are more limited, but a net of +1 individuals are known to have moved from the North Baffin LSA into Iqaluit since 2015 (data obtained from annual BCLO survey discussed in Section 3.1.2). More generally, Section 3.1.5 indicates an average of 53 Inuit and 7 non-Inuit employees / contractors with known origins lived in Iqaluit in 2018. Appropriate government-sourced migration data for the LSA are otherwise unavailable. However, the Project may also be contributing positively to LSA health service provision, by providing employees with regular access to an on-site Project medic and by providing various counselling and support services (e.g. EFAP, on-site Cultural Advisors, commitment to establish a Community Counsellor Program). This Term and Condition is more fully addressed in the following sections of this report: Section 1.2, Section 3.1.2, Section 3.1.3, Section 7.1.3, Section 7.1.11, Section 8.1.2, and Section 8.1.3.</p>
159	<p>The Proponent is encouraged to work with the GN 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.</p>	<p>Baffinland continues to engage the QSEMC and SEMWG on its socio-economic monitoring program; the GN actively participates in both these groups. Baffinland has presented information on Project-related pressures on community infrastructure in the Socio-Economic Monitoring Report. This includes indicator data on Baffinland use of LSA community infrastructure and the number of Project aircraft movements at LSA community airports. This Term and Condition is more fully addressed in the following sections of this report: Section 1.2, Section 8.1.4, and Section 8.1.5.</p>

9. RESOURCES AND LAND USE

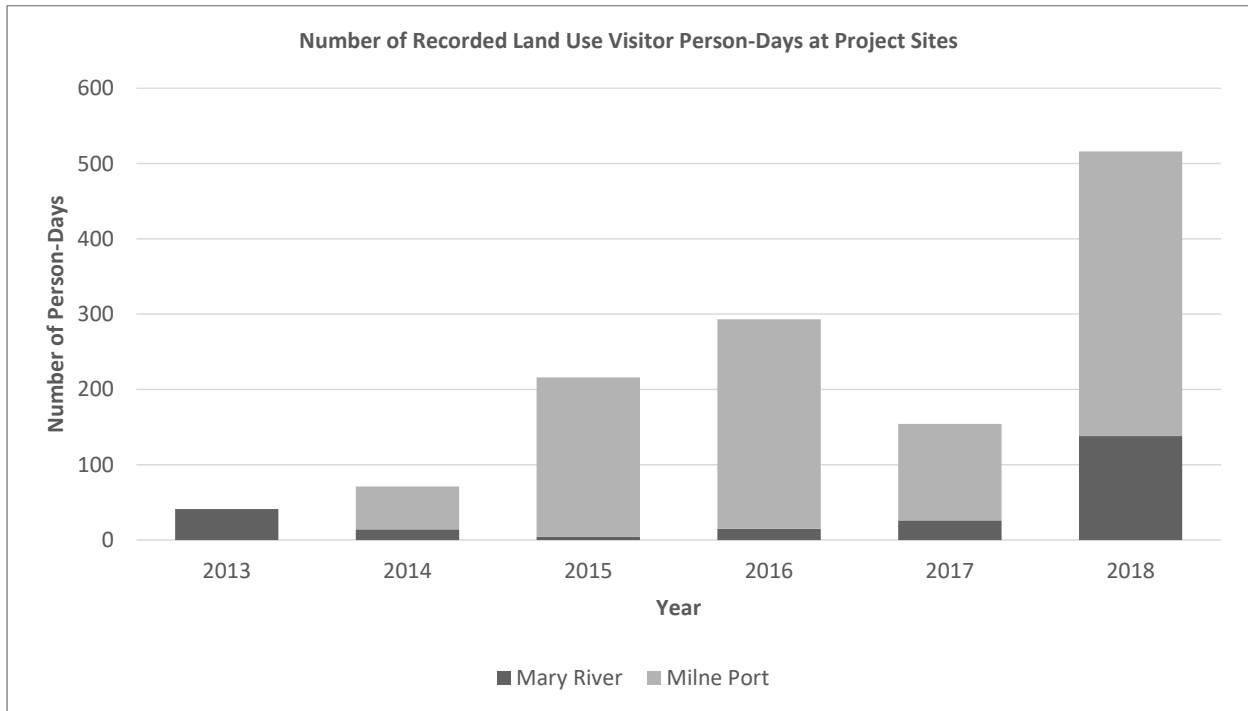
9.1 INDICATOR DATA AND ANALYSIS

9.1.1 Number of Recorded Land Use Visitor Person-Days at Project Sites

The number of recorded land use visitor ‘person-days’ at Project sites provides some indication of how often the Project area continues to be accessed for land use activities. Because groups of individuals may travel together and/or utilize Project sites over multiple days, person-days are useful for calculating the extent of site visitations in a year (i.e. one person-day is equal to one person visiting a site during one day, while ten person-days could equal one person visiting a site during ten days or five people visiting a site during two days). Baffinland maintains a Hunter and Visitor Access Log to track land use parties that pass through or use Project areas. Figure 9-1 presents the number of recorded land use visitor person-days at Project sites since 2013.

In 2018, a total of 516 land use visitor person-days were recorded at Project sites, which is 362 person-days greater than in 2017. Like previous years, most person-days were recorded at Milne Port (378), although Mary River did experience a notable increase in person-days between 2017 and 2018 (from 26 to 138). In addition, 55 person-days were attributed to a dog sled race passing through Milne Port in 2018. Project data continue to indicate some individuals are accessing Project sites for land use activities.

Figure 9-1: Number of Recorded Land Use Visitor Person-Days at Project Sites (2013 to 2018)



Source: Baffinland

Notes: This figure only includes recorded land use visitors at selected Project sites; as such, it may underestimate the total number of land use visitor person-days at all Project sites.

9.1.2 Number of Wildlife Compensation Fund Claims

The number of annual Wildlife Compensation Fund (WCF) claims provides insight into land use and harvesting issues which may be arising because of the Project. Established under Article 17.6 of the IIBA, the WCF is administered by the QIA and functions to compensate Inuit for loss or damage relating to wildlife suffered by such claimant or claimants as a result, directly or indirectly, of development activity related to the Project. 2018 data were not available at the time of report preparation. In 2017, one claim was submitted to QIA for review and was approved. It resulted in compensation of \$14,200.00 being paid out. By comparison, two claims were submitted to QIA for review in 2016; one claim was approved and resulted in compensation of \$600.00, while the second claim was reviewed and denied. WCF claim data continue to indicate some land use and harvesting issues are resulting from the Project.

9.2 EFFECTS AND COMPLIANCE ASSESSMENT

9.2.1 Effects Assessment

There were several residual effects for the Resources and Land Use VSEC assessed in the EIS. Monitoring results applicable to these are summarized in Table 9-1.

Table 9-1: Effects Assessment for the Resources and Land Use VSEC

Residual Effect	Summary	Monitoring Results
<p>Caribou Harvesting</p> <p>Marine Mammal Harvesting</p> <p>Fish Harvesting</p>	<p>The EIS predicted the Project could have a negative effect on caribou harvesting. Negligible effects on marine mammal and fish harvesting were also predicted.</p> <p>* While not all these effects were considered residual effects in Project EIS documents, they are included here for completeness.</p>	<p>Potential effects will continue to be tracked through Baffinland’s environmental monitoring programs. Terrestrial and marine monitoring are reviewed bi-annually by the Terrestrial Environment Working Group (TEWG) and Marine Environment Working Group (MEWG). Monitoring information on these topics can be found in Baffinland’s Annual Reports to the NIRB.</p> <p>Additional discussion relevant to Project harvesting interactions and food security is provided in Section 10.1.1 of the Socio-Economic Monitoring Report, which acknowledges that stakeholder concerns have been expressed about Project effects on harvesting. However, relevant mitigation is in place (e.g. Wildlife Compensation Fund, Harvesters Enabling Program) and Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer (see Table 10-1). This includes providing LSA residents with meaningful incomes (through employment) that enable the purchase of food and support the participation in harvesting activities, and through various related initiatives. Inuit employee harvesting is also permitted at the Project (subject to certain restrictions) although Baffinland’s 2018 Inuit Employee Survey indicates only minimal harvesting is currently conducted (12.1% of respondents indicated they participated in traditional activities</p>

		(e.g. hunting, fishing, harvesting) during their leisure time on site).
<p>Safe travel Around Eclipse Sound and Pond Inlet</p> <p>Safe Travel Through Milne Port</p> <p>Emissions and Noise Disruption at Camps</p> <p>Sensory Disturbances and Safety Along Milne Inlet Tote Road</p> <p>Detour Around Mine Site for Safety and Travel</p> <p>Difficulty and Safety Relating to Railway Crossing</p> <p>Detour Around Steensby Port</p> <p>HTO Cabin Closures</p> <p>Restriction of Camping Locations Around Steensby Port</p>	<p>The EIS predicted the Project could have some negative effects on Inuit travel and camping. These include effects on safe travel around Eclipse Sound and Pond Inlet, safe travel through Milne Port, emissions and noise disruption at camps, sensory disturbances and safety along the Milne Inlet Tote Road, detouring around the Mine Site for safety and travel, difficulty and safety relating to railway crossing, detour around Steensby Port, HTO cabin closures, and restriction of camping locations around Steensby Port.</p> <p>Shipping-related mitigation developed and/or proposed by Baffinland includes:</p> <ul style="list-style-type: none"> • Provision of community public safety awareness campaigns (e.g. informing the community of vessel movements, tracking the route and timing of passage, periodic public meetings and information sessions) • Establishing a detour around Steensby Port, and providing food, shelter, and fuel to detouring travellers. In addition, other mitigation measures have been identified for Steensby Port that will be implemented once that component of the Project is constructed. <p>Road and rail-related mitigation developed and/or proposed by Baffinland includes:</p> <ul style="list-style-type: none"> • Development of a Roads Management Plan (e.g. establishing speed control and signage, ensuring truck operator vigilance, reporting of non-Project individuals) • Public education • The addition of railway crossing locations <p>Mine site-related mitigation developed by Baffinland includes:</p> <ul style="list-style-type: none"> • Various public safety mechanisms (e.g. establishing signage and access barriers, restrictions on entering industrial sites) • Development of a mine closure plan • A Hunter and Visitor Site Access Procedure (an appendix to the Roads Management Plan; Baffinland 2016), which describes how land users can safely access Project facilities at Milne Port and the Mine Site. It further describes Baffinland’s policy prohibiting the public from unescorted travel on the Tote Road. Baffinland will instead transport land users and their equipment on the Tote Road in order to prevent land user-Tote Road traffic interactions. 	<p>Monitoring data suggest Inuit land use activities coexist to some degree with the Project, as local land users have continued to access Project sites since construction began (e.g. 516 land use visitor person-days were recorded in 2018). Various mitigation measures have been established by Baffinland to address effects on Inuit travel, camps, and harvesting. In addition to those already listed, Baffinland has contributed \$750,000 to a Wildlife Compensation Fund (administered by the QIA under the terms of the IIBA) to address the potential for wildlife-related impacts from the Project. Monitoring data indicate the WCF continues to be accessed by Inuit. Baffinland has also established a Harvesters Enabling Program in Pond Inlet through the amended IIBA, whereby Baffinland will contribute \$400,000/year for 10 years for a gas program to allow for more accessible travel to Inuit in the area. Relevant mitigation is thus in place and there is no direct evidence to suggest mitigation measures need to be modified at this time. However, limited monitoring data prevent a more detailed assessment from occurring. In addition, some effects related to the Steensby Inlet rail/port components are not anticipated until those components are built.</p>

9.2.3 Compliance Assessment

There are no Terms and Conditions in the Project Certificate pertaining to monitoring of the Resources and Land Use VSEC.

10. ECONOMIC DEVELOPMENT AND SELF-RELIANCE

10.1 INDICATOR DATA AND ANALYSIS

10.1.1 Project Harvesting Interactions and Food Security

Appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information. Some Project stakeholders have previously suggested adverse effects on harvesting and wildlife have been experienced because of the Project (e.g. JPCSL 2017, 2018). Additional comments on this topic were recorded in 2018. These included comments on the impacts of shipping and noise on wildlife, water pollution from shipping practices, dust contamination and marine life, and the effects of mining and shipping on harvesting in the Project area. Examples include:

This year, they're going to increase the number of ships for the next four years, according to the plan. Especially the hunters there in Pond Inlet, they know the adverse impacts it would have with our environment. It would impact the wildlife. And we definitely have to have a meeting in Pond Inlet on this matter. [2018 IIBA Annual Project Review Forum Participant]

Just the clarification: Those country meat grew up from the country meat, those mammals. And on the land, caribou, Arctic caribou, we always eat them and... we always know where they're going... Baffinland, that impact with the caribou... laboured the caribou, newborn caribou. I remember, when I was in Pond Inlet when I was a kid... those family were walking from caribou hunting, from Pond Inlet to Mary River. They were walking, going for the caribou hunting. It used to be a gathering place for the caribou hunting... Mary River, it used to have caribou all the time. But this time I heard... when the mining start, there's no more caribou. That's what I heard from the people... animals always... they had good ears. Like, those heavy equipments and the other equipments... when they make a noise, the animals always go somewhere else. That's the impact by the Baffinland. [2018 IIBA Annual Project Review Forum Participant]

And this one shipping season, during the shipping, they always came in... through the Pond Inlet. The mammals will be -- will be impact -- will be moving on -- migrate again... it's almost migrating time, those mammals... I wonder what the Baffinland are thinking about the mammals. I wonder if they're being impacted by ship... The 2017 forum project about the Baffinland... now it's on the documentation: money, funding. Those animals on the land will always migrate. [2018 IIBA Annual Project Review Forum Participant]

... the impacts that we are experiencing is very new to us. It's impacting us. And the foxes that come... on site, I think, has been impacted the most. [2018 IIBA Annual Project Review Forum Participant]

We've seen this from the past because of too much shipment -- because there's too much traffic. The ocean is becoming more polluted because of the traffic, because in the past, there used to be Inuit camps, traditional camps. And we chose those traditional camps because of the abundance of the wildlife in that area, like, if there's fish or caribou, seals, and so forth. Like, I talked about this earlier... this has been previously approved, the shipping route... Milne Inlet will be waiting for ship -- waiting for load, to reload. They usually wait, I think --

especially last year, there was too many ships that went everywhere, and they were impacting the wildlife. So, therefore, they have impacted the migration of the mammals. And they usually... the ballast... they get rid of the old water in our Arctic Ocean, and they have noticed that it has impacted the microscopic organisms in our oceans... especially the mammals that go to the Arctic Ocean. They have been contaminated because of the... water being discharged in the Arctic Ocean. It's impacted the ocean. And in Milne Inlet area, it's the fishing ground. Tugaat Lake and Koluktoo Lake has the most abundant fish, and the fish is abundant in that area. And most of the lakes contain fish. [2018 IIBA Annual Project Review Forum Participant]

But we need to make an agreement, and we need to have further studies on the wildlife before they're polluted, before we're too late. And not only working on Inuit employment, we also need to... concentrate on not contaminating and polluting the ecosystem and the wildlife as well. [2018 IIBA Annual Project Review Forum Participant]

Shipping is occurring on hunting grounds and are too many ships are disturbing hunting grounds. [2018 NIRB Public Information Meeting]

Baffinland says that they won't affect us but it is affecting hunters who used to go to fishing sites in Milne Inlet. Now there are no fish. The dust is affecting the fish. Have to go close to Clyde River to fish now. Will there be any compensation to hunters from Baffinland for what they have done to the fish? [2018 NIRB Public Information Meeting Participant]

Concern over potential contamination of marine wildlife from shipping. [2018 QSEMC Meeting]

Concern regarding dust control and that dust must be uncomfortable for animals. [2018 QSEMC Meeting]

Additional comments (not necessarily all related to the Project) on country food and/or food security were recorded in 2018. Examples include:

You also mention in your recommendations about how the site needs to have more country foods available. At the DEW line site, not all of us bring country food with us, but sometimes... they share without asking. And it becomes a problem... because they think they stole our country food because they get taken or lost, because there's not enough country foods available there. [2018 IIBA Annual Project Review Forum Participant]

We've been looking at the fishing industry for ten years and it's positively impacted the community. We work with other communities - Resolute, Arctic Bay, Qikiqtarjuaq, and Grise Fiord... together to contribute to the fishing industry. People on social assistance have to pay a lot of money for products at the stores - up to 3 times more than other communities - so with the fishing industry we can also provide food to people with low incomes at low costs. All communities should work together to help people living on social assistance so they can afford more food. We are planning on doing a sealift order for people living with low incomes. [2018 QSEMC Meeting Participant]

Before they started the work, the construction workers are arriving in the summer and tools are coming up on the second last sealift ship. We can see the economic benefits that will come from this dock. The research ship Nulialuq has been researching sea depths and it was good to see what they can research. From the research we saw what we can harvest from the sea and that will have positive impacts for Pond Inlet. We were able to retrieve information that we didn't have before, such as clam information. We had no idea there were clams right in front of Pond Inlet. We can now see the economic benefit in harvesting clams and shrimps. [2018 QSEMC Meeting Participant]

Harvesting and consumption of country food remains a valued and important part of Inuit culture and diet. The stakeholder concerns expressed about Project effects on harvesting and wildlife are acknowledged. Concerns have also been expressed elsewhere about declining rates of country food consumption and the lack of food security in Nunavut, generally. However, statistical data on these topics are limited (i.e. full Aboriginal Peoples Survey data are only available from 2012 and only at the territorial scale, while 2017 data have yet to be fully tabulated).

Statistics related to harvesting and food security presented below pertain to Inuit aged 15 years or older living in Nunavut. For example, data from the 2012 Aboriginal Peoples Survey (Statistics Canada 2015a) indicate approximately 66% of Inuit hunted, fished, or trapped in the previous year, while approximately 37% hunted, fished, or trapped at least once a week during the season. Likewise, approximately 43% of Inuit gathered wild plants in the previous year, while approximately 29% gathered wild plants at least once a week during the season. Data from the 2017 Aboriginal Peoples Survey (Statistics Canada 2018f) indicate 65% of Inuit hunted, fished, or trapped in 2017, while 37% of Inuit gathered wild plants. These data suggest a declining trend in the harvesting of country food by Inuit in Nunavut.

Achieving food security remains a pressing issue in Nunavut (e.g. Nunavut Food Security Coalition 2014, 2016). Wallace (2014) notes food insecurity refers to situations, when, for example, the food that was purchased does not last, and there is not enough money to buy more; a household cannot afford to eat balanced meals; or household members cut the size of their meals or skip meals because there is not enough money for food. Data from the 2012 Aboriginal Peoples Survey (Statistics Canada 2015b) indicate approximately 25% of Inuit have very low food security, 26% have low food security, while 41% have high or marginal food security. Data on food security from the 2017 Aboriginal Peoples Survey were not available at the time of report preparation.

Data related to harvesting and food security have also been presented elsewhere in this report. For example, Sections 7.1.2 and 7.1.3 provide indicator data on household income and food security (i.e. proportion of taxfilers with employment income, median employment income, and percentage of population receiving social assistance). As noted in Section 7.2.1, there are positive indications the Project makes contributions to improved household income and food security in the LSA, by providing LSA residents with meaningful incomes (through employment) that enable the purchase of food and support the participation in harvesting activities. Baffinland also contributes to various community well-being initiatives directly (e.g. through the IIBA's INPK Fund, school meal program, seasonal country food exchange program, community food bank donations) and indirectly (e.g. through the QIA Legacy Fund and QIA Benefits Fund)¹⁸, which may assist individuals not directly benefiting from Project employment.

Likewise, Sections 9.1.1 and 9.1.2 provide indicator data on the number of recorded land use visitor person-days at Project sites and number of WCF claims. Monitoring data suggest Inuit land use activities coexist to some degree with the Project, as local land users have continued to access Project sites since

construction. Various mitigation measures have also been established by Baffinland to address effects on Inuit travel, camps, and harvesting. Baffinland has further acknowledged the potential for Project-related wildlife impacts and has established a Wildlife Compensation Fund to address this issue; monitoring data indicate this Fund continues to be accessed by Inuit. Inuit employee harvesting is also permitted at the Project (subject to certain restrictions) although Baffinland's 2018 Inuit Employee Survey indicated only minimal harvesting is currently conducted. When 'unknown' results were removed, 12.1% of respondents indicated they participated in traditional activities (e.g. hunting, fishing, harvesting) during their leisure time on site, 37.9% of respondents did not participate in traditional activities during their leisure time on site, and 50.0% of respondents didn't know they could participate in these activities during their leisure time on site. Of note, Article 11.14 of the IIBA allows for harvesting by Inuit employees during their leisure hours, subject to certain restrictions.

The Nunavut Food Security Coalition (2014) has outlined four components of food security (i.e. availability, accessibility, quality, and use) and factors affecting each component (see Table 10-1). Baffinland has acknowledged it can play a role in each of these food security components. However, the Nunavut Food Security Coalition (2014: 2) also highlights food security components "are influenced by many complex factors" and notes "this critical and complex issue is larger than the mandate of any one organization. A collaborative approach is essential."

Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer (Table 10-1). Baffinland has also developed mitigation and monitoring programs that aim to avoid or minimize adverse effects on terrestrial, freshwater, and marine resources important to LSA residents. Baffinland's Annual Report to the NIRB should be consulted for monitoring results and information specific to these topics. Harvesting and food security are complex issues that can be influenced by several factors and this topic will continue to be monitored for emerging trends.

Table 10-1: Food Security Components and Baffinland’s Role

Components of Food Security	Factors Affecting Each Component	Baffinland’s Role
Availability	<ul style="list-style-type: none"> • Family size • Human population size • Grocery supplies • Wildlife stocks • Distribution of wildlife • Environmental conditions 	<ul style="list-style-type: none"> • Providing employees with ample and healthy food choices while on site • Avoidance/minimization of adverse effects on the biophysical/socio-economic environment and on terrestrial/freshwater/marine resources utilized by LSA residents (verified through annual monitoring)
Accessibility	<ul style="list-style-type: none"> • Cost of food • Income levels • Gambling and substance abuse • Transportation effectiveness • Strength of sharing networks • Access to hunting grounds • Climate change 	<ul style="list-style-type: none"> • Providing LSA residents with meaningful incomes through employment that enable the purchase of food and support the participation in harvesting activities • Direct and indirect contributions to community well-being initiatives (e.g. INPK Fund, school lunch program, seasonal country food exchange program, community food bank donations, community feasts, and indirect contributions to the QIA Legacy Fund and QIA Benefits Fund) • Employee support through the EFAP, on-site Cultural Advisors, and the Community Counsellors Program • Avoidance/minimization of adverse effects on the biophysical/socio-economic environment and on terrestrial/freshwater/marine resources utilized by LSA residents (verified through annual monitoring) • Permitting Inuit employee harvesting during leisure hours (subject to certain restrictions) • Permitting Inuit non-employees to access Project sites and participate in harvesting activities (subject to certain restrictions) • Establishment of a Wildlife Compensation Fund to address potential impacts (\$750,000 in compensation has been set aside for Inuit harvesters for incidents of loss or damage relating to wildlife due to the Project) • Establishment of the Harvesters Enabling Program in Pond Inlet (\$400,000/year for 10 years, to provide gas to support local travel and harvesting activities)
Quality	<ul style="list-style-type: none"> • Nutritional knowledge • Health of store-bought food • Wildlife health • Food spoilage • Environmental contaminants 	<ul style="list-style-type: none"> • Providing employees with ample and healthy food choices while on site • Establishment of country food kitchens at the Mary River and Milne Port sites • Avoidance/minimization of adverse effects on the biophysical/socio-economic environment and on terrestrial/freshwater/marine resources utilized by LSA residents (verified through annual monitoring)
Use	<ul style="list-style-type: none"> • Traditional knowledge • Food preparation skills • Budgeting skills • Literacy rates • Language barriers 	<ul style="list-style-type: none"> • Completion of a comprehensive Inuit Qaujimagatunqangit study (on several topics, including harvesting), the results of which are publicly available • Establishment of country food kitchens at the Mary River and Milne Port sites • Commitment to offer financial management training and support to employees • Commitment to offer literacy and numeracy training to employees • Support for the use of Inuktitut at Project sites

Notes: Food security components and factors affecting each component were sourced from the Nunavut Food Security Coalition (2014).

10.2 EFFECTS AND COMPLIANCE ASSESSMENT

10.2.1 Effects Assessment

No residual effects specific to the Economic Development and Self-Reliance VSEC were assessed in the EIS. Rather, an integrated assessment of other VECs/VSECs was conducted for this VSEC. Relevant monitoring of residual effects continues to be conducted through other VECs/VSECs.

10.2.2 Compliance Assessment

There is one Term and Condition in the Project Certificate pertaining to monitoring of the Economic Development and Self-Reliance VSEC. The status of this is summarized in Table 10-2.

Table 10-2: Terms and Conditions for Monitoring the Economic Development and Self-Reliance VSEC

Term and Condition No.	Description	Status
148	The Proponent is encouraged to undertake collaborative monitoring in conjunction with the QSEMC’s monitoring program which addresses Project harvesting interactions and food security and which includes broad indicators of dietary habits.	Baffinland has presented some information on Project harvesting interactions and food security in the Socio-Economic Monitoring Report. Baffinland has also presented related information on household income and food security, and on land user-Project interactions in this report. Baffinland continues to engage the QSEMC and SEMWG on its socio-economic monitoring program. This Term and Condition is more fully addressed in the following sections of the report: Section 1.2, Section 7.1.2, Section 7.1.3, Section 9.1.1, Section 9.1.2, and Section 10.1.1.

11. BENEFITS, ROYALTY, AND TAXATION

11.1 INDICATOR DATA AND ANALYSIS

11.1.1 Payroll and Corporate Taxes Paid by Baffinland to the Territorial Government

The value of payroll and corporate tax payments by Baffinland to the Government of Nunavut helps demonstrate the Project's effect on revenues flowing to the territorial government. In 2018, Baffinland paid \$5,117,466.81 in employee payroll tax and \$5,938,059.00 in fuel tax to the Government of Nunavut.

11.2 EFFECTS AND COMPLIANCE ASSESSMENT

11.2.1 Effects Assessment

There was one residual effect for the Benefits, Royalty, and Taxation VSEC assessed in the EIS. Monitoring results applicable to this are summarized in Table 11-1.

Table 11-1: Effects Assessment for the Benefits, Royalty, and Taxation VSEC

Residual Effect	Summary	Monitoring Results
Project Revenues Flowing to the Territorial Government	The EIS predicted the Project would have a beneficial effect on revenues (e.g. through taxes) flowing to the territorial government. No specific mitigation measures were developed to support this prediction.	The Project continued to pay taxes to the Government of Nunavut in 2018. This is consistent with the EIS prediction of positive effects from the Project occurring on revenues flowing to the territorial government.

11.2.2 Compliance Assessment

There are no Terms and Conditions in the Project Certificate pertaining to monitoring of the Benefits, Royalty, and Taxation VSEC.

12. GOVERNANCE AND LEADERSHIP

12.1 INDICATOR DATA AND ANALYSIS

No monitoring indicators have been developed for the Governance and Leadership VSEC.

12.2 EFFECTS AND COMPLIANCE ASSESSMENT

12.2.1 Effects Assessment

No residual effects were identified for the Governance and Leadership VSEC in the EIS.

12.2.2 Compliance Assessment

There are two Terms and Conditions in the Project Certificate pertaining to monitoring of the Governance and Leadership VSEC. The status of these are summarized in Table 12-1.

Table 12-1: Terms and Conditions for Monitoring the Governance and Leadership VSEC

Term and Condition No.	Description	Status
168	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 QSEMC.	Baffinland has presented information (where available) on demographic change, barriers to employment for women, Project harvesting interactions and food security, and potential indirect Project effects such as substance abuse, gambling, rates of domestic violence, and education rates in the Socio-Economic Monitoring Report. Baffinland also continues to engage the QSEMC and SEMWG on its socio-economic monitoring program. This Term and Condition is more fully addressed in the following sections of the report: Section 1.2, Section 3.1.1, Section 3.1.2, Section 3.1.3, Section 3.1.4, Section 4.1.2, Section 4.1.3, Section 5.1.5, Section 5.1.6, Section 7.1.5, Section 7.1.6, Section 7.1.8, Section 7.1.9, and Section 10.1.1.
169	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.	Baffinland has provided a summary of regional and cumulative economic effects in the Socio-Economic Monitoring Report. This Term and Condition is more fully addressed in Section 13.1.2 of the report.

13. CONCLUDING REMARKS

13.1 SUMMARY

13.1.1 Report Summary

This report helps accomplish the objectives of the monitoring program (presented in Section 1.3) in several ways. Namely, this report has provided an assessment (in Sections 3 to 12) of selected socio-economic effects that were predicted to occur in the Project's EIS (Objective 1). This assessment has also provided insight into the functioning of Baffinland's socio-economic management and mitigation measures (Objective 2). Likewise, this report has provided information (in the 'Compliance Assessment' sections) that may assist regulatory and other agencies in evaluating Baffinland's compliance with socio-economic monitoring requirements for the Project (Objective 3). Finally, this report supports adaptive management for the Project, as issues identified in this report will continue to be monitored and opportunities for potential performance improvements may be assessed (Objective 4). Section 13.2 contains additional information on adaptive management measures.

13.1.2 Summary of Regional and Cumulative Economic Effects

The Project continues to make positive contributions to Nunavut's economy. As noted previously, 3.1 million hours of Project labour were performed by Baffinland employees and contractors in 2018, equal to approximately 1,529 FTEs. Of this total, 435,908 hours were worked by Inuit, representing approximately 216 FTEs. A total of 11.9 million hours of Project labour have been performed since Project development, of which 1.9 million hours have been performed by Inuit. In addition, \$12.0 million in payroll was provided to Baffinland Inuit employees in 2018 and, since 2014, Baffinland has provided \$45.2 million in payroll to its Inuit employees. Likewise, \$140.9 million was spent on contracting with Inuit Firms in 2018. A total of \$960.0 million has been awarded to Inuit Firms since Project development.

When compared to annual economic outputs for Nunavut as a whole, these values are notable. In 2017 (the most recent year estimates were available), for example, there were a total of 18,345 jobs held in Nunavut and 32,677,000 total hours worked (Nunavut Bureau of Statistics 2018g), with average weekly earnings of \$1,329.54 per employee (Nunavut Bureau of Statistics 2018h). By comparison, hours worked by Baffinland's employees and contractors in 2017 (i.e. 2,380,990) represent 7.3% of the Nunavut total.²⁵ Average weekly earnings of Baffinland's Inuit employees in 2017 were also higher than the Nunavut average, at \$1,719.17.²⁶

Mining remains an important contributor to the Nunavut economy. Nunavut's real gross domestic product (GDP) for all industries in 2017 was \$2,228.1 million.²⁷ Of this amount, '*mining, quarrying, and oil and gas extraction*' was responsible for contributing \$391.4 million (or 17.6%). Mining may also

²⁵ This is a general estimate only, as not all Project hours were necessarily worked in Nunavut (see Section 2.3)

²⁶ Baffinland Inuit employee numbers (93) and payroll amounts (\$8,313,897.59) for 2017 were presented in Baffinland's 2017 Socio-Economic Monitoring Report (JPCSL 2018). Inuit employee numbers in 2017 were calculated based on the average of quarterly totals. Weekly employee earnings are thus an estimate and may not fully reflect average amounts for the year.

²⁷ The Bank of Canada (2016) notes real GDP is "the most common way to measure the economy... GDP is the total value of everything - goods and services - produced in our economy. The word "real" means that the total has been adjusted to remove the effects of inflation." The real GDP amounts by industry presented by the Nunavut Bureau of Statistics (2018i) are in chained 2007 dollars.

make economic contributions to supporting industries such as *'construction'* (\$310.8 million contribution to the Nunavut economy in 2017), *'transportation and warehousing'* (\$53.8 million contribution to the Nunavut economy in 2017), and *'accommodation and food services'* (\$25.8 million contribution to the Nunavut economy in 2017), among others (data sourced from Nunavut Bureau of Statistics 2018i). The Mary River Project has likely been an important contributor to these amounts, as has Agnico Eagle Mines Limited's Meadowbank Mine and TMAC Resources Hope Bay Project (Nunavut's only other operating mines in 2017), and several other Nunavut-based mining projects that were in various stages of development in 2017. Mining in Canada, generally, contributed \$57.6 billion to the country's GDP, or 3.4% of total Canadian GDP (in 2016). The industry also directly employs more than 403,000 individuals and remains the largest proportional private sector employer of Indigenous peoples in the country (Mining Association of Canada 2018).

No negative regional or cumulative economic effects directly associated with the Project were identified in 2018. As such, no mitigation measures have been proposed to manage negative effects.

13.2 ADAPTIVE MANAGEMENT

This report has identified various positive effects of the Project and presents information that is consistent with several EIS predictions. However, some monitoring data have revealed unclear, inconsistent, or otherwise negative trends. Long-term monitoring will be necessary to track Project outcomes more fully over time and may contribute to an improved understanding of observed trends and causality. However, no need has been identified to substantially modify Baffinland's existing management/mitigation approach at this time. Project benefits are being delivered and actions continue to be taken by the Company to address issues that have been identified. It is also likely some Project benefits will take time to be fully realized. Likewise, the negative trends observed for some monitoring indicators are not all necessarily due to the Project, and there is currently no direct evidence to suggest key EIS predictions are inaccurate (although additional monitoring may be necessary in some instances).

LSA employment in 2018 was largely consistent with EIS predictions, although Iqaluit employment was somewhat less than predicted. There were also several Inuit employee departures noted. Inuit employment, contracting, and Inuit employee turnover are areas Baffinland has committed to continue addressing in 2019, and several initiatives are occurring in support of these efforts. This includes ongoing implementation of the IHRS (Baffinland 2018b) and IPCS (Baffinland 2017). The IHRS is a strategic document for Baffinland and describes goals and initiatives that will be used by the Company to enhance Inuit employment, training, and skills development at the Project. The IPCS addresses several Inuit contracting requirements contained in the IIBA and identifies preferential opportunities and procedures for Inuit Firms to contract with Baffinland.

Baffinland and QIA are also partners in the Q-STEP training program. Q-STEP is a four-year initiative being undertaken 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 consists 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.

Likewise, the IIBA was renegotiated in late 2018 (QIA and Baffinland 2018) and includes various commitments that may assist with increasing Inuit employment over time (e.g. Work Ready Program, Baffinland Apprenticeship Program, Inuit Internship Program, hiring of Inuit Recruiters, \$10 million

commitment to a Baffinland Inuit Training Centre in Pond Inlet, establishment of annual Minimum Inuit Employment Goals). Continued monitoring of Inuit employment hours, Inuit employee turnover, and initiatives described in the IHRS, IPCS, Q-STEP, and IIBA will be needed to evaluate outcomes over time. More generally, Baffinland has committed to using adaptive management as a tool to identify and make necessary improvements to the Project's socio-economic performance in the future.

Effectiveness of the Project's socio-economic monitoring program will also continue to be evaluated in an ongoing manner. This may lead to future modifications of the Project's Socio-Economic Monitoring Plan (i.e. Baffinland 2018a), indicators used, and/or methods of analysis employed. Likewise, Baffinland has acknowledged data limitations currently exist for certain aspects of the monitoring program and welcomes feedback on potential program improvements. Baffinland also anticipates monitoring may cease for some indicators in the future, especially where EIS predictions have been sufficiently verified over time. Should the need arise to significantly modify the Project's monitoring program, the SEMWG will be consulted.

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APPENDIX A: 2018 QSEMC & SEMWG MEETING MINUTES

QSEMC Meeting, June 20, 2018 - Pangnirtung, NU

Attendees

Gabrielle Morrill - Iqaluit
Bethany Scott - QIA
Kimberly Masson - Embrace Life
Meeka Mearns - NBS
Timoon Toonoo - Cape Dorset
Mialiralaaq Judea - Kimmirut
Joshua Katsak - Pond Inlet
Jaypetee Audlakiak - Hall beach
Eljassie Kavik - Sanikiluaq
Mary Ann Qiyutaq - Qikiqtarjuaq
Andrew Moore - Baffinland
Jason Prno - Consultant for Baffinland
Rhoda Katsak - EDT
Chantelle Masson - EDT
Erika Zell - EDT
Frank May - Arctic Bay
Celestino Uyarak - Igloolik
Sandy Kautuq - Clyde River
David Abernathy - INAC
Stevie Komoartok - Pangnirtung
Luc Brisebois - QIA

Minutes

Opening remarks by chairperson - Speak in your most comfortable first language throughout the meeting. We have Baffinland representatives here. During the meeting if you have a question and you didn't say anything you can email me or write a letter with any questions, even after the meetings. Anything you read about and bring home you can ask me.

Mayor of Pangnirtung - I recognize many people around the table. Welcome everyone that is here.

Community Roundtable

Arctic Bay - The mine has a big impact on our community - 25 or so people working from Arctic Bay. I saw somewhere its 1.7 million in gross wages. From my point of view the impact from the mine has been positive. We've had a lot of exposure to the mine. A lot of people understand what's expected from the mine since Nanisivik has also been active there for quite a long time. The fiscal input for the minds also contributes to items such as Christmas hampers in communities. There's more money with Mary River than there was with Nanisivik. We are seeing some family issues with regards to rotational work. It takes a strong relationship at home to make it work but as of yet I haven't heard of any major issues concerning that aspect of the schedule.

Igloolik - Last year in Igloolik in regards to Baffinland's Mary River before an MOU was in place we are looking at their business plans. Igloolik people in the Hamlet are working much closer with Baffinland especially in construction of the roads leading to the mine. We are working on

some projects with Baffinland and one of those is a metal project. I can see the benefits that will come with that. During winter maybe an ice road could be constructed as its very flat. We had two close calls in terms of safety, but the age of the people was also a factor. Very large terrain so search and rescue do have to come around. In Hall Beach there are no docks, we want to work with other agencies to come up with programs to benefit the communities with services.

Clyde River - I went on the radio quite a bit to find out what the people would like me to bring forward to the meeting but didn't get any calls. I see people going to work at the mine, I see a lot of young people quitting school. This is something we should be targeting. Quitting school impacts their lack of employment later on in their lives.

Pang - We've had a lot of development with youth projects up until 2015 when we lost our funding. We've been lucky to have a society take over the youth center. Implemented a soup kitchen that serves 3x a week to roughly 30-6- people. Peregrine Diamonds have a project close to our community and we were hoping to see them today to get some information from them. Quite a few social issues in the community had roughly 12 attempted suicides in February. Drug and alcohol abuse is high in the community and roughly 90% of crime statistics are alcohol related. Pang will be very interested in learning from communities with mines nearby. There are very few to no people in the community working at the mines. We are interesting in knowing what other community's impacts to social well-being were with employment at the mine? Many of the communities will know about both positive and negative impacts and we are interested to learn what other's experiences are.

Iqaluit – Iqaluit has been seeing a lot of economic growth. 30 new businesses opened this year - most by non-beneficiaries. The beer and wine store opened this year, so some community members feel there is a lot more alcohol consumption happening and have seen some violent crimes. Number and severity of crimes has increased. Youth have a lot of high hopes with careers that they can follow but a few have said they are interested in work at the mine and QIA's training opportunities. Iqaluit has seen some in-migration from other communities. Some have partner's working at the mine and they hope to find employment and childcare. It may be better to break-down numbers by the community instead of regional/territorial.

Grise Fiord - We are now at about 130 residents - The alcohol and drug issue is also affecting our community. We are open without restrictions. Youth are trying out new drugs or alcohol and sometimes they over-indulge and we recognize that - it's normal for young people to try new things. People coming from other communities with restricted alcohol rules come to Grise Fiord and order large amounts of alcohol. As the alcohol committee we tell them to limit their alcohol intake since it has a large impact on families. We don't want to see alcohol being a major disruption in families' lives. If you're restricted in a community you are probably breaking the law to drink more. Before the children graduate school we try to teach them about what are acceptable limits so that if you're drinking, you're drinking responsibly. Unfortunately our students in the higher grades have been dropping out. We had graduates this year that we are very proud of. Only when they do their departmental exams do we know if they pass grade 12. It's always good to see students in the higher grades participate in activities such as sports to get out of their home community. We recently had a youth go to Indigenous games and Arctic Winter Games and they both got medals. It's a good opportunity to keep youth healthy and gives them exposure to other communities and cities. Not enough jobs available in Grise Fiord, we have no daycare. The daycare closed and now we are really hoping we can get another daycare opened. We have a privately owned gas bar that benefits the community economically. If we see someone coming in to sell liquor without a permit, the police are very active. When they hear of bootleggers, they meet them at the airport to stop negative impacts to the

community. There are many old houses that once housed police that need to be renovated. We have to work on beautifying the community. We had a small amount of seal pups because of the bad ice conditions due to a changing climate. There are many people who want to work at Mary River but a lot of people don't want to move to another community because it would impact their families. Some have moved to the south. We've been looking at the fishing industry for ten years and it's positively impacted the community. We work with other communities - Resolute, Arctic Bay, Qikiqtarjuaq, and Grise Fiord work together to contribute to the fishing industry. People on social assistance have to pay a lot of money for products at the stores - up to 3 times more than other communities - so with the fishing industry we can also provide food to people with low incomes at low costs. All communities should work together to help people living on social assistance so they can afford more food. We are planning on doing a sealift order for people living with low incomes. We are a happy community; we use the radio quite a bit especially when something affects the community we rally behind to family to come up with solutions.

Cape Dorset - The Co-op has been running very well. Kingait is a good resource for the community and work with other museums and galleries and do in-house artist presentations. We are working with better partnerships between Kingait and the co-ops. We are developing a local culture center on the culture industry signed to be manned by the hamlet employees. People who go to Dorset can purchase their art at the culture center that the hamlet and co-op are working together to build. The plans to open are in motion and we hope that the GN can assist us. GN employees will be going to the opening. GN has assisted in the construction of the building, and all partners at every level are invited to the opening. The Community Economic Plan is going ahead and is being used quite a bit, especially when we need new employees it's a good database to go to. This has been in motion for the last few years. Baffinland were never really a big part of our community but for airfare and meals they have been quite open and Dorset is seeing benefits. At the Hamlet level, the metal project is what we've been working on. It started last year and already had a positive impact. All the old cars, ATVs, anything metal related is being used in different ways. We are also working on the sewage and water pumps and fixing those since they are so outdated. We would also like those to be looked at by the Government. We try to assist all the businesses in the communities - Dorset Suites is doing very well. There is also a mechanical shop for cars and skidoos. They are working on the community economic plan and using different ventures for that.

Kimmirut - I haven't gathered a whole lot of information for this meeting. Everything seems to be fine; I try to assist individuals and the community as a whole. The sub-committee is tourism but due to having no EDO we don't meet very often. The job has been open for some time but no one has been applying. The EDO position changes quite a bit year to year and it makes it hard to gather information.

Pond Inlet - The dock (small craft harbor) construction has started and we thank EDT for providing funds and making this happen. Before they started the work, the construction workers are arriving in the summer and tools are coming up on the second last sealift ship. We can see the economic benefits that will come from this dock. The research ship Nulialuq has been researching sea depths and it was good to see what they can research. From the research we saw what we can harvest from the sea and that will have positive impacts for Pond Inlet. We were able to retrieve information that we didn't have before, such as clam information. We had no idea there were clams right in front of Pond Inlet. We can now see the economic benefit in harvesting clams and shrimps. Numbers of employees from Pond Inlet has been dwindling; we also see an impact from alcohol consumption. We knew ahead of time a lot of people would be leaving to work there and that there would be both negative and positive impacts. What we have

seen with alcohol is not good. Not just up in Pond but other communities too. We've had to let go of employees due to their alcohol consumption. We heard of one person making their own moonshine and drinking it up at the mine. We are aware of that problem - when you have a lot of money coming in it can impact the community. We are trying to educate about these impacts of having a mine nearby. Treatment options could be given to employees but there are no treatment facilities in Nunavut. The socio-economic impacts aren't really looked at or discussed. We are looking more into these impacts and how we can assist people who are making good money and how to be responsible with this money.

Baffinland - We appreciate you raising this concern and we do have resources for employees to help with these types of issues. One of these is the Employee and Family Assistance Program that employees can call a hotline 24/7 in all languages. Customized counselling for any issues including drug and alcohol, troubles with supervisors, etc. We've had a good uptake of individuals accessing this programming. We are always looking for solutions to help with negative impacts on and off the mine site.

Hall Beach - We received a letter inviting us to this meeting and the EDO was unable to attend. We are still without a dock but it's good to hear that some work will be done this year to look at the feasibility of dock construction. We are able to see lands now that we were never able to see before so climate change is impacting our community. As the permafrost thaws we will be seeing more changes of the land. When I was running for hamlet counsellor I was really vying for a dock which I think is why I got elected. We've lost a lot of boats because of the lack of dock and this costs people a lot of money to replace. Our public housing has a lot of mold issues. We are working with our MLA to fix this. One of our Hamlet staff houses is affected and we don't know if we can keep our hamlet employees if they don't have good housing. One of our employees wasn't sure if they would stay in the community since they don't have housing. Igloolik and Hall Beach are close to each other and we try to work together and keep our communication lines open as to how we can work together to create solutions for development. When we have the same vision it makes partnerships easier.

Sanikiluaq - For the last two months we've had no EDO and we are actively looking for one. We are seeking funds from other agencies. We have a new health center being constructed and a new water facility and expanding the dump. We are also looking to adding new roads to accommodate the increasing population. The recreation department will be doing day camps this summer for children. I don't know how we can participate more in employment and contracting with the mining industry. We would like to work more with the Mary River project. This summer and fall Sanikiluaq will be hosting the Elder meetings. Elders come from Nunavut and Nunavik.

Qikiqtarjuaq - Our mayor could not attend so I am here on behalf of the Hamlet. The garbage at the dump sometimes goes into the water reservoir and so we are working on that and we hire employees for a couple of days to clean up garbage around the community.

Nunavut Bureau of Statistics

Arctic Bay - Is there information on attendance rates on NBS website?

NBS - You have to ask Department of Education

Arctic Bay - Your total population numbers about 100 people higher than what CGS is using in their information

Igloolik - We see high population increases. We have seen some numbers different at the community level than what's being used at the government level.

NBS - There's two different ways of doing statistics - the ones from Statistics Canada that we get here they do counts every 4 years. They go to the houses and that's who we get our information from. That's where there may be some confusion

Igloolik - At the local level we know there were 20 births in the month of January.

Iqaluit - Population estimates - are transients measured? Municipally we are struggling to keep up with infrastructure demands.

NBS - We have a small office and we rely on Statistics Canada.

Embrace Life Presentation

Igloolik - We've been working with embrace life over the years. This information has helped us a lot. Last year we had a lot of instances and we try to help any way we can. We got the community involved to develop some action plans. We have a community wellness community working together to help improve community members lives. It has helped a lot, I'm sure many communities have the same issues. There are ways to find solutions when we work together.

Iqaluit - in Iqaluit we had two murder suicides and an Elder wanted to put on a program on "what is love?" vs. "what is abuse?" She would like to find training for a program like this and turn it into something more Inuit culturally appropriate.

Embrace Life – There is a program out of Rankin developed specifically for Inuit by Inuit. It's a family violence education program run through department of Justice. It's also delivered in schools. If the Elder wants a copy, I can provide.

Lunch Break

Meeting Resume at 1:15

Chairperson – This is a reminder that this is a discussion forum, we are a committee that can bring information back to our workplaces. If you want to share more information on impacts on your community and what you've seen please feel free to share. All of the reports from this committee meeting are shared with the NIRB.

****Arctic Bay - would like to see all the documents prior to the meeting *** ACTION ITEM FOR NEXT YEAR – Send all presentations and documents prior to meeting**

Indigenous and Northern Affairs - Nunavut General Monitoring Plan

Igloolik – The mayor met a group with the University of Ottawa and CGS came at the same time and we wanted them to meet with and talk to us about our drinking water. 2015 we ran out of water. Two years later they came to test how our water has improved - in Igloolik our water has to be snow or tap water because our drinking water has high levels of chlorine and we can't drink. I hope to see this improve in the future.

INAC - I understand CGS has worked with universities to look at these issues and make informed decisions. I should also note that we issue calls for proposals for projects (with one coming out in the fall). So I encourage you to think about NGMP and contact me about the programs we fund. They have to benefit community members so please share what your concerns are. You can also submit proposals for funding to do these projects. If there's an issue that's important to you we want you to come to us and perhaps create partnerships to do this research.

Baffinland - Introduction to Project and Update on Socio-Economic Monitoring Program Results

Baffinland has conducted a number of workshops with Elders in communities to discuss the best way forward with the updated phase 2 proposals.

Through the IIBA, QIA and Baffinland give preferential hiring to Inuit in the Qikiqtaaluk region with a focus on the 5 LSA communities. Also, Baffinland has committed to hiring Inuit from all Qikiqtaaluk communities. Baffinland will work with community members and has looked at covering expenses in working towards employment at the mine.

Pond Inlet - Is Baffinland making efforts to work with EDOs in the communities?

Baffinland - Yes this is something we are looking at. Baffinland hopes to make it as easy as possible for individuals to apply for employment at the mine. Not only to post these job opportunities, but finding the easiest way for people to apply for jobs at Baffinland.

Iqaluit - Do you know what communities they are moving into and out of in the LSA?

Baffinland - We have that data but if it's a single individual due to confidentiality reasons we can't necessarily report on this.

Iqaluit - I would like to look at how many people are moving into Iqaluit, is this possible?

Baffinland - yes we can look at the data sets for this information – ****Action Item – Share these data sets if possible**

Arctic Bay - What is the difference in the kind of jobs being done if you work directly with Baffinland vs. working as a contractor

Baffinland - We are a mining company so the general scope of work in general terms is that you're working in mine operations. However, drilling and blasting is done by contractors. Flight operations are contractors. Maintenance on the tote road is done by Baffinland employees. We have two kinds of contractors - service contractors (emergency electrician, power plant issues) and then we have workforce contractors - They provide services in emergency instances such as contracting flights if there are issues with charter flights not being able to come in from communities.

Pang - In the other section on the "other Nunavut" section on the table on page 13 it's all 0's. Why is that?

Baffinland - We have a commitment to hire from the Qikiqtaaluk region, it's also a lack of applications from other regions.

Pang - I know there are people working at the site even though it's not listed on the table.

Baffinland - That's a data gap and we will look into that

Arctic Bay - For heavy equipment training are you including training outside of the Mary River site?

Baffinland - You have to go through the site-specific training (specifically for safety reasons). Q-Step has also been initiated to provide a number of training aspects including pre-employment and apprenticeships. All individuals that complete this training will offer employment to all successful trainees. 48% of training hours went to Inuit in 2017.

QIA - Can you provide more information on school literacy and lunch programs?

Baffinland - We are currently providing school lunch programs at 3 schools. What we are going to do is help bring some learning opportunities into schools. So the food will be made at hotels and co-ops, but students will be cooking and serving, so will be learning at the same time about food safety and culinary skills. We also donated books to school libraries in the north Baffin communities. Through this initiative we were able to talk about opportunities at Baffinland and what education is required to gain this employment. This allowed Baffinland the opportunity to talk about the importance of staying in school to gain future employment.

Pang - Our youth are just starting to understand how important it is to have money in their pocket, have education, and the importance in saving money for the long-term. This is why you need to keep coming to the schools and remind students. It's only in the last few decades that we started attending school and it's only in the last 10-20 years we've been taught how valuable it really is to go to school. That's why we need companies to come to visit schools to keep our youth informed.

Baffinland - We agree and we are taking steps to do that. Our CEO's tour was an initiative related to this. They went into schools to talk about how important it is to keep attending school and to get an education to gain employment. We have people attending career fairs in schools, we attend graduations, and we encourage graduates and current students. Every graduate from the north Baffin receives a laptop from Baffinland with our laptop program.

Pond Inlet - QIA has the QSTEP program - are they working together with Baffinland?

QIA - The partners are Baffinland, QIA, Kakivak, Government of Nunavut and Government of Canada

Clyde River - We are very thankful for the laptop program but is there something else Baffinland can provide such as cell phones? Youth are using cell phones more than laptops these days.

Baffinland - This is something we can definitely take back and discuss. - ****Action Item – Baffinland to discuss the option of a cell phone program vs. laptop program**

Pang - Are there companies in Nunavut doing bear monitoring in Mary River? We have community members that haven't heard of that being an opportunity.

Baffinland - We do have bear monitors and they are contracted so it is people already employed by who we are contracting

EDT - Maybe some of these jobs that are open could be employed by Inuit (referring to slide13). Are there opportunities for more Inuit to be employed?

Baffinland - Yes there are initiatives and the important part of this report is that we can break down what things we are doing well and what things need improvement. Later we will talk about what things the company is doing to increase Inuit employment.

QIA - What are the reasons for such high turnover rates?

Baffinland - We report to QIA quarterly in our IIBA report. Generally we've heard 3 common comments on why staff leave Baffinland – 1) Found a job in my home community 2) Dislike of rotational work 3) Stress on family.

QIA - So this isn't only voluntary turnover rate?

Baffinland - This is terminations, individuals who quit, didn't pass their probation period, and no contract renewal.

Arctic Bay - Is there a way to compare turnover rates in other provinces at mines as well as GN turnover rates, and other companies?

Baffinland - Yes we do compare these rates. We also understand that there are high turnover rates in other companies in Nunavut and we can compare those numbers.

Baffinland does not turn a profit. All of our money is from our investors. That is why the phase development is so important so that we can get out of a deficit and get into a profit phase.

Iqaluit - Why did procurement values skyrocket in 2017?

Baffinland - 2017 was a construction phase year which involves a lot of contracting. Construction years are the big spending periods in a project.

Apprenticeship program is implemented right now. The company is very hopeful that every graduate of that 4 year program (on the job and apprenticeship) will all want to stay working for Baffinland or one of its contractors. To be an apprentice you must be registered with the GN by writing a pre-trades exam. Baffinland provides support to ensure that Nunavummiut can and will pass this exam.

EDT - A comment that was made on the Pond Inlet radio that it's so hard to hire Inuit. It's discouraging that you open the position but nobody applies. Another comment was that "when we get hired, we are hired for a position but when we get to site it's only a labor job. We applied for a different position but are hired for general labor positions". Ten positions were open - maybe 4 could be filled by Inuit? How many vacant positions were open but nobody managed to grab the opportunity. Do you have those numbers? What positions are possibly available?

Baffinland - We do not have those statistics right now. We have numerous positions open with a lot summer positions. We are targeting Inuit employees for every single position at the company but we don't have the specific statistics.

Pang - How many years' worth of mining do you believe there are?

Baffinland - 100 years but there's still a lot of exploration to do. The exploration that has been done to date shows the iron is at the highest grade and is sustainable for at least the next 100 years.

Pang - Are employees bringing drugs and alcohol on-site?

Baffinland - We have a zero tolerance policy and bags are screened before employees come on-site

Cape Dorset - In regards to turnover rate, do you monitor the gender of turnover.

Baffinland - We do capture that information we just don't report on it in this monitoring program report. I can provide that information if people are interested.

Qikiqtani Inuit Association

Igloolik - Will there be another survey in the next 5 years?

QIA - 2019 or 2020 would like to survey again. It depends on funding, capacity to coordinate the project, etc.

Igloolik - The self-reported gambling numbers might be a little low.

Baffinland - Would you do the same communities again?

QIA - Yes

Baffinland - You asked the question about community consultation, 69% said not enough, was the question general, specific to mining, government, etc.

QIA - I believe it was quite general but I can double check.

Embrace Life – In regards to the dialogue about social networking, were there discussions or questions about social media?

QIA – The questions focused more on face-to-face dialogue and didn't focus so much on social networking.

Pang - Government of Canada sent in people to do the census and going house to house and did not bring interpreters and did not understand what is needed going door to door. The way you performed the census seems like a much better approach.

QIA - The contractor hired on to help develop the census went on to hire at least two of our community researchers to help the Department of Health in doing their own (unrelated) survey that the contractor was helping Health develop and implement.

QIA - There is a final report on the website and is currently being translated.

EDT - In Baffinland's presentation there is a slide on data gaps and it has gambling issues as one of those gaps but I see you presented on it and collected it - can you share this?

QIA - We can share it. We don't do the survey annually but it is information all stakeholders can use in monitoring. - **** Action Item – QIA to share results of gambling issues data**

Closing Statements for afternoon session

EDT - After supper please consider everything that was presented today and come back with questions and observations. Are there things that you aren't seeing? Are there items you would like to discuss more? We won't have any presentations, just more discussions.

End of Afternoon

Evening Session - Open Discussions, Q & A, Roundtable

Iqaluit - On social media there was a disturbing article about a woman reporting that she was sexually harassed at the Baffinland mine and some posts from employers talking about Inuit women at the Mary River site. Regarding the 46% turnover rate numbers - who was delivering this survey to the staff to get these reasoning's behind their leaving?

Baffinland - The CEO delivered a statement on this today. The company was very disturbed to read this online, we want the employees to be comfortable to come to HR and Elders. A full investigation will be done and if these allegations turn out to be true, these individuals will be terminated. Second part of the question - in the presentation, when we report turnover it's all encompassing (quit, dismissed, end of contract, temporary position). We also look at it quarterly because in the summer we have many more employees than in other seasons. So through the reporting, that counts as turnover too. We report to QIA about turnover and employee retention rates. We offer employees exit interviews, but these are voluntary. With Inuit employees this interview is done with an HR representative and Elders.

Iglolik - Last year we discussed potential visits to Mary River for Mayors and administrative staff. Is this an option, has this option been explored?

Baffinland - If you can find a time to make it work, email us with dates and names of Mayors/staff and Baffinland can make that work. - **** Action Item – Community Mayors to send information to Baffinland to organize site visits**

Pang - General observation as a nurse working with clients from the mine over many years. It is not uncommon that STIs are contracted on the mine site. Do any of the mines have clear responsibilities and accountability to ensure that public health measures are being implemented? This is a common impact on social and family well-being. Does the Government provide any regulations or Government inspections on the mines in this respect? Or on the health and well-being of families and individuals? If there is no such public health accountability, were there any thoughts to implement such a thing or these protocols?

Baffinland - We have an MOU with the GN for the provision of certain health services. For employees at the mine, they have to go through pre-employment checks, including a medical exam. This is in place to protect the individuals and avoid any unknown medical incidents due to any underlying medical conditions. On-site we have 2 physician assistants to provide check-ups and guidance on various health matters. We do have to report through the NIRB about

communicable diseases on-site. Project certificate condition 154 asks Baffinland to report on rates of STI's and communicable diseases.

GN - Regulations exist under the Public Health that requires the reporting of incidents of communicable diseases, including sexually transmitted infections. Department of Health is working very hard to ensure that Companies provide STI testing on-site, there may have even been agreements made in some of the new project terms and conditions in other Projects agreeing to provide this testing.

Pang – This should be followed up on by the socio-economic monitoring committee and statistics should be kept so that we know what types of measures are being taken and whether we see any progress being made. Mines and stakeholders need a system in place where accountability will be measured.

Pang - In this community we work on many ventures. It's hard being a business owner; it's mainly non-Inuit who own businesses here. When you're starting out in business you're a small operator. I've had my painting business for the last 5 years and I rent out vehicles. It is a slow progress but it's something I work on that helps the community. You are required to have housing, a good building, and good tools as a business owner. There are a lot of regulations that you have to abide by. When Nunavut was created we had a lot of visions to have a lot of small business in small communities but today that is not the case. It takes a long time to create stability in businesses. It's very important to support the small businesses in your community and other communities.

Grise Fiord – Why didn't Peregrine Diamonds attend?

EDT - We invite them every year, this year they were unable to attend. We will follow up with them to have any questions answered. - ****Action Item – EDT to follow up with community representatives and pass along questions to Peregrine Diamonds**

EDT - You saw the statistics reports and the presentations given today. Are there any questions, comments, and were you surprised by any of the numbers or presentations given this afternoon?

Arctic Bay - When talking about socio-economic development in the communities, in my mind the biggest infrastructure issue in Nunavut is housing. If you can't fix inadequate housing, you aren't fixing the problem of all the other social and economic problems. There isn't enough money coming out of Nunavut to take care of all of our housing needs. The communities in the Qikiqtaaluk region, there is an awful lot of royalty money flowing into QIA from Mary River, and has there ever been any thought given to setting up a housing co-op to help out some employees and to give them an initiative to stay in their job, maybe a mortgage fund, to get out of social housing and get their own house.

QIA - Department of social policy spends a lot of time talking about housing and education. When it comes to all of the millions of dollars flowing to QIA, 2 years ago QIA set up a new revenue policy to do with the royalties coming from many different areas. Revenue policy sets up two funds - legacy fund (how we will save and invest this money) because there wasn't a desire to spend all this money and it's gone. So the legacy fund is to save and invest until there's \$75 million and QIA board will look at what happens when we reach that target (now at about \$36/37 million). The investment is a 4% amount of the legacy fund and this money is how we spend this money. QIA is committed to going to all communities every 2 years asking what

programs communities want them to spend it on. At that time the answers were cultural activities, sewing programs, daycares and early childhood education. Set up the new Q-CAP program - The QIA board wants to be re-elected so they want to deliver things that want to be seen. So at the next consultations there's opportunity for people to say what it is they want and need. If this means asking about helping us with housing, then that's how you can influence them. QIA also manages IOL's where there are parcels in municipalities (such as in Iqaluit, where QIA is developing municipal IOL). QIA is committed to putting affordable housing for Inuit on this piece of land - we don't know what it will look like yet, but they have committed. This way, we see what works, what can be improved, and other communities with IOL can then replicate these successes. If you have IOL in your municipality, talk to your QIA director and discuss these options.

QIA – We've also been attending poverty reduction roundtable and housing is the main priority. We developed a model that we pushed forward to Family Services also attended the Northern Housing Forum where we discuss many aspects of housing in the arctic. Housing is at the top of the list.

Igloolik - We've been talking about housing for employees since 2013 and we worked on a 5 year plan. This is something we are still trying to work with; we know these employees need housing. We are trying to acquire a building to do research, looking at other ventures too. Under education and skill building, 2012-2014 some research had been done so there's been a lot of ongoing research but no production yet. We've notified QIA and EDT and Baffinland that we would like to work with these corporations, as well as other agencies and government. We want the fishermen in our communities to benefit. We also have a music festival in our community to bring happiness to the community.

Clyde River - Our community members are seeing and benefitting from employment at Baffinland. We are expecting a bigger payout to work closer with Baffinland. What Arctic Bay discussed about housing, this is an everyday issue. Inadequate housing results in other social and wellbeing issues. We would like to see QC and QIA providing funds to smaller communities. The dropout rate is very high in our communities from schools which impact their future employment since they don't have the right education and skills.

Iqaluit – I want to reiterate that it's not accurate to lump communities in with Iqaluit when it comes to monitoring. Because of the population of Iqaluit, results will be skewed. I would like to see Baffinland separate Iqaluit from the rest of the communities when it comes to statistical analyses. In regards to Government of Canada, we never see federal representatives do community consultations. When they do consultations in Iqaluit they never give a lot of warning, they never visit anywhere other than Iqaluit, and since there isn't a lot of warning there are very few community representatives that turn out to the consultations. Please send back that we need adequate advance warning for communities, and go see other communities. How many Inuit Owned Businesses were unable to start up because of inadequate buildings for their business, or inadequate funding? I know of many people that have tried to startup businesses but they were Inuit owned, Inuit staffed, fluent in Inuktitut and were unable to find funding for their business. A month or two ago we put in a request to remove section 12 of the Cities, Towns and Villages act. For monitoring Projects, is there any support that could go towards staff administration costs? So many organizations are understaffed that they can't take on the opportunities that are handed to them because they are so short staffed.

INAC - We do expect organizations to pay their own staffing funds with the NGMP monitoring program funds. In regards to the Minister visiting, a lot of work is put in to meet with the right people but it's hard to meet with everyone all the time.

Baffinland - In regards to Inuit Business, Baffinland has an agreement in their IIBA that supports the development of Inuit owned businesses. This can help to pay for business licenses and the process to obtain a business license done through QIA. QIA has reported that it is underused, so this is an available funding source.

Iqaluit - It's not always getting the funding that's the issue, it's also skills development and help getting through the paperwork process on the Hamlet's part.

Grise Fiord - Which Inuit Owned Businesses does Baffinland give money to? QIA and NTI registered businesses? We need help for the business owners to get started up. I just learned there is the \$75 million target from QIA; I had never heard that before. I've gone through so many meetings for a long time. We hoped and were expecting that we would benefit from this money. There are only a few thousand people even a small amount would be enough. There are so many elders with businesses in our communities; they don't always get as much help as they should. It would benefit our communities. People are tired of waiting for this \$75 million cap, there are people starving, there are many elders who have nothing. We're working with Baffinland; we need to work together by listening to each other. Inuit need more, if we can think about today, and not necessarily waiting for the future. We have the lowest population and we are told that our community is too small but we need equal treatment. It's hard to hear that there's money there but it isn't being utilized. We need to look into all these buildings that aren't being used in communities. Elders are abused, they've never been employed, and they don't have food to eat.

Cape Dorset - Quite happy with all the presentations that were in front of us and the flow of the agenda, feeling like we are getting a lot more answers instead of "I will get back to you".

Pond Inlet - Looking at the Nunavut Agreement, a lot of Inuit have not looked into the document and what we are entitled to. Under the NLCA, we as Inuit have a lot of power. We do not understand it as to how we should be using what is granted to us. Hunter's capabilities and abilities are much more than when we were previously with NWT. There are other schedules under the NLCA that we need to use and understand. Maybe we should look at developing some kind of training for Inuit to better understand NLCA and how Inuit can better benefit in the long term.

Hall Beach - I had said when we started that this is more of a learning curve for me. After what I've heard and seen, I'm very happy with what we do here at the SEMCs. We have offices in the 5 communities that make our work a lot easier and our communication lines much more open. We were very happy to hear about the new ventures that Baffinland is going ahead with, with the other communities. QIA has an office in each of these communities where people can go and discuss and learn more. Unfortunately not every community has an EDO, but maybe each QIA community office could be a place for people to get information and pass along information.

Sanikiluaq – Thank you to all the presentations, and from Embrace Life, I thank you.

Qikiqtarjuaq – Discussing new businesses and small businesses, I hope to see more opening. Especially for carvers and artists, I really want them to benefit.

EDT - I want to comment on NLCA Article 12.7, it is specified there and that is why we are meeting today. It is legally binding. Our job is to comply with the NLCA and we gather information from our communities and yes we do need to have a better understanding on what our communities are asking for and how we can support them. Once we know the NLCA better, we can make better agreements.

QIA - QIA does have funding available that individuals, community groups, and hamlets can access. There is an annual \$750,000 funding that communities can apply to. They take proposals throughout the whole year. QCAP program funded 31 projects in communities; a second callout is coming around the middle of July so I encourage you to apply for this. QIA also has a grants and contributions program where you can ask for smaller amounts of money. Business capacity and start up fund that provides funding to expand businesses or startup businesses.

Iqaluit - I have had people ask about Inuit owned businesses so if these stats are available as well as the GDP that comes from these.

Embrace Life - We fully fund a firearms safety course so that we can wave the fee for community members as long as there is an instructor in your community. Healthy Nunavummiut are healthy for everyone, so if there is a service that we can provide in your community or your corporation or your hamlets, we can provide services and work together.

Closing

There was a vote for where the next QSEMC meeting will be held. The results were as follows:

- 6 votes Iqaluit
- 5 votes Cape Dorset
- 4 votes Baffinland
- 1 vote Clyde River

Therefore, the next meeting will be in May in Iqaluit; dates, location and logistics to be confirmed

Action Items

Item	Organization	Timeframe
Send all presentations and documents prior to meeting	GN - EDT	1-2 weeks prior to next SEMC meeting and all meetings following
Share data of Mary River employees moving into Iqaluit (specifically to Iqaluit representative) – if available	Baffinland	As soon as possible and discuss at next SEMC
Separate Iqaluit from the rest of the data results – look at a community based approach for monitoring if that data is available so as not to skew the results due to Iqaluit's high population	Baffinland	Ongoing

Discuss and explore the option of turning the laptop program into a cell phone program	Baffinland	As soon as possible and report back to communities
Share results of reported gambling problems with SEMC and SEMWG	QIA	Immediately and discuss at future meetings
Send information (dates, names, availability) of interested Mayors and organize a Mary River site visit	Community Mayors to send information; Baffinland to organize site visit	Ongoing
Follow up with questions from community representatives and pass along to Peregrine Diamonds and follow up with responses	EDT	Ongoing

2018 QSEMC Baffinland Action Items

1. Share data of Mary River employees moving into Iqaluit if available [Request made by Iqaluit representative]

Baffinland's response:

Baffinland collects employee/contractor migration data from two sources: Baffinland Community Liaison Officer (BCLO) Surveys and Workplace Surveys. Data from these two surveys may provide insights into potential in-migration trends to Iqaluit. However, Baffinland does not collect survey data on non-Inuit employees/contractors moving into Iqaluit from non-Local Study Area (LSA) communities (the LSA refers to the communities of Arctic Bay, Clyde River, Hall Beach, Igloolik, Pond Inlet, and Iqaluit).

- 2018 BCLO Survey
 - 3 Inuit employees/contractors out-migrated from North Baffin LSA communities. However, none of these individuals out-migrated to Iqaluit. 0 non-Inuit employees/contractors out-migrated from North Baffin LSA communities.
- 2018 Workplace Survey (71 Inuit employee/contractor respondents)
 - 7 individuals (9.9%) answered 'yes' to the question 'Have you moved to a different community in the past 12 months?'. However, 0 (0.0%) of these individuals had moved from a North Baffin LSA community to Iqaluit.
 - 12 individuals (16.9%) answered 'yes' to the question 'Do you intend to move to a different community in the next 12 months?'. 2 of these individuals indicated they intended to move from a North Baffin LSA community to Iqaluit and 1 individual indicated they intended to move from a North Baffin LSA community to Iqaluit or a non-Nunavut community.

2. Separate Iqaluit from the rest of the data results and look at a community-based approach for monitoring if that data is available so as not to skew the results due to Iqaluit's high population [Request made by Iqaluit representative]

Baffinland's response:

Baffinland separates Iqaluit data from other community (e.g. North Baffin LSA) data in its annual socio-economic monitoring reports, where appropriate. This is currently done in the following areas:

- Population estimates (government sourced data)
- Employee origin (Baffinland sourced data)
- Hours of Project labour performed (Baffinland sourced data)
- Employee payroll (Baffinland sourced data)
- Secondary school graduates (government sourced data)
- Number of NTI registered Inuit firms (NTI sourced data)
- Number of youth charged (government sourced data)
- Proportion of taxfilers with employment income (government sourced data)
- Median employment income (government sourced data)
- Percentage of population receiving social assistance (government sourced data)
- Number of impaired driving violations (government sourced data)

- Number of drug violations (government sourced data)
- Health centre visits related to infectious diseases (government sourced data)
- Crime rate/number of violations per 100,000 persons (government sourced data)
- Health centre visits, total number (government sourced data)
- Health centre visits, per capita (government sourced data)
- Project aircraft movements (Baffinland sourced data)

**3. Discuss and explore the option of turning the laptop program into a cell phone program
[Request made by Clyde River representative]**

Baffinland's response:

We thank the Mayor of Clyde River for his request that Baffinland look at changing its annual laptop program into a cell phone program. At this time, Baffinland will continue to provide laptops to new high school graduates. Baffinland believes that laptops are better suited for educational and employment-related purposes than other devices such as cell phones. However, should a graduating student have the need for an alternative device due to a special need, Baffinland will do its best to accommodate those requests.

4. Send information (dates, names, availability) of interested Mayors and organize a Mary River site visit [Baffinland commitment]

Baffinland's response:

Baffinland remains committed to hosting a Mary River Project site visit for interested regional Mayors. Baffinland is prepared to plan and host this visit once interest is confirmed and additional details are available. To make this visit possible, Baffinland encourages the Mayors to provide dates that may work for a group visit to the Mary River Project.

Meeting Notes
Mary River Socio-Economic Monitoring Working Group (SEMWG) Meeting
February 14, 2018 (2:00pm - 3:20pm)
By Teleconference

Attendees:

Baffinland Iron Mines Corporation (Baffinland):

Mary Hatherly (MH)

Andrew Moore (AM)

Alyssa Stewart (AS)

Jason Prno (consultant) (JP)

Government of Nunavut (GN):

Lou Kamermans (LK)

Chantelle Masson (CM)

Qikiqtani Inuit Association (QIA):

Allan McDougall (AMD)

Jason Ash (JA)- Joined call at 3pm

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC):

David Abernathy (DA)

Julia Prokopick (JP-CIRNAC)

Other Information:

Mary Hatherly chaired the meeting. Alyssa Stewart took meeting notes.

Meeting Notes:

1. Project Update

MH- Noted there is not much to report on for an update on the Project except that there was a proposed amendment to the land use plan submitted to include rail. The public hearings in Pond Inlet have concluded and Baffinland is waiting for a decision from NPC. If the outcome is positive the next step is to proceed with the environmental review through NIRB and an EIS would be submitted likely in June.

DA- Asked if there have been guidelines prepared.

MH- Explained that guidelines had been done for 12MT to be transported by road and that the guidelines needed to be revised to include railway as a form of transportation.

DA- Asked if community concerns were going to be included in the guidelines.

MH- Indicated that Baffinland would continue to consult with the communities and the QIA moving forward through the EIA process.

2. Baffinland's Responses to NIRB recommendations on the Socio-Economic Monitoring Report

Jason Prno summarized Baffinland's draft responses and members of SEWMG provided feedback on the responses.

Recommendation #14 (in-migration and out-migration of Inuit and non-Inuit residents and effects on local housing opportunities; Inuit employee turnover rate)

JP- Baffinland feels they have responded to this in the past and that Baffinland already reports on migration patterns as well as Inuit turnover rates. Baffinland has made use of the information that is available to them from the GN in addition to other sources. Conclusion that Baffinland has addressed this recommendation.

LK- Advised group that NHC report related to suggested housing questions has been finalized and will be distributed to all mining companies in the coming weeks.

JP- Noted that any changes to the employee survey would not occur until next year's report.

AM- Asked how many questions are being put forward in the housing report.

LK- Explained there would be 15 but they are up for discussion.

JP- Noted that if anyone had additional questions on Baffinland's responses or would like to provide written comments or have one-on-one discussions that Baffinland would be open to that, but thought discussing during this working group would make things easier for everyone.

Recommendation #15 (monitoring of non-Inuit residents and contractor employees; information on Baffinland's Inuit employee payroll)

JP- Indicated that this recommendation had been addressed in last year's report, but that Baffinland was happy to discuss further if something has been missed. Also mentioned that employment data is provided in the reports Baffinland provides and that Baffinland feels this recommendation has been met.

MH- Added that Baffinland's quarterly IIBA reports also include this data and that the reports are shared with QIA.

Recommendation #24 (Project-related influences on housing and employee surveys to address indicators related to migration)

JP- Explained that surveys from the most recent employee survey have been collected and data is being compiled at this time. Mentioned that the GN's update on the housing report has been noted and appreciated.

LK- Agreed that the survey was applicable to the housing report and that a conversation with NHC would help. The 4 additional indicators being suggested in the final workshop report that is being released on Monday include: public housing waitlist numbers, overcrowding numbers, Nunavut Downpayment Assistance Program (NDAP's) numbers and public housing income levels.

DA- Wanted a clarification in regards to the survey and whether it was for all Inuit employees and would it be done annually.

JP- Explained that the survey has been a work in progress and captures data that we need. It was offered to Inuit employees and contractors. The survey was offered on site during approximately a 1.5 week period. We took a comprehensive approach to recruiting employees to fill out the survey. It was not conducted at the time of hire. The survey is updated every year based on feedback and data collected and Baffinland will continue to update survey each year.

DA- Mentioned that it was very encouraging to see how it was being conducted.

Recommendation #25 (negative changes or concerns reported in the community surveys and how Baffinland has addressed these)

JP- Noted that last year's report did not include the negative results but that this year's report will include both the positive and negative results. It was also noted the Phase 2 Proposal EIS would

discuss the survey results. Otherwise, Baffinland has responded appropriately to the recommendation.

DA- Agreed that it was an adequate response. Asked if there would be some financial management training/general training offered to assist employees on how to manage their income as well as on camp life.

MH- Explained the 12 week Work Ready program that will begin next week that is designed to help employees adapt to the fly-in fly-out work life as well that Baffinland will be partnering with QIA on their financial literacy program to offer it on site.

AM- Added that during on site orientation and employee reviews, management communicated with employees regarding stress both at work (camp life) and in their personal life.

DA- Noted that it was good to show active measures on what Baffinland is doing to help employees deal with mine site work.

LK- Asked if there was an intention to deliver this survey frequently or if it was a one-time thing.

MH- Community Survey in September 2016 was a one-time occurrence but there have been internal discussions about holding surveys on a more regular basis because a survey is a good indicator of opinions on the pros and cons in the communities regarding the mine.

Recommendation #26 (use of INPK Fund to provide additional supports to community daycares or child care services)

JP- Noted that the two funds listed (i.e. INPK Fund and Business Capacity and Start-Up Fund) are both administered by QIA.

MH- Explained that the response provided is accurate and that preliminary discussions were needed to discuss the development for a process for Baffinland to have a greater involvement in the types of projects that would be funded. Baffinland would like more communications and involvement in these as it could impact Inuit employment very positively.

AM- Noted that Baffinland works with QIA on the Joint Management Committee and there are discussions about it and that Baffinland provides funding but has no control over what is approved. Andrew asked if QIA had any feedback in regards to the funds.

AMD- Replied that there was none at this time

Recommendation #27 (measurement tool/indicator for food security; information on the impact of the Project on food security)

JP- Provided a summary of Baffinland's response and added that this year's report includes a table describing Baffinland's role in each of the four food security components identified by the Nunavut Food Security Coalition and Baffinland may continue to build on this table in future years.

Recommendation #28 (Project implications on existing health and social services, including strategies for tracking health and social service requests)

JP- Baffinland will continue to report on the data they are able to collect in addition to the data provided by the GN.

AM- Added that Baffinland remains in regular contact with the GN Department of Health in regards to the Project's impact on community health services as well as community lack of health services.

General Discussion on NIRB Recommendations

JP- Asked for feedback regarding this approach of going over each NIRB recommendation and Baffinland's proposed responses with the group.

LK- Expressed that he liked the format and how each response was written, agreed that it was good to talk about these before they are submitted to NIRB but also pointed out that these discussions

are still only half the story and that NIRB has to accept the recommendations. Also wanted to know if the group could see a draft copy of the report before it is submitted to NIRB.

MH- Baffinland thought that before the comments go to NIRB it would be positive to get everyone's thoughts on the recommendations and Baffinland's responses. We have not talked about sending the working group the draft report but logistically it would be a difficult exercise to issue a draft report and get everyone to submit comments before the deadline of March 31st.

JP- Noted that there would not be enough time to get the working group the draft report in good time before the NIRB deadline of March 31st as Baffinland has to wait to compile the previous quarter of data and then it has to go through internal review and then have changes made if needed, before a final draft can be issued for public consumption. Having a working group meeting immediately after the report is submitted would be key so we can deal with any issues in this forum instead of having to continue to submit all comments formally to NIRB.

LK- Our concern would be the timeline between when the report is submitted to NIRB and the date for when the comments have to be in by. If possible, the earliest Baffinland can share the report would be best.

MH- Asked what the timeline usually is.

LK- Responded with whatever NIRB gives as the timeline.

MH- Asked if the timelines were set by NIRB or if the dates were set firm in the Project Certificate, whether these were tight timelines or if it was possible to extend the submission for comments.

JP- Mentioned we will check to see if the Project Certificate includes a specific date and confirmed that the NIRB Annual Report is submitted on March 31st.

DA- Agreed that this approach of going through each recommendation and Baffinland's draft responses was good and it is a good reason for us to come together and communicate and is what this forum should be focusing on.

MH- Expressed that Baffinland agrees as well.

3. Plans for 2017 Socio-Economic Monitoring Report

Overview of Report:

JP- Gave brief overview of the report, that it would be very similar to the 2016 report and that the results are also similar. The Inuit employment predictions have not been met but Baffinland has an action plan in place that includes the new Inuit Human Resources Strategy, training programs and apprenticeship programs. Once everyone has had time to review the report it will be very beneficial to discuss and get everyone's feedback/recommendations.

Summary of Major Report Changes:

JP- There were no major report changes to note, but there is a new table being created in the report to make it clear on what is being changed. Baffinland's responses to the NIRB recommendations will also be shared.

Survey:

JP- Explained that the survey conducted on site was specific to IIBA requirements and Project Certificate conditions, to gain data primarily on Inuit and their views on the workplace.

Plans to integrate workshop report recommendations:

JP- Expressed that there are three new indicators/data types added to the monitoring program, waiting to see the final workshop report to determine if additional changes to the monitoring program will be made.

GN update to government sourced data:

LK- Announced that the final revised workshop report will be released Monday. Explained that there will be data gaps as some portions were left out; NBS did not provide all necessary data for the report. Expressed that the GN wants to ensure the information is useful to Baffinland and that it will help to align expectations. There will be up to 15 indicators that are being provided in the report that have reliable data.

MH + AM- Agree this sounds like a good approach.

4. Revised SEMWG Terms of Reference

Note: Jason Ash (JA) joined the meeting.

MH- We circulated Baffinland's draft revisions to the Terms of Reference, this document was based on Agnico Eagle's Socio-Economic Monitoring Working Group Terms of Reference and addressed Baffinland's responsibilities under the agreement. Proposed changes to the "Working Group Mandate"- Section 4.1 include that the working group act as a forum for addressing technical aspects of the program and that any issues with the program will be attempted to be resolved by the working group, having NIRB still function as the oversight body. Would like the working group to read and provide comments and questions on the NIRB report directly through this forum.

DA- Reviewed the draft terms of reference and overall it is good. Wanted to bring to attention Section 6.2 under "Meetings" and asked if it could be re-written as it is a bit confusing in regards to the schedule.

MH- Agreed to make it more clear and direct.

DA- Will continue to go through and provide comments.

LK- Agreed that it looked good from their end and that they passed the document along to their legal department for potential language changes.

JA- Asked for a brief summary on the main changes from the Agnico Terms of Reference document.

MH- The main point of this document was to streamline and emphasize functionality of the working group and to provide an initial forum to work out issues before they go to NIRB.

AM- Added that another addition was the involvement with QIA into the terms of reference as Agnico Eagle does not include their regional Inuit organization in their working group. Therefore, they are not included in the Terms of Reference.

JP- The main updates in the Terms of Reference were to refer to what the working group is currently doing and the potential of what it can get to.

LK- Agrees with the above summary.

JP- Asked LK if Agnico attached their monitoring plan to the Terms of Reference.

LK- Agnico did not attach it as an appendix, they shared it when they updated their monitoring program.

JP- We'll look at adding additional text to the TOR that references the monitoring plan that is included in the annual Socio-Economic Monitoring Report.

5. Next Steps

Timing of next SEMWG meeting and dates of QikSEMC meeting in Pangnirtung:

JP- Asked when the next meeting should be, asked when the Pangnirtung meeting was in June.

LK- Noted that the dates hadn't yet been confirmed but the initial dates proposed were June 5-6.

MH- Noted that those dates worked for Baffinland.

DA- Noted that those dates worked for INAC.

JP- Noted that those dates worked for him. Also noted that the report would be available March 31st and asked if the group wanted to have a call before the in-person meeting, depending on NIRB's commenting timeline.

-It was agreed that the group would leave this topic until they found out the timeline.

Preliminary items to add to next SEMWG agenda:

-Review and feedback on the final workshop report.

MH- Sign off on the Terms of Reference if not already done.

General comments:

DA- Happy with how the meeting went.

MH- Thanked everyone and noted she looked forward to seeing everyone's comments on the Terms of Reference.

Meeting adjourned at 3:20pm.

Meeting of the Mary River Socio-Economic Monitoring Working Group

Auyuittuq Lodge, Pangnirtung, Nunavut

June 19, 2018 (7:30pm)

Meeting Chair: Baffinland

Note Taker: Baffinland

Attendance:

Jason Prno, Consultant to Baffinland (JP)

Andrew Moore, Baffinland (AM)

Bethany Scott, QIA (BS)

Luc Brisebois, QIA (LB)

Rhoda Katsak, GN (RK)

Chantelle Masson, GN (CM)

Erika Zell, GN (EZ)

David Abernethy, CIRNAC (DA)

1. Project Update

- Phase 2 Proposal update provided by Andrew
- AM- Phase 2 NPC positive decision. Now getting into NIRB process. EIS development underway.
- RK- How long does this process take?
 - AM- Been working on this for some time internally.
 - JP- Process has been going on for sometime. Lots of internal work. NIRB has to lay out the process.
- DA- Saw NIRB letters, 2 processes. 6 million tonnes/year? And 12 million tonnes/year? Please explain.
 - AM- Yes 2 different applications. May hit 4.2 million tonnes/year during this shipping season. Need discussions with regulators QIA, to discuss next steps.
- LB- What can you currently ship?
 - AM- Truck and ship 4.2 million tonnes/year. Limited stockpile ability outside of Milne.
- JP- General discussion on planned upcoming IQ workshops and socio economic work related to Phase 2.
- BS- Can you describe the economic modelling work further?
 - JP- Input-output model was used. Report looks at everything from GDP, government and Inuit organization revenues, direct jobs, to spin off opportunities from Phase 2. Marcel LeBreton is doing this work; His company is called EcoTec Consultants.
- DA- Community workshops. Is this a continuation of past IQ work, or is it only for Phase 2?
 - JP- We look at it as a continuation of past work, which included several workshops and one-on-one interviews. More recently, workshops were held on Phase 2 and land use, caribou, and shipping-related topics. Winter shipping is now off the table.
- RK- When you talk about workshops...there are lots of meetings that go on. It's Phase 2, it's early revenue phase. How has it been with the general public? QIA is involved in this discussion. Are people confused?

- AM- Good questions. Baffinland is working with QIA to improve community consultation.
- LB- Talked about NPC process, went to Mary River, Phase 2 group formed in Pond Inlet to respond to NPC. QIA doing what it can to engage. Radio, etc...
- LB- Now it's a straight forward project. But changes exist.

2. **2017 Socio-Economic Monitoring Report**

- JP- General discussion about process, NIRB, commenting, data gaps exist. Some specific community level data is non-existent.
- LB- For data gaps you mentioned, is it not BIM's responsibility to get the data?
 - i. JP- BIM is not a statistics agency. We can report on what exists [in addition, BIM is often not the only 'responsible party' listed on the Project Certificate's Terms and Conditions related to socio-economic monitoring].
 - ii. JP- We rely on these QSEMC meetings and BIM's community engagement program to gather qualitative information on these topics instead.
 - iii. LB- Compared to the marine and environment monitoring groups, there seems to be less data presented by BIM on socio-economics. Can't these serve as a model example? Seems like more effort is needed from Baffinland.
 - iv. JP- You should read the annual report; there is a considerable amount of information included in it. In addition to government statistics, Baffinland collects (and reports on) a lot of its own information.
 - v. CM- Where gaps exist is related to self reported items. For example, gambling issues. How can we find data on this?
 - vi. General discussion on surveys and ability of surveys to answer these questions
 - vii. BS- QIA community based socio-economic work did ask gambling related questions. 280 households surveyed in Pond Inlet, Igloolik, and Cape Dorset. Will present on this at QSEMC. Work funded by CIRNAC. This will be a public report.
 - viii. AM- This is good. Need to talk about bridging the gap between other departments in QIA and Baffinland.
 - ix. CM- What was the response rate?
 - 1. BS- Goal was 90 households in each community. Total was 280 households.
 - x. AM- This is where we want to see this group moving to. Working together to discuss data gaps and ways to address them.
 - xi. JP- Responsibility for several PC conditions on socio-economic monitoring not all on Baffinland but also the QSEMC and other parties.
 - xii. DA- Is Baffinland working with other mining companies on data gaps
 - 1. AM- Yes, to extent possible. However, we all have to monitor different things in different ways.
 - 2. JP- All mining companies have different data gaps
- JP- This group should be where we have discussions about the NIRB annual report and where issues are resolved if possible.
- LB- What sort of process can we take to address comments from the SEMWG?
 - i. JP- Yes we can find new ways of doing this.
- RK- Only one apprentice in 2017

- i. AM- Bit of a misnomer as we now have trade assistants. We can make it clearer moving forward.
- DA- Should we be meeting 2 weeks before the NIRB deadline? To discuss comments?
 - i. JP- We are open to suggestions. We were a little concerned this year as we asked for comments from SEMWG members several times and didn't receive any.
 - ii. DA- NIRB comment period is over but we have the ability to continue to work on items.
 - iii. JP- Absolutely. Baffinland is happy to have that discussion.
- BS- Question on indicator 'number of youth charged'?
 - i. JP- Yes, it's actual numbers of youth charged; Statistics Canada data.
- LB- When did you reach out about comments?
 - i. JP – Several times. No comments were received from QIA.

3. Plans for 2018 Socio-Economic Monitoring Report

- JP- Always open for suggestions on how our monitoring program could be made better. We will also look at the GN's final socio-economic monitoring workshop report.
- JP- Another employee survey will be conducted. Expected to be very similar to the one included in this year's report.
- RK- Was mentioned by communities that they want to do their own monitoring
 - i. JP- This can have value. But from a monitoring perspective we need data to be regularly produced to allow for data comparison.
 - ii. RK- Communities confused about where to get money for this type of monitoring?
 - iii. BS- Part of the gap here is those sustained opportunities to get community monitoring going.
 - iv. LB- Community based monitoring and what it is sits with the QIA. In the major projects office.

4. Revised SEMWG Terms of Reference

- JP- Breakdown of changes. Changes were to really just update the mandate of this group and what it should do.
- CM- Trying to align with other regions and their TORs. Alignment between the projects.
- JP- We used the Agnico TOR as a base and made edits from there.
- DA- CIRNAC is good to go. Just a couple clarifications needed on the difference between 6.2 and 6.3
 - i. CM- Plan to get things formalized at the territorial level
- AM- Need to find out how we get this approved?
 - i. Baffinland to send out final version for email approval. 30-day approval period. Baffinland to send out on Friday.

5. Other Items

- Update on Territorial Monitoring Framework
 - i. CM- Work ongoing. Looking at getting everything finalized in October-November. Report produced will be both working group and community focused. Based on all 2017 monitoring reports and meetings.

- Timing of next SEMWG meeting
 - i. Could be by teleconference.
 - ii. JP- Worth having one before issuing the Project monitoring report?
 - iii. JP- We will issue report March 31.
 - iv. BS- Meeting in early February
 - v. JP- Next meeting we can plan to occur in February-March. And perhaps a meeting a month or so after the report is issued. Agreed?
 - vi. Agreed.
- Items for next meeting
 - i. Focused on plans for 2018 monitoring report
- LB- This whole meeting seems very fast. This was not like the marine and terrestrial monitoring groups. Seems short. We need to discuss making this meeting bigger.
- JP – This working group meeting also coincides with the much longer QSEMC meeting, where lengthy discussions and presentations of data take place.
- CM- Maybe we can schedule a meeting of this group after the QSEMC meeting next time.
- CM- Maybe we can have a meeting to plan what we want to achieve for an SEMC meeting?

Meeting Closed- 8:50pm.

APPENDIX G
2018 GEOTECHNICAL INSPECTION REPORTS



October 2, 2018

Assol Kubeisnova
Technical Advisor, NWB
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Submission of 2018 Geotechnical Inspection Report No. 1 (Jul/Aug. 2018)

Under Part D, Item 18 of Baffinland Iron Mines Corporation's (Baffinland) Type "A" Water Licence 2AM-MRY1325 Amendment No. 1 (Water Licence), there is a requirement to conduct biannual geotechnical inspections of specified Mary River Project (the 'Project') infrastructure. Part D, Item 18, of the Water Licence states that:

"The Licensee shall conduct inspections of the earthworks and geological and hydrological regimes of the Project biannually during the summer or as otherwise approved by the Board in writing. The inspection shall be conducted by a Geotechnical Engineer and the inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations."

The first biannual geotechnical field inspection for 2018 was conducted by Barry Martin of Barry H. Martin Consulting Engineer and Architect (BMCE) of Timmins, Ontario. The focus of the inspection was on the Water Licence related infrastructure located at the main camp sites, known as the Mary River Mine Site and Milne Port. Mr. Barry Martin has been conducting annual geotechnical inspections for the Project since 2008. The attached report covers the first inspection that was conducted between July 24th and August 1st, 2018.

During the July/August 2018 inspection, the following site facilities were inspected:

Mary River Mine Site

- Bulk Fuel Storage Containment (MS-HWB-7)
- Generator Fuel Storage Facility Containment
- Polishing/Waste Stabilization Pond No. 1
- Polishing/Waste Stabilization Ponds Nos. 2 and 3
- Helicopter Fuel Cell Containment
- Enviro-Tank Storage (MS-HWB-1)
- Hazardous Waste Storage (MS-HWB-2)
- Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)
- Stove Oil Storage (MS-HWB-5)
- Jet Fuel Tank and Pump Containment
- Solid Waste Disposal Site (Landfill)
- Mine Site Fuel Tank Farm Containment
- Quarry (QMR2)

- Crusher Pad Drainage Containment
- Waste Pile Drainage Containment
- Jet “A” Aircraft Containment
- Hazardous Waste Containment (MS-HWB-6)

Milne Port

- Hazardous Waste Storage (MP-HWB-3, and MP-HWB-4)
- Port Site Fuel Tank Farm Containment
- Polishing/Waste Stabilization Pond (PWSP)
- Land Farm
- Contaminated Snow Containment
- Sedimentation Ponds East and West
- Quarry (Q1)
- Loading Area Contaminated Storage (MP-HWB-1)
- Fuelling Facility Containment

Site plans for the Mary River and Milne Port showing most structures reviewed are included in the inspection report (refer to Attachment 1).

The attached report (refer to Attachment 1) presents the findings of the August 2018 inspection and recommendations for the aforementioned structures. The following subsections of this letter summarize Baffinland’s plan for implementing recommendations. Where there is no mention of particular infrastructure, there were no concerns identified by BMCE during the inspection.

Recommendations for the Mary River Mine Site Infrastructure

Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

We have no recommendations with respect to this containment structure other than to repair the puncture in the liner.

Baffinland Action: The liner of this storage facility was repaired in August 2018. This repair will be monitored in further inspections to confirm integrity.

Enviro Tank Storage (Now MS-HWB-1)

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.

Baffinland Action: The cell is currently not being used and has been left empty. The Site Services Department supervisors are aware that this area shall not be used for the storage of hazardous waste or substances until it has been repaired. Alternatively, this facility may be decommissioned.

Crusher Pad Drainage Containment

We recommend that the drainage ditch at the edge of the new pad expansion be revised slightly to provide a uniform gradient to this ditch.

Baffinland Action: Baffinland will ensure ongoing maintenance of ditches conforms with design drawings.

Hazardous Waste Containment (MS-HWB-6)

We have no recommendations with respect to this structure other than making repairs to the damaged enviroliner. The side dykes should be also built up to keep traffic off them.

Baffinland Action: Baffinland has repaired the enviroliner at this facility and will monitor the status in the future.

Recommendations for Milne Port Infrastructure

Fuel Tank Farm

We have no recommendations with respect to the containment at this time other than to make sumps at the north end operational, to readily facilitate water removal.

Baffinland Action: Baffinland will review sumps in the north end of the tank farm and evaluate if further excavation is required.

Landfarm Containment

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement.

Baffinland Action: Baffinland will cover exposed liner around perimeter of landfarm by July 2019.

Sedimentation Pond East

We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, as required.

Sedimentation Pond West

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

Baffinland Action: Baffinland will review ballast currently used on the exposed liner and place additional used tire ballast, as required.

Loading Area Contaminated Storage (MP-HWB-1)

We have no recommendations with respect to this structure other than to repair the tear identified.

Baffinland Action: Baffinland will repair the torn liner by the end June 2019. In the meantime, stormwater and snowmelt in the berm will not be allowed to reach the height of the tear.


Fueling Facility Containment

We recommend that 4" to 6" of "mud" be removed without disturbing the gravel layer over the liner at the base and sides of the fuel tank.

Baffinland Action: Baffinland will remove built up material from the fueling facility by the end June 2019.

We trust that this submittal meets the requirements for geotechnical inspections as outlined in the Water Licence. Should you have any questions, please do not hesitate to contact the undersigned or William Bowden.

Regards,



Connor Devereaux
Environmental Superintendent

Attachments:

Attachment 1: 2018 Geotechnical Inspection Report No. 1

Cc: Karén Kharatyan (NWB)
Fai Ndofor, Sean Joseph (QIA)
Sarah Forte, Bridget Campbell, Ian Parsons, Jonathan Mesher (CIRNAC)
Tim Sewell, Grant Goddard, Megan Lorde-Hoyle, Christopher Murray, Sylvain Proulx, Gordon Mudryk (Baffinland)

Attachment 1
2018 Geotechnical Inspection Report No. 1



BHM Project No. 18-068

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS

MARY RIVER PROJECT

FIRST INSPECTION OF TWO

August 2018



Prepared for:

Mr. Jeff Bush
Site Services Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

and

Mr. William Bowden
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3



Barry H. Martin, P. Eng., MRAIC, Consulting Engineer and Architect

1499 Kraft Creek Road
Timmins, Ontario P4N 7C5

Tel: 705-268-5621

barry.martin@barryhmartin.com

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Milne Inlet Photos
Milne Inlet Drawing

Oct 1st, 2017

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Jeff Bush
jeff.bush@baffinland.com

William Bowden
William.bowden@baffinland.com

**RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 18-068**

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the tenth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

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

The inspection that took place July 24th to August 1st is the first phase of a biannual inspection to be carried out within the open water shipping season at Mary River, the mine site, and Milne Inlet, the port site. As we arrived in Mary River, the ships had started to arrive in Milne Inlet.

The inspections were carried out in accordance with the guidelines set out in “Dam Safety Guidelines 2007” as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runway extension, initial bridges on the connecting road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The nine previous annual water licences geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned new designations in the report as compared to past years and are now identified by both the new designation and the past descriptive designation.

The facilities inspected are as per the following:

Mary River Site

Bulk Fuel Storage Containment
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond No. 1
Polishing/Waste Stabilization Ponds Nos. 2 and 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure) (MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Jet Fuel Tank and Pump Containment
Solid Waste Disposal Site
Mine Site Fuel Tank Farm Containment
Quarry
Crusher Pad Drainage Containment
Waste Pile Drainage Containment
Jet "A" Aircraft Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3 and MP-HWB-4)
Port Site Fuel Tank Farm Containment
Polishing/Waste Stabilization Pond (PWSP)
Land Farm
Contaminated Snow Containment
Sediment Ponds East and West
Quarry (Q01)
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who also reviewed both sites in the past 9 years during the open water season.

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. I note that the quarries are active removal areas and long term stability was not yet established.
5. New structures under construction were reviewed for conformity with design drawings.
6. Photographs were taken to document observations made during the inspection and are attached.

3.0 MARY RIVER CAMP

3.01 General

There had been rain events at the Mary River site for a number of days prior to and during the inspection, hence the integrity of the containment structures could be verified by water ponding in the containment structures.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. For small amounts, the water is pumped out and transported to where treatment takes place.

At the Bulk Fuel Storage Facility Containment, the water that collects within the dyke is treated at the end of the containment structure. At the time of this inspection, the treatment was not actively taking place.

Bladders and associated piping have been removed from the Bulk Fuel Storage Containment (Exploration Phase Bladder Farm). The Bulk Fuel Storage Containment is currently being used to store barrels of fuel, lubricant cubes, and a large fuel tank at this time. The north end of the berm is being used to store hydrocarbon contaminated water.

The unloading area is now utilized as an entrance to the containment with some storage.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

General Conditions

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels and lubricant cubes now stored within the berms, as well as a large fuel tank.

The granular cover over the geotextile and liner is still in place within the containment structure with a fair amount of water at one end awaiting treatment.

There is now a ramp over the north end of the containment to permit access over the dyke for placing barrels and cubes in storage. There is also some cube/barrel storage in this area.

At the south end this access is through the former fuel unloading area.

Stability

At the time of this initial review, water had not been removed from within the containment and water was ponding above the level of the gravel within the bottom of the containment at the south end of the facility.

At the load-out end of the facility there was water ponding within the dykes. At the former fuel unloading area at the north end there is minor water ponding within the dykes.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water within the structure and at the load-out area is an indication of the liners integrity.

The dykes have been built up two years ago to reinforce the concept of no loader travel over the dykes.

There is one area along the interior of the west dyke where the liner integrity has been compromised by a loader operator that has punctured the membrane. At this time the puncture is above the water level in the cell.

Recommendations

We have no recommendations with respect to this containment structure other than to repair the puncture in the liner.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is currently being decommissioned.

The granular fill over the geotextile and liner shall eventually require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the granular cover is either moved to a land farm or other containment. There is water ponding within the structure confirming the integrity of the containment.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was approximately fifty percent of capacity to accommodate further sewage and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements have had little effect on the integrity of the structure.

Recommendations

We have no recommendations with respect to this containment facility.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. Both cells were was operating at approximately 50% of capacity.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP #3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points have been set upon the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. Monitoring was discontinued three years ago.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is still minimal, however.

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

The temporary fuel containment cell that was set up last year has been removed since our last inspection in 2017.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition and contains water that attests to its integrity.

Recommendations

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment (Now MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called “Barrel Fuel Containment” in our previous inspection reports is a two-cell structure currently used to accommodate contaminated waste in the east cell and barrels of fuel in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. There is some water ponding in this structure attesting to its integrity

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (Now MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the "Enviro Tank Storage", from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is water ponding in this structure.

The structure appears to be stable in its present condition. The water in the cell confirms the integrity of the liner.

Recommendations

There are no recommendations at this time.

3.09 Enviro Tank Storage (Now MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It is currently not being utilized and access is blocked.

Stability

Two years ago, there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell was dry last year during the second inspection raising concerns anew on the integrity of the liner. This inspection showed minor water present.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.

3.10 Stove Oil Storage (Now MS-HWB-5)

General Conditions

This particular structure had been used to store barrels of stove fuel in 2011.

The structure again contains barrels of stove oil and some cubes of lubricant.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one piece liner.

Stability

Our review of the exterior at the base of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is water contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

General Conditions

This particular structure was reconstructed based on our recommendation of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Minor water ponding confirms the integrity of the liner.

At this time as in our earlier inspection report two years ago, the jet fuel tank and pump have been removed and the cell is empty.

Stability

Our review of the area around the cell at the base of the slopes showed no sign of seepage and water is ponding within the cell.

The structure is stable in its present condition.

Recommendations

There are no recommendations at this time.

3.12 Solid Waste Disposal Site

The solid waste disposal site is currently in the second phase of its construction. The first lift of solid waste has been placed and covered fully and appears to be doing exactly what it was proposed to do at the design stage. Since our inspections last year, the second lift has been undertaken. Some of the second lift has now been covered and some awaits cover.

Work is currently continuing on building a berm on three sides of the disposal site at the level of the second lift. The berm on the second level is being constructed as per the berm on the first level that served well over the past several years.

There is some material dumped on the second lift for use as cover for the second lift where waste is being placed.

3.13 Mine Site Fuel Tank Farm Containment

General Conditions

There is water ponding in the bottom of the containment confirming the integrity of the liner. This ponding of water is now well above the cover on the bottom of the containment. (6" to 8")

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

3.14 Quarry (QMR2)

General Conditions

The quarry has well defined benches. The quarry faces at the benches are clean on the lower lift. Where blasting occurred in the late fall, the edges and back slopes are well protected with large rocks. (2' x 3')

Recommendations

We have no recommendations with respect to the manner in which quarrying is being carried out.

3.15 Crusher Pad Drainage Containment

General Conditions

The crusher pad has been increased in size. A catchment channel has been created to conduct water from the large pad to the drainage containment. Water from the containment is now pumped to an outfall.

Stability

The structure has been completed in a most satisfactory manner.

Recommendations

We recommend that the drainage ditch at the edge of the new pad expansion be revised slightly to provide a uniform gradient to this ditch

3.16 Waste Stockpile Drainage Containment

Stability

The dyke appears stable at this time.

This particular structure has now been totally completed.

Water from the sides of the drainage area is collected below the catchment pond and pumped back to the pond.

Water from the pond is now pumped back to a pH adjustment facility and then pumped to the watershed as in past years.

A leak is now apparent from the pond and water is currently percolating through the soil under the dyke. From our observations, we suspect a leak through a welded joint in the liner. This could possibly be at the location where the liner is folded at the interior base of dyke. Further investigation is required.

As the percolation points are not particularly close to each other, there could be more than one leak.

3.17 Jet "A" Fuel Containment

General Conditions

This cell was constructed to replace the containment structure near the Weatherhaven Camp.

This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes.

Recommendations

We have no recommendations with respect to this structure.

3.18 Hazardous Waste Containment (MS-HWB-6)

General Conditions

It is located near the incinerator and is utilized to store barrels of ash from the incinerator.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner. There are tears in the enviroliner noted with 3 in the west side and one in the south east corner. All waste is in barrels or totes and is contained.

There were no signs of cracking of the dykes or seepage around the exterior of the dykes.

Recommendations

We have no recommendations with respect to this structure other than making repairs to the damaged enviroliner. There are four tears in the side of the liner that should be repaired if use is to continue as we understand it shall. The side dykes should be also built up to keep traffic off them.

3.19 Overview

This report is the annual Geotechnical Inspection at Mary River and Milne Inlet completed by Barry H. Martin on behalf of Baffinland Iron Mines Corporation and will cover the first of two inspections occurring in the 2018 shipping season. This will be the ninth year of annual geotechnical inspection.

As set out in our past reports, there has been little or no erosion taken place 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 last year, there are 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 to be settlements 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.

A number of these structures at Mary River are awaiting the construction of a land farm to facilitate the disposal of contaminated granular fill from the bottom of containment cells.

We recommend that where clear water has collected from rainfall and no contamination exists the water be decanted.

We recommend that where clear water has collected from rainfall and no contamination exists that the water be decanted.

We particularly reviewed the liner membrane where it was exposed. We found no degradation of the liner from exposure.

MARY RIVER PHOTOS



1. Bulk Fuel Storage Facility.



2. Generator Fuel Storage Containment.



3. PWSP #1



4. PWSP #2



5. PWSP #3



6. Helicopter Fuel Cell Containment



7. Barrel Fuel Containment (MS-HWB-3 and MS-HWB-4)



8. Hazardous Waste Storage (MS-HWB-2)



9. Enviro-Tank Storage



10. Stove Oil Storage (MS-HWB-5)



11. Jet Fuel Pump and Tank Containment



12. Solid Waste Disposal Site



13. Fuel Farm Containment (Mary River)



14. Quarry (QMR2)



15. Crusher Pad Drainage Containment



16. Waste Pile Drainage Containment

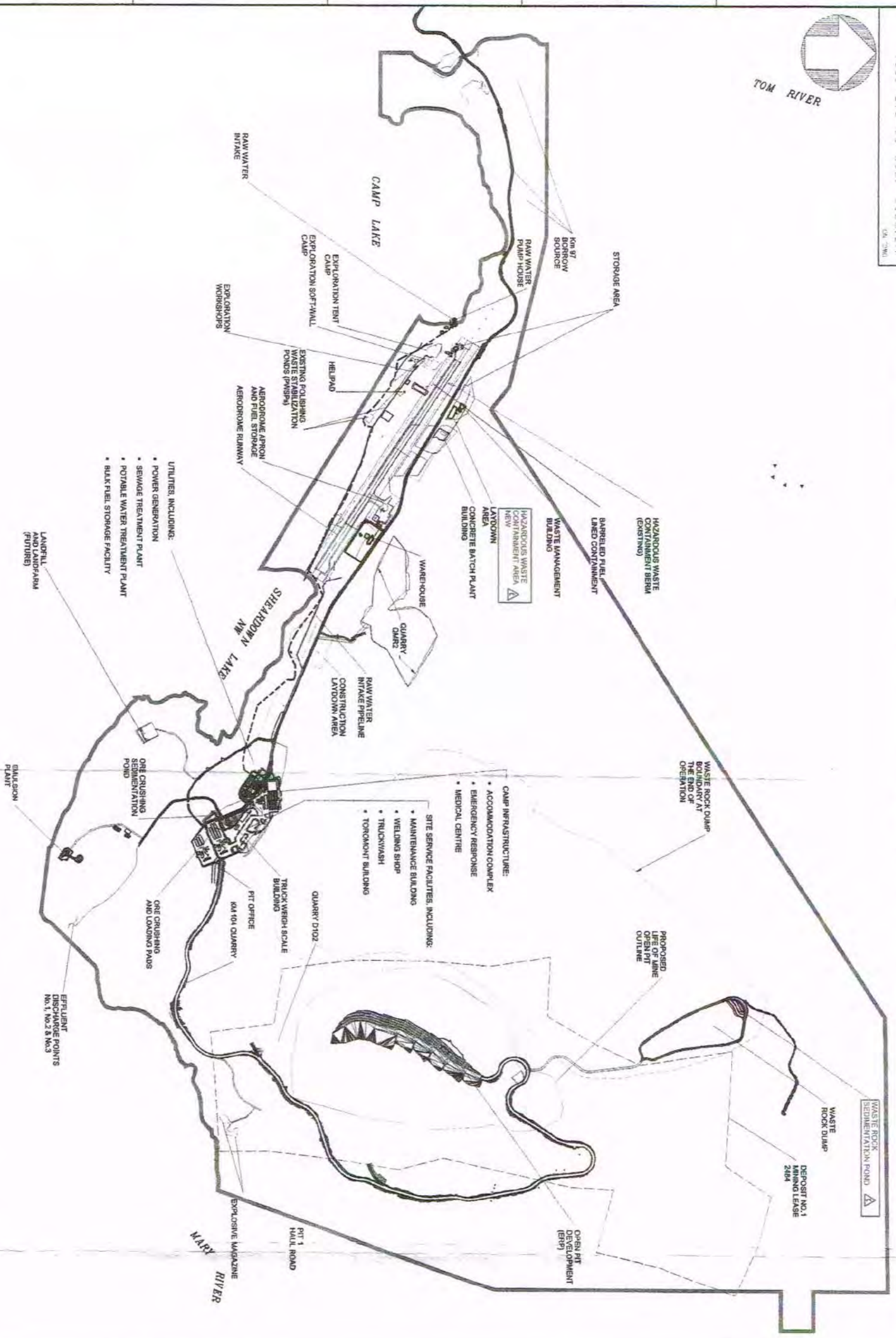


17. Jet 'A" Aircraft Containment



18. Hazardous Waste Containment (MS-HWB-6)

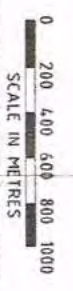
MARY RIVER DRAWINGS



- UTILITIES INCLUDING:
- POWER GENERATION
 - SEWAGE TREATMENT PLANT
 - POTABLE WATER TREATMENT PLANT
 - BULK FUEL STORAGE FACILITY

- CAMP INFRASTRUCTURE:
- ACCOMMODATION COMPLEX
 - EMERGENCY RESPONSE
 - MEDICAL CENTRE

- SITE SERVICE FACILITIES INCLUDING:
- MAINTENANCE BUILDING
 - WELDING SHOP
 - TRUCKWASH
 - TONKOUNT BUILDINGS



NOTES:
 1. COORDINATE GRID IS SHOWN IN UTM (MADRS) ZONE 17 AND IS IN METRES.
 2. 2016 WORK SHOWN IN RED TEXT.

FOR INFORMATION

LEGEND

WATER	EXISTING AREA	CONVEYOR LEASE
ROAD	RAILWAY/STEEL TROUGHAGE	PROJECT DEVELOPMENT AREA
RAILWAY	RAIL WATCH MILE	
	EFFLUENT	

ISSUE AUTHORIZATION

REV	DATE	BY	APP'D BY	DESCRIPTION
1	2016-10-21	J. HERRILL	J. CLEAVED	ISSUE FOR USE
2	2016-10-21	J. HERRILL	J. CLEAVED	ISSUE FOR USE
3	2016-10-21	J. HERRILL	J. CLEAVED	ISSUE FOR USE
4	2016-10-21	J. HERRILL	J. CLEAVED	ISSUE FOR USE
5	2016-10-21	J. HERRILL	J. CLEAVED	ISSUE FOR USE



MARY RIVER PROJECT
 MINE SITE
 INFRASTRUCTURE FOOTPRINT
 WORK PLAN 2016

SCALE NO. 1:15000
 DWG. NO. H349000-4000-00-015-0021
 ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

KEYPLAN

MINE PORT
 MINE SITE

4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, even since our previous inspection in September/October of last year.

4.02 Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is still only utilized to store sea cans that contain scraps of enviroliner and geotextile removed from the decommissioning of the exploration phase bulk fuel bladder farm.

A new hazardous waste storage facility has been constructed near the loadout area for storing hazardous waste to be shipped out and is in full operation. As in a former report, MP-HWB-5 is now decommissioned.

Stability

There is water ponding in both cells of the original structure, confirming the integrity of the enviroliner at this time.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time.

4.03 Fuel Tank Farm

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks. Another tank has been constructed since the last inspection.

Two sumps have been installed in the north end (low end) of the containment. Water is currently ponding in the low end of the containment, confirming the integrity of the enviroliner.

This water is currently 6" to 10" in depth.

Stability

All containment dykes are in excellent condition and there are no signs of weakness.

Recommendations

We have no recommendations with respect to the containment at this time.

4.04 New Effluent Pond (PWSP)

General Conditions

This pond was put into operation in 2014.

The containment pond was operating at fifty percent of capacity at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure

4.05 Landfarm Containment

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000 m³ of oil contaminated soil and seasonal water accumulation.

At the time of our inspection the landfarm was in operation and sorting of contaminated materials had taken place. Since our last inspection, there is still minor sorting to take place including the removal of waste and contaminated waste.

There is still some contaminated waste in the landfarm in addition to contaminated soil. No land farming or treatment of contaminated soil has taken place.

It appears the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed. There has been some minor settlement at the north top side of the dyke.

Recommendations

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings. This however, is not an absolute requirement. Since our last inspection, the exposed liner has been covered with a non-woven geotextile but has not been covered with soil.

4.06 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m³ based on estimates of volume

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time. The structure appears as it did in our September/October review in 2017.

4.07 Sediment Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the ore pad is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point although some tire ballast has been placed over the liner on the north side.

The two inlets to the pond have recently been upgraded and the enviroliner repaired at these locations. It is performing well, particularly at the culvert entrance.

Stability

We have concerns over the stability of the liner on this pond and recommend possibly further tire ballast over the liner which appears possibly subject to wind damage. This shall provide a function for used tires

Recommendations

We further recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift. I do note that there is no deterioration of the exposed liner.

4.08 Sediment Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is now complete with repairs recommended in our past reports having been completed.

The inlet where the water was being conducted under the liner with gravel has been rectified via reconstruction of the inlet.

Stability

We have some concern over the stability of the liner on this pond as we have with the east pond and further recommend that used tire ballast be further considered.

Recommendations

We have no concerns other than that of possible wind damage to the liner and recommend the use of tires as ballast.

4.09 Quarry (MPQ1)

General Conditions

The quarry was not in operation during our review and has been expanded since our last inspection.

Stability

Rock faces appear stable.

A rock berm has been left in place along the face. I assume this is to contain falling rock during the cleaning of the upper face prior to blasting. This an excellent idea.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (Now MP-HWB-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out.

Most hazardous waste has now been removed from the containment and shipped out.

Construction appears to have taken place in accordance with standardized drawings prepared in the past.

Stability

Construction appears stable. However there is one exposed tear in the liner at the dyke that requires repair. This was noted last year and awaits repair. This tear is where travel took place over the berm on the north side of the structure.

Recommendations

We have no recommendations with respect to this structure other than the liner repair.

4.11 Fuelling Facility Containment

General Condition

A new fueling facility for the fueling of B trains has been constructed utilizing design drawings prepared by our office for a double fueling facility.

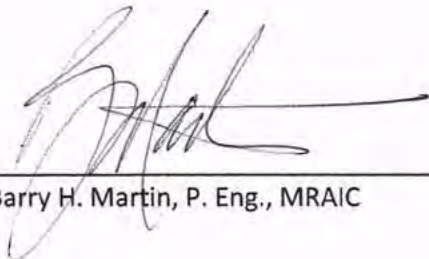
Work conforms to the design drawing. However, I note that "mud" and the like apparently has been falling from the underside of trucks and trailers to an extent where it is now filling the void set aside to contain a fuel spill.

4.13 Recommendations

We recommend that 4" to 6" this "mud" be removed without disturbing the gravel layer over the liner at the base of the structure or the liner in both sides of the fuel tank.

4.12 Overview

Work on containment structures except for maintenance appears complete.



Barry H. Martin, P. Eng., MRAIC



MILNE INLET PHOTOS



1. Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)



2. Port Site Fuel Tank Farm



3. Polishing/Waste Stabilization Pond (PWSP)



4. Land Farm Containment



5. Contaminated Snow Containment



6. Sediment Pond West



7. Sediment Pond East



8. Quarry (MPQ1)



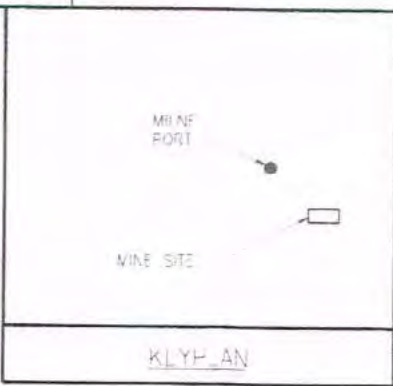
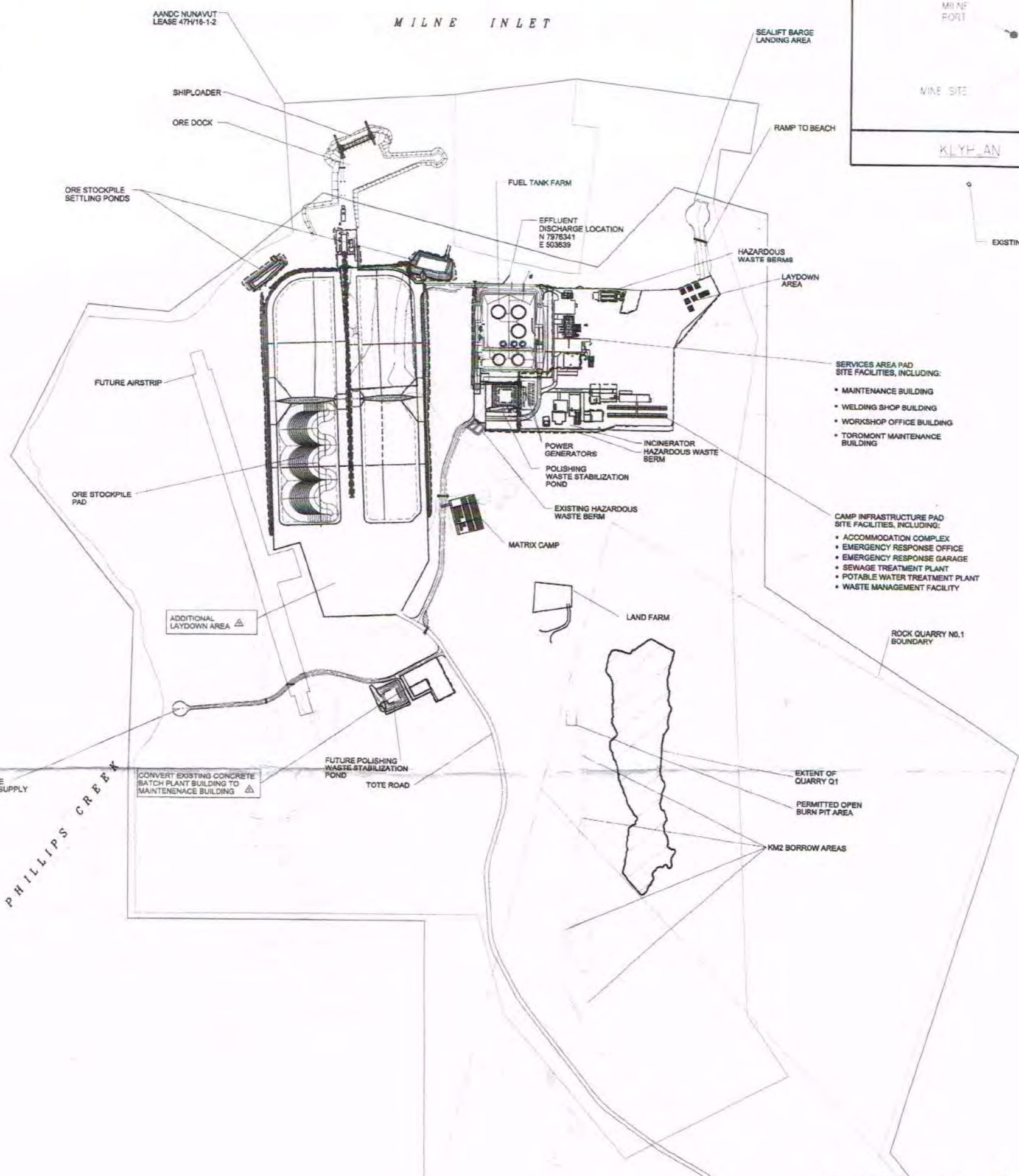
9. Loading Area Contaminated Storage (MP-HWB-1)



10. Fueling Facility Containment

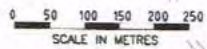
MILNE INLET DRAWINGS

H349000-2000-00-015-0021



FOR INFORMATION

- NOTES:**
- COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
 - 2016 WORK SHOWN IN RED TEXT.



LEGEND:

WATER	RIVER/STREAM/DRAINAGE
QUARRY	ROAD
COMMERCIAL LEASE	PROJECT DEVELOPMENT AREA
AANDC LEASE 47H/16-1-2	BORROW AREAS

HATCH	
DESIGNED BY C. LEISTNER DATE 2014-10-20	DRAWN BY J. BALJACIC DATE 2014-10-20
CHECKED BY S. POTTER DATE 2014-10-20	DISCIP. ENGR A. GRZEGORCZYK DATE 2014-10-20
ISSUED FOR USE M.R. J.R. 20'S 10-19	PROJ. ENGR T. THRELLI DATE 2014-10-20
ISSUED FOR USE S.M. T.M. 2014-12-10	PROJ. ENGR J. CLELAND DATE 2014-06-19
ISSUED FOR USE C.L. T.M. 2014-10-31	PROJ. MGR J. CLELAND DATE 2014-06-19
ISSUED FOR USE C.L. A.G. 2014-06-19	
ISSUE AUTHORIZATION	

Barrinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE: 1:5000
DWG. NO. H349000-2000-00-015-0021

REV. D



October 10, 2018

Assol Kubeisnova
Technical Advisor, NWB
P.O. Box 119
Goja Haven, NU X0B 1J0

RE: Submission of 2018 Geotechnical Inspection Report No. 2 (Oct. 2018)

Under Part D, Item 18 of Baffinland Iron Mines Corporation's (Baffinland) Type "A" Water Licence 2AM-MRY1325 Amendment No. 1 (Water Licence), there is a requirement to conduct biannual geotechnical inspections of specified Mary River Project (the 'Project') infrastructure. Part D, Item 18, of the Water Licence states that:

"The Licensee shall conduct inspections of the earthworks and geological and hydrological regimes of the Project biannually during the summer or as otherwise approved by the Board in writing. The inspection shall be conducted by a Geotechnical Engineer and the inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations."

The first biannual geotechnical field inspection for 2018 was conducted by Barry Martin of Barry H. Martin Consulting Engineer and Architect (BMCE) of Timmins, Ontario. The focus of the inspection was on the Water Licence related infrastructure located at the main camp sites, known as the Mary River Mine Site and Milne Port. Mr. Barry Martin has been conducting annual geotechnical inspections for the Project since 2008. The attached report covers the second inspection that was conducted between October 3rd and 10th, 2018.

During the October 2018 inspection, the following site facilities were inspected:

Mary River Mine Site

- Bulk Fuel Storage Containment
- Generator Fuel Storage Facility Containment
- Polishing/Waste Stabilization Pond # 1
- Polishing/Waste Stabilization Ponds # 2 and #3 (constructed as a two-cell structure)
- Helicopter Fuel Cell Containment
- Barrel Fuel Containment (constructed as a two-cell structure) (MS-HWB-3 and MS-HWB-4)
- Hazardous Waste Storage (MS-HWB-2)
- Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
- Stove Oil Storage (MS-HWB-5)
- Jet Fuel Tank and Pump Containment
- Solid Waste Disposal Site
- Mine Site Steel Fuel Tank Farm Containment

- Quarry (QMR2)
- Crusher Pad Drainage Containment
- Waste Pile Drainage Containment
- Jet 'A' Fuel Containment
- Hazardous Waste Containment (MS-HWB-6)

Milne Port

- Hazardous Waste Storage (MP-HWB-3, and MP-HWB-4)
- Port Site Fuel Tank Farm Containment
- Polishing/Waste Stabilization Pond (PWSP)
- Land Farm
- Contaminated Snow Containment
- Sedimentation Ponds East and West
- Quarry (Q1)
- Loading Area Contaminated Storage (MP-HWB-1)
- Fuelling Facility Containment

Milne Inlet Tote Road Bridge Crossings

- Km 17 Bridge
- Km 62 Bridge
- Km 80 Bridge
- Km 97 Bridge

Site plans for the Mary River and Milne Port showing most structures reviewed are included in the inspection report (refer to Attachment 1).

The attached report (refer to Attachment 1) presents the findings of the October 2018 inspection and recommendations for the aforementioned structures. The following subsections of this letter summarize Baffinland's plan for implementing recommendations. Where there is no mention of particular infrastructure, there were no concerns identified by BMCE during the inspection.

Recommendations for the Mary River Mine Site Infrastructure

Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

We have no recommendations with respect to this containment structure other than to confirm repair of the puncture in the liner on the west berm of the structure.

Baffinland Action: The liner of this storage facility was repaired in August 2018. This repair will be monitored in further inspections to confirm integrity.

Polishing/Waste Stabilization Pond #1

The damage to the liner at the top of the dyke at the area where trucks dump into the cell should be repaired.

Baffinland Action: The small tears on the top of the berm walls where vacuum truck offload will be repaired by Jul 2019.

Hazardous Waste Storage (Now MS-HWB-2)

There is an area at the front of the cell where traffic has exposed the liner. This liner is to be covered.

Baffinland Action: Aggregate will be used to cover the exposed area as soon as conditions and snow cover allow.

Enviro Tank Storage (Now MS-HWB-5)

We recommend that the geotextile over the liner be checked and the granular cover be reapplied prior to continuing use of this cell.

Baffinland Action: The cell is currently not being used and has been left empty. The Site Services Department are aware that this area shall not be used for the storage of Hazardous waste or substances until it has been repaired. Alternatively, this facility may be decommissioned.

Crusher Pad Drainage Containment

We recommend that the ore on the pad be placed to suit the design with a 3m buffer between the ditch and the ore. This shall require the relocation of stockpiles. Ditches were snow filled and could not be reviewed fully.

Baffinland Action: As in 2018, Baffinland will continue to perform ongoing design maintenance of drainage ditches in 2019. Baffinland recognizes the original 2013 Hatch design stating a 3m setback of material from the ditching perimeter and material accessible by heavy equipment has been setback 3m, however, the stockpile design results in certain areas being difficult to access. Baffinland is developing a progressive strategy to address this issue and will work towards addressing this setback in the 2019 season. As an interim supplementary measure to ensure fines do not slough into the ditching structures, strategically spaced out oversize rock barriers have been placed.

Waste Rock Stockpile Drainage Containment

Recommendations:

1. There is a small erosion area on the west side of the containment dyke that is now under snow cover. This area is small but must be mitigated first thing in the spring.
2. Ensure that deposited Waste Rock material is comprehensively contained by the Stockpile ditching system and that the ditches are flowing down-gradient to the Waste Rock Stockpile Pond upon freshet 2019.
3. Continue evaluations of Waste Rock Pond Liner in 2019 to determine compromised location.

Baffinland Action:

1. The erosional area on the west side of the containment dyke will be reinforced with aggregate to mitigate potential erosion prior to Freshet.
2. A new IFC for the Waste Rock Stockpile was issued by Golder as part of the waste rock pond expansion project (Modification No. 8) and it is Baffinland's plan to readjust the existing ditches to fit this new design during the 2019 summer season. Freshet stockpile drainage ditching maintenance and snow clearing will be performed as required prior. The intention of the ditch redesign will be to address berm height, ditch depth and grading concerns and irregularities noted.
3. Approximately 2/3 of the Waste Rock Pond Liner was evaluated by external professional engineers in 2018 and was confirmed competent. In 2019 the remainder of the Pond liner will be evaluated to determine the source of the leak and the pond will be repaired and expanded as conditions allow.

Jet "A" Fuel Containment

There is one small area of exposed liner on the west dyke of this containment. This exposed liner should be covered with material.

Baffinland Action: The liner will be covered with material as soon as snow conditions allow.

Hazardous Waste Containment (MS-HWB-6)

We recommend making repairs to the damaged liner in three damaged locations. The side dykes should be also built up to keep traffic off them and material stored outside of the dykes should be relocated to within the dykes.

Baffinland Action: Baffinland repaired one of the small liner tears in August 2018 and will repair the remaining by July 2019. The tears are located on the berms and are above freeboard levels at this facility.

Recommendations for Milne Port Infrastructure

Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)

We recommend to repair the liner in MP-HWB-3 directly in front of the container stored within the cell.

Baffinland Action: Baffinland will make repairs the minor tear by July 2019 which is above freeboard levels.

Fuel Tank Farm

We have no recommendations with respect to the containment at this time other than to level/trim the top of the east dyke.

Baffinland Action: Baffinland will perform berm maintenance to level the east dyke by July 2019.

Landfarm Containment

We recommend that as a minimum, the exterior side of the dyke be covered with gravel/soil to at least half way up from the bottom of the dyke at the area around the sump.

Baffinland Action: Baffinland will cover the exposed section of the Landfarm sump by July 2019.

Loading Area Contaminated Storage (MP-HWB-1)

We have no recommendations with respect to this structure other than to repair the tear on the North Side of the structure.

Baffinland Action: Baffinland will repair the torn liner by July 2019. In the meantime, stormwater and snowmelt in the berm will not be allowed to reach the height of the tear.

Fueling Facility Containment

We recommend that 4" to 6" of "mud" be removed without disturbing the gravel layer over the liner at the base and sides of the fuel tank.

Baffinland Action: Baffinland will either remove the built up material from the fueling module pad or propose a mitigative strategy including a flat floor grade and end berms to reduce potential pooling and impacted water.

We trust that this submittal meets the requirements for geotechnical inspections as outlined in the Water Licence. Should you have any questions, please do not hesitate to contact the undersigned, Connor Devereaux or Timothy Ray Sewell.

Regards,



William Bowden
Environmental Superintendent

Attachments:

Attachment 1: 2018 Geotechnical Inspection Report No. 2 and Tote Road Bridges Abutment Review (October 2018)

Cc: Karén Kharatyan (NWB)
Fai Ndofo, Sean Joseph (QIA)
Sarah Forte, Bridget Campbell, Ian Parsons, Justin Hack, Jonathon Mesher (CIRNAC)
Tim Sewell, Grant Goddard, Megan Lorde-Hoyle, Christopher Murray, Sylvain Proulx, Gordon Mudryk (Baffinland)



BHM Project No. 18-068

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INSPECTIONS

MARY RIVER PROJECT

SECOND INSPECTION OF TWO

October 2018



Prepared for:

Connor Devereaux
Environmental Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

Mr. William Bowden
Environmental Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3



Barry H. Martin, P. Eng., MRAIC, Consulting Engineer and Architect

1499 Kraft Creek Road

Timmins, Ontario P4N 7C5

Tel: 705-268-5621

barry.martin@barryhmartin.com

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Milne Inlet Photos
Milne Inlet Drawing

December 10, 2018

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3

Attention: Connor Devereaux
connor.devereaux@baffinland.com

William Bowden
william.bowden@baffinland.com

**RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 18-068**

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer, completed the tenth annual water licence geotechnical inspection of the following on-site engineered facilities as required by Licence No. 2AM-MRY 1325 of the Nunavut Water Board:

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

The inspection that took place Oct 3rd to October 10th is the second phase of a biannual inspection to be carried out within the open water shipping season at Mary River, the mine site, and Milne port. As we arrived in Mary River, the last 4 ships had not yet arrived in Milne Inlet.

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities both at Mary River and Milne Inlet, the runway extension, initial bridges on the Tote Road, the solid waste disposal site as well as continuing construction of select mine infrastructure.

The nine previous annual water licences geotechnical inspections were completed by Mr. Martin. You shall note that Hazardous Waste Containment Structures have been assigned new designations in the report as compared to past years and are now identified by both the new designation and the past descriptive designation.

The facilities inspected are as per the following:

Mary River Site

Bulk Fuel Storage Containment
Generator Fuel Storage Facility Containment
Polishing/Waste Stabilization Pond # 1
Polishing/Waste Stabilization Ponds # 2 and # 3 (constructed as a two-cell structure)
Helicopter Fuel Cell Containment
Barrel Fuel Containment (constructed as a two-cell structure) (MS-HWB-3 and MS-HWB-4)
Hazardous Waste Storage (MS-HWB-2)
Enviro-Tank Storage (constructed contiguous with hazardous waste storage and stove oil storage) (MS-HWB-1)
Stove Oil Storage (MS-HWB-5)
Jet Fuel Tank and Pump Containment
Solid Waste Disposal Site
Mine Site Steel Fuel Tank Farm Containment
Quarry (QMR2)
Crusher Pad Drainage Containment
Waste Pile Drainage Containment
Jet 'A' Fuel Containment
Hazardous Waste Containment (MS-HWB-6)

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

Hazardous Waste Storage (constructed as a two-cell structure) (MP-HWB-3 and MP-HWB-4)
Port Site Fuel Tank Farm Containment
Polishing/Waste Stabilization Pond (PWSP)
Land Farm
Contaminated Snow Containment
Sediment Ponds East and West (MP-05 and MP-06)
Quarry (Q1)
Loading Area Contaminated Storage (MP-HWB-1)
Fuelling Facility Containment

A site plan for the Milne Inlet site showing most structures reviewed is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who also reviewed both sites in the past 9 years during the open water season

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. I note that the quarries are active removal areas and long term stability was not yet established.
5. New structures under construction were reviewed for conformity with design drawings.
6. Photographs were taken to document observations made during the inspection and are attached.
7. The berms of containment structures were examined with respect to possible tears in liner membranes.

3.0 MARY RIVER CAMP

3.01 General

There had been snowfall in the two weeks prior to our inspection at Mary River. There was very little snow on the ground at Milne Inlet. Hence the integrity of the containment structures could be verified by the recent ice that had formed in the bottom of the containment structures.

A monitoring program is in place to test storm water that accumulates within the containment structures. As reviewed, the water that does not meet the water licence effluent requirements is treated on site prior to release. For small amounts, the water is pumped out and transported to where treatment takes place. This is done earlier in the season.

At the Bulk Fuel Storage Facility Containment, the water that collects within the dyke and is treated at the end of the containment structure. At the time of this inspection, the treatment was not actively taking place due to the cold weather.

The unloading area is currently utilized as an entrance to the containment with some storage.

3.02 Bulk Fuel Storage Facility (Exploration Phase Bladder Farm)

General Conditions

The Bulk Fuel Storage Facility still exists but it is no longer utilized as a bulk fuel storage facility. There are a number of full fuel barrels and lubricant cubes now stored within the berms, as well as a large fuel tank.

The granular cover over the geotextile and liner is still in place within the containment structure with a fair amount of water and ice at one end awaiting treatment.

There is now a ramp over the north end of the containment to permit access over the dyke for placing barrels and cubes in storage. There is also some cube/barrel storage in this area.

At the south end this access is through the former fuel unloading area.

Stability

At the time of the initial springtime inspection water had not been removed from within the containment. This water was ponding above the level of the gravel in the bottom south end of the containment facility. At the time of our current inspection this water is frozen.

At the load-out end of the facility there was water and ice ponding within the dykes. At the former fuel unloading area at the north end there was minor water ponding within the dykes.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water and ice within the structure and at the load-out area is an indication of the liner's integrity.

The dykes have been built up two years ago to reinforce the concept of no loader travel over the dykes.

There is one area along the interior of the west dyke where the liner integrity had been compromised by a loader operator that has punctured the membrane. The puncture appears to have been repaired and covered.

Recommendations

We have no recommendations with respect to this containment structure other than to confirm the puncture was repaired and then covered.

3.03 Generator Fuel Storage Containment (Exploration Phase)

This particular containment structure is currently being decommissioned.

The granular fill over the geotextile and liner shall eventually require landfarming with the material from the bulk fuel storage facility.

There is no indication that the liner is compromised and decommissioning should proceed when the granular cover is either moved to a land farm or other containment. There is water and ice ponding within the structure confirming the integrity of the liner.

3.04 Polishing/Waste Stabilization Pond #1

General Conditions

PWSP # 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for off spec sewage and sewage sludge forming in lift stations.

The supernatant from PWSP #1 is periodically decanted to PWSPs # 2 and #3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our visit there was approximately fifty percent of capacity to accommodate further sewage and the structure readily conforms to its design intent.

Stability

Our review of this area around the pond at the base of the slopes showed no sign of seepage; hence, we conclude that the liner has been effective in containing sewage. There are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane. Travel with small machinery in the past has caused many punctures and small tears in the top of the dyke.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

There appears to be no sign of erosion of the dykes, even with the precipitation that has occurred over the lifetime of the facility.

The minor settlements have had little effect on the integrity of the structure.

Recommendations

The damage to the liner at the top of the dyke at the area where trucks dump into the cell should be repaired.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

The structure was designed and constructed as a two-cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs #2 and #3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visit there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. Both cells were operating at approximately 50% of capacity.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Monitoring points have been set up on the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. Monitoring was discontinued three years ago. There is no sign that these very minor settlements are affecting the function of this containment structure.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is still minimal, however.

Recommendations

We have no recommendations with respect to this containment facility.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent.

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

The temporary fuel containment cell that was set up last year has been removed since our last inspection in 2017.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition and contains water and ice that attests to its integrity.

Recommendations

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment (Now MS-HWB-3 and MS-HWB-4)

General Conditions

This particular structure which we called “Barrel Fuel Containment” in our previous inspection reports is a two-cell structure currently used to accommodate contaminated waste in the east cell and barrels of fuel in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. There is some ice and water ponding in this structure attesting to its integrity

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations at this time.

3.08 Hazardous Waste Storage (Now MS-HWB-2)

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the “Enviro Tank Storage”, from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage. There is ice and water ponding in this structure.

The structure appears to be stable in its present condition. The ice and water in the cell confirms the integrity of the liner.

Recommendations

There is an area at the front of the cell where traffic in has exposed the liner. This liner is to be covered.

3.09 Enviro Tank Storage (Now MS-HWB-1)

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It is currently not being utilized and access is blocked.

Stability

Two years ago there was concern for the integrity of this cell as the cell was dry and the geotextile was exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming limited integrity of the liner.

The cell was dry last year during the second inspection raising concerns anew on the integrity of the liner. This inspection showed no ice and water present.

Recommendations

We recommend that the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell. Alternatively, as the cell has not been utilized for over a year, it could be removed.

3.10 Stove Oil Storage (Now MS-HWB-5)

General Conditions

This particular structure had been used to store barrels of stove fuel in 2011.

The structure again contains barrels of stove oil and some cubes of lubricant.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one-piece liner.

Stability

Our review of the exterior at the base of the dyke showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

There is ice and water contained within the cell confirming the integrity of the liner.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

General Conditions

This particular structure was reconstructed based on our recommendation of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one-piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Minor ice and water ponding confirms the integrity of the liner.

At this time as in our earlier inspection report two years ago, the jet fuel tank and pump have been removed and the cell is empty.

Stability

Our review of the area around the cell at the base of the slopes showed no sign of seepage and ice and water is ponding within the cell.

The structure is stable in its present condition.

Recommendations

There are no recommendations at this time.

3.12 Solid Waste Disposal Site

The solid waste disposal site is currently in the second phase of its construction. The second lift of solid waste has been placed and covered fully.

A small amount of waste has been placed on the north side and awaits cover.

A new galvanized steel fence has been constructed along the west side to control wind blown debris.

3.13 Mine Site Fuel Tank Farm Containment

General Conditions

There is ice and water ponding in the bottom of the containment confirming the integrity of the liner. This ponding of water is now well above the cover on the bottom of the containment. (6" to 8") as it was during our earlier inspection this year.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

3.14 Quarry (QMR2)

General Conditions

The quarry has well defined benches. The quarry faces at the benches are clean on the lower lift. Where blasting occurred in the late fall, the edges and back slopes are well protected with large rocks (2' x 3')

Considerable removals have occurred since our last visit as a systematic approach to quarrying is in place.

Recommendations

We have no recommendations with respect to the manner in which quarrying is being carried out.

3.15 Crusher Pad Drainage Containment

General Conditions

The crusher pad drainage containment has now been constructed and appears satisfactory. The crusher pad has now been expanded as designed

Stability

The edge of the crusher pad is now being revised to ensure the drainage, off the pad, to the ditch beside it.

Recommendations

We recommend that the ore on the pad be placed to suit the design with an 3m buffer between the ditch and the ore. This shall require the relocation some ore. Ditches were snow filled and could not be reviewed fully.

3.16 Waste Rock Stockpile Drainage Containment

Stability

The dyke appears stable at this time.

The waste rock stockpile drainage containment had been drained to locate what appears to be a leak in one of the seams in the liner. Dye testing within the containment has confirmed that there is a leak in the liner but further work in the spring is required.

In the meantime, an emergency dyke and ditch have been constructed to operate until construction is complete on the upgraded waste rock stockpile drainage containment.

The operation of adjusting pH and removing suspended solids from the effluent has been suspended for the winter season. The geo tube containment at the treatment facility appears secure.

The drainage ditching systems conveying runoff and flow to the Waste Rock Stockpile Pond were snow filled and could not be reviewed fully.

Recommendations

1. There is a small erosion area on the west side of the containment dyke that is now under snow cover. This area is small but must be made good first thing in the spring.
2. Ensure that deposited Waste Rock Material is comprehensively contained by the Stockpile ditching system and that the ditches are flowing down-gradient to the Waste Rock Stockpile Pond upon flow initiation in Spring 2019.
3. Continue evaluations of Waste Rock Pond Liner in 2019 to determine compromised location.

3.17 Jet "A" Fuel Containment

General Conditions

This cell was constructed to replace the containment structure near the Weatherhaven Camp. This cell now contains two double walled tanks and is located north of the air terminal buildings.

Stability

The cell was constructed using a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is water ponding in the bottom of the cell confirming the integrity of the liner.

There were no signs of cracking of the dykes.

Recommendations

There is one small area of exposed liner on the west dyke of this containment. This exposed liner should be covered with gravel.

3.18 Hazardous Waste Containment (MS-HWB-6)

General Conditions

Although it was constructed in 2012, we have not reported on it until 2015.

It is located near the incinerator and is utilized to store barrels of ash from the incinerator.

Stability

The cell was constructed utilizing a one piece enviroliner with geotextile and was constructed in accordance with standardized drawings prepared in the past for such construction by our office.

There is ice and water ponding in the bottom of the cell confirming the integrity of the liner. There are tears in the enviroliner noted with three in the west side and one in the south east corner. All waste is in barrels or totes and is contained. The tear in the liner in the south east corner has been repaired but not covered. Other tears have not been repaired and are slightly above the bottom of the containment.

There were no signs of cracking of the dykes or seepage around the exterior of the dykes and one in the back corner.

Recommendations

We have no recommendations with respect to this structure other than making repairs to the damaged enviroliner in three locations. The side dykes should be also built up to keep traffic off them and material stored outside of the dykes should be relocated to within the dykes.

3.19 Overview

This report is the annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and will cover the second of two inspections occurring in the 2018 shipping season. This will be the tenth year of annual geotechnical inspections.

As set out in our past reports, there has been little or no erosion taken place 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 last year, there are 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 to be within the one metre \pm active layer above the permafrost and are of little concern as the PWSP's are temporary structures. These settlements have had no effect on the dyke stability. These settlements may also be settlements within a thicker active layer due to the dark fluid in the ponds.

It is expected that many of the structures that form the basis for the inspections set out in the biannual Geotechnical inspections shall be decommissioned as the mine facilities are finalized.

A number of these structures at Mary River are awaiting the construction of a land farm to facilitate the disposal of contaminated granular fill from the bottom of containment cells.

We particularly reviewed the liner membrane where it was exposed in this inspection. We found no degradation of the liner from exposure.

MARY RIVER PHOTOS



A. Bulk Fuel Storage Facility



B. Generator Fuel Storage Containment



C. PWSP #1 – Repair Liner at Unloading Area



D. PWSP #3



E. PWSP #2



F. Helicopter Fuel Cell Containment



G. MS-HWB-3 – Barrel Fuel Containment



H. MS-HWB-2 – Hazardous Waste Storage – Exposed Liner



I. MS-HWB-5 – Envirotank Storage



J. MS-HWB-1 – Stove Oil Storage



K. Jet Fuel Tank and Pump Containment



L. Solid Waste Disposal Site



M. Mine Site Fuel Tank Farm Containment



N. Mary River Quarry (QMR2)



O. Crusher Pad Drainage Containment (MS-06)



P. Waste Rock Water Treatment System Geotube field



Q. Waste Rock Pond down gradient

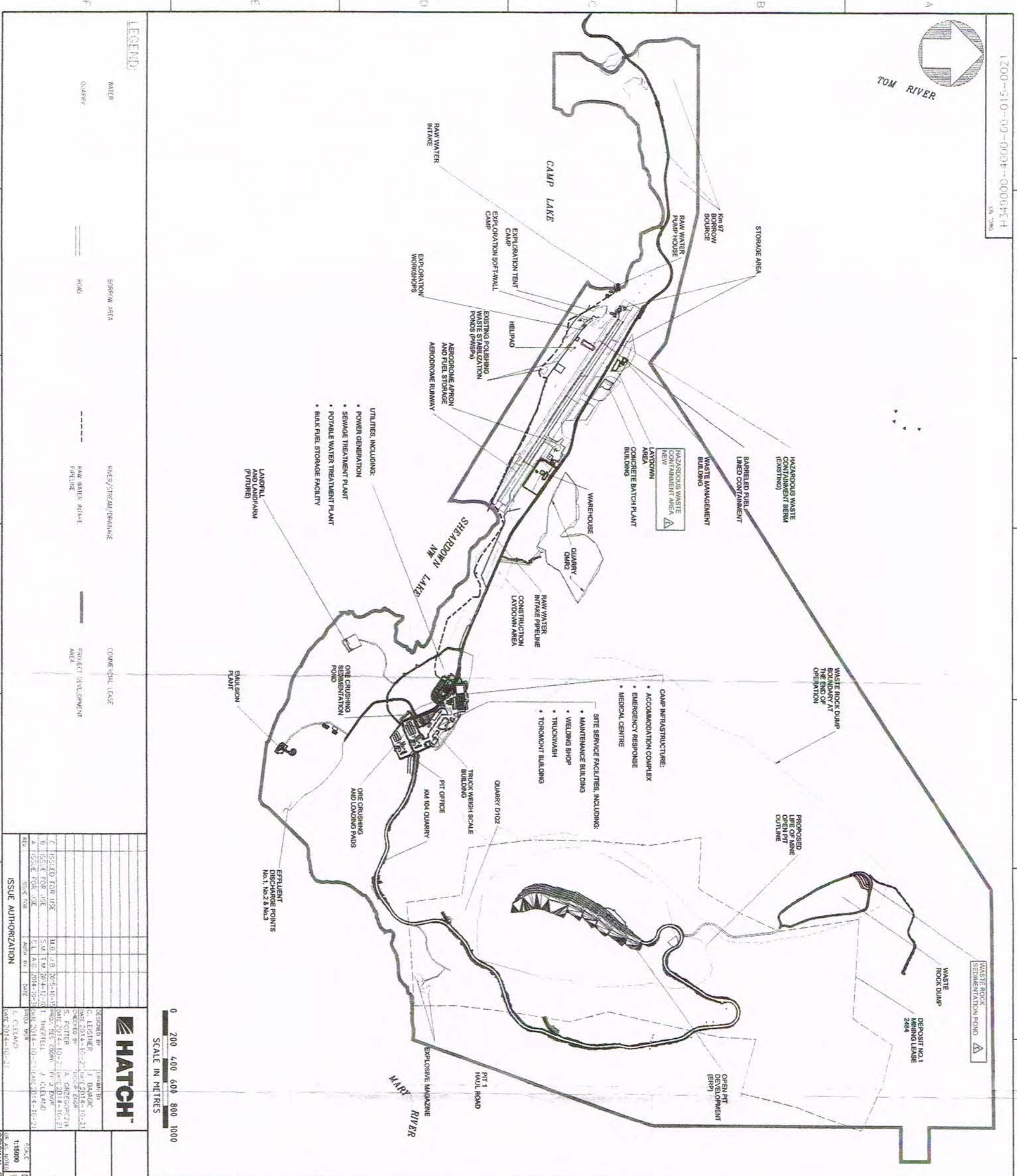
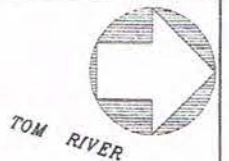


R. Jet 'A' Fuel Containment



S. MS-HWB-6 – Hazardous Waste Containment

MARY RIVER DRAWINGS



LEGEND

- WATER
- EXISTING AREA
- PROPOSED/STAGED/CONCEALED
- CONVEYOR LEASE
- PROJECT DEVELOPMENT AREA

- UTILITIES, INCLUDING:
- POWER GENERATION
 - SEWAGE TREATMENT PLANT
 - POTABLE WATER TREATMENT PLANT
 - BULK FUEL STORAGE FACILITY

- CAMP INFRASTRUCTURE:
- ACCOMMODATION COMPLEX
 - EMERGENCY RESPONSE
 - MEDICAL CENTRE

- SITE SERVICE FACILITIES, INCLUDING:
- MAINTENANCE BUILDING
 - WELDING SHOP
 - TRUCKWASH
 - TONKOUNT BUILDINGS

FOR INFORMATION

NOTES:
 1. CORPORATE GRID IS SHOWN IN UTM (MADRS) ZONE 17 AND IS IN METRES.
 2. 2018 WORK SHOWN IN RED TEXT.



MARY RIVER PROJECT

MINE SITE

INFRASTRUCTURE FOOTPRINT
 WORK PLAN 2018

DWG. NO. H349000-4000-00-015-0021

DATE: 2014-10-21

4.0 MILNE INLET

4.01 General

There are still changes taking place at Milne Inlet, even since our previous inspection in July/August of this year.

4.02 Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)

General Conditions

This particular structure has been constructed as a two-cell structure and is still only utilized to store sea cans that contain scraps of enviroliner and geotextile removed from the decommissioning of the exploration phase bulk fuel bladder farm.

Stability

There is water ponding in both cells of the original structure, confirming the integrity of the enviroliner at this time. However, there is a tear in the liner in MP-HWB-3.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We have no recommendations with respect to the use of these two cells at this time except for repair to the liner in MP-HWB-3 directly in front of the container stored within the cell.

4.03 Fuel Tank Farm

General Conditions

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks. One additional tank has been constructed since the last inspection and a second tank is currently under construction.

Two sumps have been installed in the north end (low end) of the containment. Water is currently ponding in the low end of the containment, confirming the integrity of the enviroliner.

This water is currently 6" to 10" in depth.

Stability

All containment dykes are in excellent condition and there is no sign of weakness except for the top of the dyke midway on the east side where a dozer has turned around on top of the dyke.

Recommendations

We have no recommendations with respect to the containment at this time other than to trim the top of the east dyke.

4.04 New Effluent Pond (PWSP)

General Conditions

This pond was put into operation in 2014.

The containment pond was empty at the time of our inspection.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure.

4.05 Landfarm Containment

General Conditions

The landfarm containment is complete except for soil cover on the dykes in the area of the sump.

The landfarm was constructed to accommodate approximately 9000 m³ of oil contaminated soil and seasonal water accumulations.

At the time of our inspection, the landfarm was in operation and sorting of contaminated materials had taken place since our last inspection. There is still minor sorting to take place including the removal of waste and contaminated waste.

There is still some contaminated waste in the landfarm in addition to contaminated soil. Land farming is just starting with the levelling of much of the contaminated soil.

It appears the structure has been constructed in accordance with good construction practice for structures of this type.

Stability

The structure appears stable as constructed. There has been some minor settlement at the north top side of the dyke.

Recommendations

We recommend that as a minimum, the exterior side of the dyke be covered with gravel/soil to at least half way up from the bottom of the dyke at the area around the sump.

4.06 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the landfarm.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m³ based on estimates of volume provided by the owner and there is considerable liquid in the cell. It is at approximately 50% of capacity.

The structure has been constructed with good quality control.

Stability

The structure appears stable as constructed.

Recommendations

We have no recommendations with respect to this construction at this time. The structure appears as it did in our July/August review earlier this this year.

4.07 Sediment Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the ore pad is complete.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point but, tires have been placed over the liner on the berms as a ballast.

The two inlets to the pond have recently been upgraded and the enviroliner has been repaired at these locations. It is performing well, particularly at the culvert entrance.

Stability

We have no concerns with stability at this time.

Recommendations

I do note that there is no deterioration of the exposed liner.

4.08 Sediment Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the ore pad is now complete with repairs recommended in our past reports having been completed.

The inlet where the water was being conducted under the liner with gravel has been rectified via reconstruction of the inlet.

Stability

We note that the tires placed as ballast on the liner as with the east pond appears to be working well as a ballast.

Recommendations

We have no recommendation with respect to the sediment pond west.

4.09 Quarry (MPQ1)

General Conditions

The quarry was not in operation during our review and has been greatly expanded since our last inspection.

Stability

Rock faces appear stable.

Recommendations

We have no recommendations to be made with respect to the quarry.

4.10 Loading Area Contaminated Storage (Now MP-HWB-1)

General Conditions

This area has been constructed near the loading dock to facilitate assembly of hazardous materials for shipment out.

Most hazardous waste has now been removed from the containment and shipped out.

Construction appears to have taken place in accordance with standardized drawings prepared in the past.

It appears a container of used oil has spilled within the containment and the spill has been controlled by the berm.

Stability

Construction appears stable. However, there is one exposed tear in the liner at the dyke that requires repair. This was noted last year and awaits repair. This tear is where travel took place over the berm on the north side of the structure.

Recommendations

We have no recommendations with respect to this structure other than the liner repair.

4.11 Fuelling Facility Containment

General Condition

A new fuelling facility for the fuelling of B trains has been constructed utilizing design drawings prepared by our office for a double fueling facility.

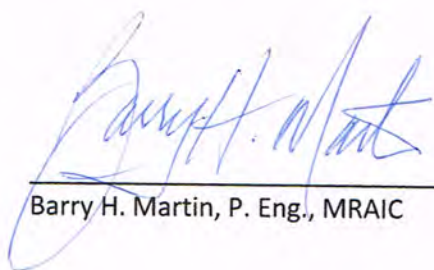
Work conforms to the design drawing. However, I note that "mud" and the like apparently has been falling from the underside of trucks and trailers to an extent where it is now filling the void set aside to contain a fuel spill. This has been further compounded by the addition of clean gravel over the "mud".

Recommendations

We recommend that 4" to 6" this "mud" and gravel be removed without disturbing the gravel layer over the liner at the base of the structure or the liner in both sides of the fuel tank. It is understood that some work is currently in progress.

4.12 Overview

Further work on containment structures except for maintenance appears complete. Weather will permit very little further work.



Barry H. Martin, P. Eng., MRAIC



MILNE INLET PHOTOS



1. Hazardous Waste Storage (MP-HWB-3 and MP-HWB-4)



2. Port Site Fuel Tank Farm



3. Polishing/Waste Stabilization Pond (PWSP)



4. Land Farm Containment



5. Contaminated Snow Containment



6. Sediment Pond West (MP-06)



7. Sediment Pond East (MP-05)



8. Quarry (Q1)



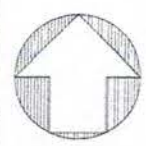
9. Loading Area Contaminated Storage (MP-HWB-1)



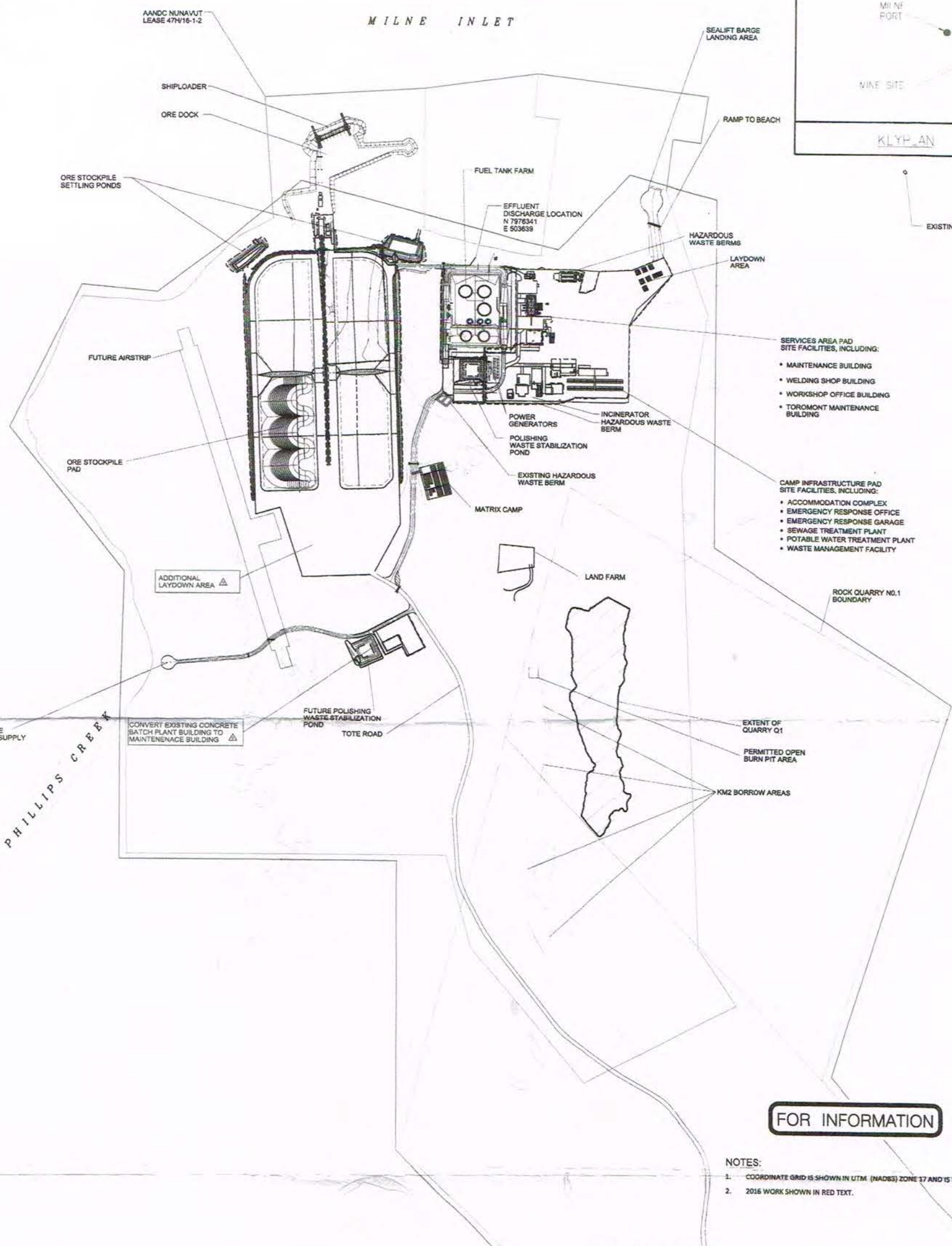
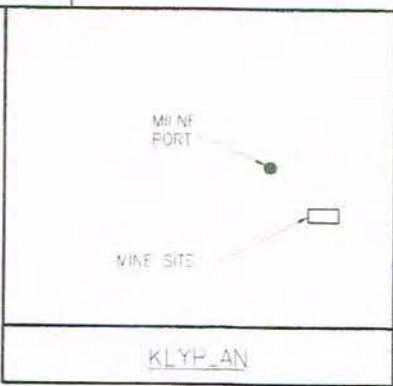
10. Fueling Facility Containment

MILNE INLET DRAWINGS

H349000-2000-00-015-0021

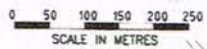


MILNE INLET



FOR INFORMATION

- NOTES:
- COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
 - 2016 WORK SHOWN IN RED TEXT.



LEGEND:

WATER	RIVER/STREAM/DRAINAGE
QUARRY	ROAD
COMMERCIAL LEASE	PROJECT DEVELOPMENT AREA
AANDC LEASE 47H/16-1-2	BORROW AREAS

HATCH	
DESIGNED BY C. LEISTNER DATE 2014-10-20	DRAWN BY J. BALJACIC DATE 2014-10-20
CHECKED BY S. POTTER DATE 2014-10-20	PROJ. DES. COORD. T. THURTELL DATE 2014-06-19
ISSUED FOR USE M.B. J.B. 2015-10-15	PROJ. MGR. J. CLELAND DATE 2014-06-19
ISSUED FOR USE S.M. T.M. 2014-12-10	
ISSUED FOR USE C.L. T.M. 2014-10-31	
ISSUED FOR USE C.L. A.G. 2014-08-19	
ISSUED FOR USE S.M. T.M. 2014-12-10	

Barrinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE: 1:5000
DWG. NO. H349000-2000-00-015-0021
REV. D

ISSUE AUTHORIZATION



Consulting Engineer and Architect
1499 Kraft Creek Road
Timmins, Ontario, P4N 7C3

December 10, 2018

Mr. Connor Devereaux
Environmental Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

RE: MARY RIVER PROJECT - TOTE ROAD BRIDGES - BRIDGE ABUTMENT REVIEW

On October 7, 2018, the abutments of the four (4) Tote Road bridges were inspected by Barry H. Martin.

The scope of the inspection focused on assessing the general condition of the abutments of each Tote Road bridge.

A summary of the observations noted during the October 7, 2018 inspection by Barry H. Martin is provided below.

1. Km 17 – Tote Road Bridge

a. South Abutment

- On the southwest corner, there is approximately ¼” of clearance between the steel and the ballast blocks. On the southeast corner, there is less than ¼” of clearance between the steel and the ballast blocks.
- The ballast blocks are no longer exactly aligned. The top block appears to have been “pushed back” by the wood deck at the wood deck level.

b. North Abutment

- Clearance between the steel and the ballast blocks averages 3 ¼”.
- The ballast blocks are slightly out of alignment but the variance is negligible.

c. Abutments for Former Shipping Container Bridge at Km 17

- The abutments are geotechnically stable.
- Fill on the north side of the former south abutment is spilling out slightly.

d. Photographs

- i. North Abutment – NW Corner
- ii. North Abutment - NE Corner
- iii. South Abutment - SE Corner
- iv. South Abutment - SW Corner
- v. North Abutment (Former Shipping Container Bridge)
- vi. South Abutment (Former Shipping Container Bridge)

2. Km 62 - Tote Road Bridge

a. South Abutment

- Clearance between the steel and ballast blocks is 3 ¼” and 2 ¼” on the SE and SW corners, respectively.

b. North Abutment

- Clearance between the steel and ballast blocks is approximately 1 ¼” and 2” on the NE and NW corners, respectively.

c. Abutments for Former Shipping Container Bridge at Km 62

- Heavy rip rap and armouring around the abutments maintain these structures as “secure” and geotechnically stable.

d. Photographs:

- i. North Abutment - NE Corner
- ii. North Abutment - NW Corner
- iii. North Abutment (Former Shipping Container Bridge)
- iv. South Abutment (Former Shipping Container Bridge)

No photographs of the South Abutment are available.

3. Km 80 – Tote Road Bridge

a. South Abutment

- Clearance between the steel and ballast blocks is approximately 1 ½” and ¾” on the SE and SW corners, respectively.
- The ballast blocks are slightly out of alignment with the top blocks protruding past the lower blocks.

b. North Abutment

- Clearance between the steel and ballast blocks is approximately 1 ½” and 2” on the NW and NE corners, respectively.
- The ballast blocks are slightly out of alignment with the top blocks protruding past the lower blocks.

c. Abutments for Former Shipping Container Bridge at Km 80

- The abutments are geotechnically stable.

d. Photographs:

- North Abutment - NE Corner
- North Abutment - NW Corner
- South Abutment - SE Corner
- South Abutment - SW Corner
- North Abutment (Former Shipping Container Bridge)
- South Abutment (Former Shipping Container Bridge)

4. Km 97 – Tote Road Bridge

a. South Abutment

- Clearance between the steel and ballast blocks is $\frac{1}{2}$ " and $1 \frac{1}{4}$ " on the SW and SE corners, respectively.
- The ballast blocks are slightly out of alignment with the top blocks protruding past the lower blocks.

b. North Abutment

- Clearance between the steel and ballast blocks is $3 \frac{1}{2}$ " and $3 \frac{1}{4}$ " on the NW and NE corners, respectively.

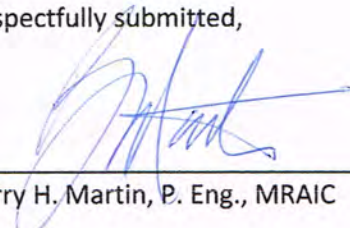
c. Abutments for Former Shipping Container Bridge at Km 97

- The abutments are geotechnically stable.

d. Photographs:

- North Abutment - NE Corner
- North Abutment - NW Corner
- South Abutment - SE Corner
- South Abutment - SW Corner
- North Abutment (Former Shipping Container Bridge)
- South Abutment (Former Shipping Container Bridge)

Respectfully submitted,


Barry H. Martin, P. Eng., MRAIC



Photographs

Km 17 Bridge



Photo 1 - North Abutment - NW Corner



Photo 2 - North Abutment - NE Corner

Km 17 Bridge cont'd



Photo 3 - South Abutment - SE Corner



Photo 4 - South Abutment - SW Corner

Km 17 Bridge cont'd



Photo 5 - North Abutment (Former Shipping Container Bridge)



Photo 6 - South Abutment (Former Shipping Container Bridge)

Km 62 Bridge



Photo 1 - North Abutment - NE Corner



Photo 2 - North Abutment - NW Corner

Km 62 Bridge cont'd



Photo 3 - North Abutment (Former Shipping Container Bridge)



Photo 4 - South Abutment (Former Shipping Container Bridge)

Km 80 Bridge



Photo 1 - North Abutment - NE Corner

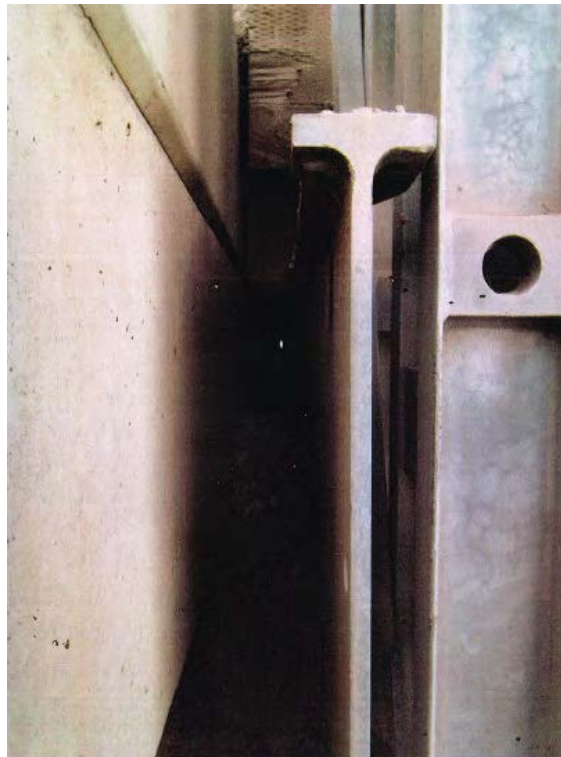


Photo 2 - North Abutment - NW Corner

Km 80 Bridge cont'd



Photo 3 - South Abutment – SE Corner



Photo 4 - South Abutment – SW Corner

Km 80 Bridge cont'd



Photo 5 – North Abutment (Former Shipping Container Bridge)



Photo 6 – South Abutment (Former Shipping Container Bridge)

Km 97 Bridge



Photo 1 - North Abutment - NE Corner



Photo 2 - North Abutment - NW Corner

Km 97 Bridge cont'd



Photo 3 - South Abutment – SE Corner



Photo 4 - South Abutment – SW Corner

Km 97 Bridge cont'd



Photo 5 – North Abutment (Former Shipping Container Bridge)



Photo 6 – South Abutment (Former Shipping Container Bridge)

APPENDIX H
STATUS OF PROPONENET COMMITMENTS IN 2018

Commitment No.	Relevant PC Condition	Description of Commitment	Status
1	N/A	Baffinland is committed to incorporating the relevant changes in the site layout for infrastructure and design that will take into account the results of continuing environmental advances so as to address engineering concerns related to the Mary River Project.	In-Compliance This commitment is addressed with the submission of Issued for Construction Drawings and As Build Drawings.
2	10, 21	Baffinland is committed to developing and implementing mitigation measures which control fugitive dust emissions.	In-Compliance Refer to summary sheets for PC Condition No. 10 and 21.
3	N/A	Baffinland will undertake only the physical crushing and screening processing of the ore generated from the Mary River Project within the project area.	In-Compliance The Mary River Project involves the crushing and screening of ore. It does not involve milling, processing and generation of tailings.
4	179	Baffinland is committed to providing information on potential variability of the mine's iron ore production rate in response to QIA's comments.	Not Applicable Refer to summary sheet for PC Condition No. 179.
	179a		In-Compliance Refer to summary sheet for PC Condition No. 179a.
	179b		In-Compliance Refer to summary sheet for PC Condition No. 179b.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
5	N/A	Baffinland is committed meeting or exceeding all regulatory requirements that relate to the Mary River Project, including significant reporting to provide details on the project's performance.	In-Compliance Baffinland continues to meet all regulatory requirements and undertakes annual and other reporting.
6	17, 24	Baffinland is committed to collecting and treating, if required, contact water generated from mining activities to ensure that relevant effluent criteria are met as established in the water licence.	Partially-Compliant Refer to summary sheets for PC Condition No. 17 and 24.
7	N/A	Baffinland is committed to constructing their on-land fuel storage with the capability to last at least 16 months, in lined, engineered structures as part of its normal operating practice.	In-Compliance At Milne Port and at the Mine Site, permanent fuel storage has been constructed. Please refer to the site layouts for the location of the permanent fuel containment areas. Steensby Port did not receive fuel and no containment was required.
8	95, 96, 172	As part of standard operation procedures, Baffinland is committed to avoiding ship-to- shore transfer of fuel during freeze-up or break-up periods.	Not Applicable Refer to summary sheets for PC Condition No. 95, 96, and 172.
9	173	Baffinland is committed to undertaking fuel transfer from vessels to shore under good weather conditions. Once the ore dock is constructed at Steensby, fuel transfer will be carried out at the freight dock.	In-Compliance Refer to summary sheet for PC Condition No. 173.
10	92	Baffinland is committed to installing leak detection instrumentation on the overwintering fuel vessel and to conduct ongoing monitoring in the vicinity of the vessel, in accordance with relevant guidelines and regulations. Baffinland is committed to using best management practices to reduce the possibility of spills.	In-Compliance Refer to summary sheet for PC Condition No. 92.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
11	98	Baffinland is committed to maintaining an up to date Spill Contingency Plan and will distribute copies of the Plan to stakeholders.	In-Compliance Refer to summary sheet for PC Condition No. 98.
12	N/A	Baffinland is committed to developing and implementing a Security Plan in accordance with regulatory requirements.	In-Compliance Addressed in Appendix A of the Emergency Response Plan (BAF-PH1-840-P16-0002).
13	177	Baffinland is committed to providing full specifications to Transport Canada, including the sizes, type and design of ore carriers proposed for use, prior to finalizing the ore carrier design.	In-Compliance Refer to summary sheet for PC Condition No. 177.
14	165	Baffinland commits that buildings placed along the rail line for signal and switch requirements will also be intended for use as emergency shelters for Railway personnel.	In-Compliance Refer to summary sheet for PC Condition No. 165.
15	53	Baffinland is committed to creating crossings along the Railway track which facilitate the passage of caribou.	In-Compliance Refer to summary sheet for PC Condition No. 53.
16	N/A	Baffinland is committed to designing the rail track to allow for snow machine and ATV crossings at points intersecting with identified travel routes.	Not Applicable No update. Rail track has yet to be developed.
17	147	Baffinland is committed to work with the QIA to hold meetings in the communities to discuss safety aspects involved with travellers who may potentially be crossing the ship track and Railway using designated (or other) crossings.	In-Compliance Refer to summary sheet for PC Condition No. 147.
18	N/A	Baffinland is committed to purchasing the highest tier (per the USA's EPA standards) of locomotive available for use at the Mary River project.	Not Applicable No update. Locomotives have not been purchased to date by Baffinland.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
19	N/A	Baffinland is committed to having a Railway Emergency Response Plan and trained personnel for responding to Railway specific emergencies.	Not Applicable No update. Rail component of the Project has yet to be developed.
20	N/A	Baffinland is committed to installing ploughs on the sides of locomotives in order to ensure that the rail line is kept clear of snow during Railway operations.	Not Applicable No update. Rail component of the Project has yet to be developed.
21	N/A	Baffinland is committed to carrying out regular maintenance and inspection of the Railway infrastructure in accordance with established guidelines and regulations.	Not Applicable No update. Rail component of the Project has yet to be developed.
22	N/A	Baffinland is committed to comply with the Railway Locomotive Inspection and Safety Rules, Railway Freight Car Inspection and Safety Rules referenced in Transport Canada's final written submission to the NIRB.	Not Applicable No update. Rail component of the Project has yet to be developed.
23	N/A	Baffinland is committed to developing and finalizing an operating strategy that will provide the highest level of safety in transportation of fuel using rail cars.	Not Applicable No update. Rail component of the Project has yet to be developed.
24	N/A	Baffinland is committed to ensuring that bulk fuel transported by rail is contained in tanker cars and all hazardous substances will be shipped in sea containers to minimize spill potential along the rail line.	Not Applicable No update. Rail component of the Project has yet to be developed.
25	N/A	Baffinland is committed to providing detailed maps of the Railway corridor to the Nunavut Planning Commission if a NIRB project certificate is issued for the Mary River Project.	Not Applicable No update. Rail component of the Project has yet to be developed.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
26	N/A	Baffinland is committed to appointing one of its personnel to act as a Marine Safety Officer during the construction, operation, and closure phases of the Mary River Project.	In-Compliance Addressed in Table 1-1 and Sections 5 and 6 (Roles and Responsibilities) in the Milne Port OPEP (BAF-PH1-830-P16-0013).
27	127, 128	Baffinland is committed to meeting with the community of Igloolik once the vessels used to transport ore for the Mary River Project are selected.	In-Compliance Refer to summary sheet for PC Condition No. 127 and 128.
28	127, 128	Baffinland is committed to visiting Igloolik to provide the community with information on the fuel vessel selected for overwintering at Steensby Inlet.	In-Compliance Refer to summary sheet for PC Condition No. 127 and 128.
29	N/A	Baffinland is committed to ensuring that normal shipping activities will be confined to the Nunavut Settlement Area on the north side of the Hudson Strait where conditions are favorable to shipping and to incorporating the necessary mitigation measures to ensure that shipping does not impact marine wildlife and that community concerns are addressed from an operational standpoint.	Not Applicable No update. Southern Shipping Corridor has yet to be utilized. See Shipping and Marine Wildlife Management Plan (BAF-PH1-830-P16-0024) for description of mitigation measures adopted to ensure that shipping does not impact marine wildlife and that community concerns are addressed.
30	102, 164, 166	Baffinland is committed to providing shipping notification on a regular and consistent basis to relevant communities prior to shipping and construction activities for the Mary River Project.	In-Compliance Refer to summary sheets for PC Conditions No. 102, 164, and 166.
31	N/A	Baffinland is committed to ensuring that the vessels used to transport ore from the Mary River Project are of appropriate class and specification, and will operate in a manner that is consistent with applicable regulations and guidelines.	In-Compliance Vessels used to transport ore comply with all applicable regulations and guidelines.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
32	14	Baffinland is committed to providing the QIA with a copy of the frequency-noise distribution graph for sound generated by ore ship propellers travelling through ice.	In-Compliance Refer to summary sheet for PC Condition No. 14.
	14a, 14b, 15		In-Compliance Refer to summary sheets for PC Condition No. 14a, 14b, and 15.
33	N/A	Baffinland is committed to implementing appropriate mitigation measures including but not limited to, periodic suspension of shipping if Baffinland determines that shipping-related activities are negatively impacting the project area.	In-Compliance Addressed in the Shipping and Marine Wildlife Management Plan (BAF-PH1-830-P16-0024). The Marine Environment Working Group (MEWG) will inform future mitigations if required.
34	150	Baffinland is committed to issuing public notices to affected communities advising them of shipping traffic schedules, and marker locations. Baffinland is also committed to installing reflective markers at a distance of approximately 100 metres from the ship track ice edge with approximately 500 metres between each marker on both sides of the shipping lane during the winter period to ensure that shipping lanes are visible at all times. Baffinland is committed to conducting weekly patrols along these shipping lanes to ensure that markers are in place and remain visible.	Not Applicable Refer to summary sheet for PC Condition No. 150.
	164		In-Compliance Refer to summary sheet for PC Condition No. 164.
	175		Not Applicable Refer to summary sheet for PC Condition No. 175.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
35	125a	Baffinland is committed to providing affected communities and other stakeholders with details on the type and location of all navigational aids installed along the shipping route.	In-Compliance Refer to summary sheet for PC Condition No. 125a.
36	102	Baffinland is committed to providing real-time data on the location of ships or vessels associated with the Mary River Project to all affected communities.	In-Compliance Refer to summary sheet for PC Condition No. 102.
37	177	Baffinland will consider enrolling its vessels operating under the Canadian flag in Transport Canada's Marine Safety Delegated Statutory Inspection Program, as recommended in TC's final written submission.	In-Compliance Refer to summary sheet for PC Condition No. 177.
38	N/A	Baffinland is committed to undertaking a phased approach to any abandonment and restoration, as well as final abandonment and restoration, of the Mary River Project site(s) and relevant monitoring activities in a manner that is consistent with applicable guidelines and regulations.	In-Compliance Addressed in the Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012).
39	39	Baffinland is committed to investigating and exploring the potential for native species of flora to be used for re-vegetating areas disturbed within the project area.	In-Compliance Refer to summary sheet for PC Condition No. 39.
40	36, 48a, 50, 76	Baffinland is committed to undertaking environmental effects monitoring during the mine life as well as after closure.	In-Compliance Refer to summary sheets for PC Condition No. 36, 48a, 50, 76.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
41	125	Baffinland is committed to participating in ongoing initiatives, including working with stakeholders, to address all issues related to the Mary River Project.	Not Applicable Refer to summary sheet for PC Condition No. 125.
	133		In-Compliance Refer to summary sheet for PC Condition No. 133.
42	18	Baffinland is committed to establishing a working/ advisory group consisting of stakeholders of the Mary River Project to identify and address issues surrounding abandonment and restoration activities associated with the Mary River Project. The terms of reference, as well as information on all issues identified to be resolved by the working group, will be made available to the NIRB and interested persons for information and/or review purposes.	In-Compliance Refer to summary sheet for PC Condition No. 18.
43	37	Baffinland is committed to collaborating with the Government of Nunavut on issues related to the Mary River Project for which both the GN and Baffinland have a stake.	Not Applicable. Refer to summary sheet for PC Condition No. 37.
44	N/A	GN is committed to working with Baffinland to ensure that an understanding of their respective roles are confirmed.	Not Applicable This Project Commitment is applicable to GN.
45	129, 131, 145, 148, 154, 159, 168	Baffinland is committed to participating in the Qikiqtani Socio-Economic Monitoring Committee (SEMC) working group to ensure that relevant effects of the Mary River Project are monitored.	In-Compliance Refer to summary sheets for PC Condition No. 129, 131, 145, 148, 154, 159, and 168.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
46	49, 77, 129, 130,	Baffinland is committed to participating in formal, stakeholder working groups, such as terrestrial environment and marine environment working groups, as established within and/or outside of the scope of the IIBA, to gain input, insight, advice and oversight from stakeholders throughout the life of the project and to ensure that adaptive management principles are applied accordingly.	In-Compliance Refer to summary sheets for PC Condition No. 49, 77, 129, and 130.
47	49	GN is committed to participating in the terrestrial environment and marine environment working groups as deemed appropriate. GN is committed to providing feedback on terms of reference for the working group.	In-Compliance Refer to summary sheet for PC Condition No. 49
48	N/A	EC is committed to participating in the terrestrial environment and marine environment working groups to the extent that EC resources would allow, and in the context of its mandate.	Not Applicable This Project Commitment is applicable to EC.
49	49, 77	GN is committed to developing, with the terrestrial working group, ways to monitor caribou within the project area during sensitive life cycle periods.	In-Compliance Refer to summary sheets for PC Condition No. 49 and 77.
50	49	GN is committed to undertaking further research to determine the status, health, population and other variables associated with the North Baffinland caribou herd.	In-Compliance Refer to summary sheet for PC Condition No. 49.
51	77, 76	GN is committed to working with other departments and agencies to develop and implement an effective marine monitoring program aimed at determining the impacts of shipping activities on the marine environment.	In-Compliance Refer to summary sheets for PC Condition No. 77 and 76.
52	N/A	QIA is committed to explaining the contents of an IIBA for the Mary River Project to the GN once the IIBA has been finalized.	Not Applicable This Project Commitment is applicable to QIA.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
53	N/A	Baffinland is committed to contributing to overseeing the implementation of the IIBA including monitoring of the Project on a continuous basis to allow for ongoing Inuit input related to environmental and social impacts.	In-Compliance The IIBA was signed between QIA and BIM in September 2013. Please refer to IIBA Annual Forum Report(s) for monitoring results related to IIBA implementation.
54	N/A	DFO is committed to ongoing involvement in assisting Baffinland to develop a robustly designed and long-term monitoring program for verifying impact prediction, demonstrating the efficacy of mitigation measures, and adjusting those measures as needed.	Not Applicable This Project Commitment is applicable to DFO.
55	N/A	CCG is committed to exploring the possibility of increases to its level of service in order to support shipping associated with the Mary River Project, if approved.	Not Applicable This Project Commitment is applicable to CCG.
56	N/A	AANDC is committed to exploring the possibility of having its assigned representatives inform communities in the Qikiqtani Region about the Project as it pertains to their mandate and/or responsibilities.	Not Applicable This Project Commitment is applicable to INAC.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
57	7, 9, 10, 11, 19, 20, 22, 26, 33, 74, 90	Baffinland is committed to updating its management plans to reflect new information, new practices and changes to operating conditions.	In-Compliance Refer to summary sheets for PC Condition No. 7, 9, 10, 11, 19, 20, 22, 26, 33, 74, and 90.
	23, 89		In-Compliance (No. 23) Partially-Compliant (No. 89) Refer to summary sheets for PC Condition No. 23 and 89.
	55, 100, 175		Not Applicable Refer to summary sheets for PC Condition No. 55, 100, and 175.
58	2	Baffinland is committed to contributing to regional monitoring and information gathering.	Not Applicable Refer to summary sheet for PC Condition No. 2.
	51		In-Compliance Refer to summary sheet for PC Condition No. 51.
59	5	Baffinland is committed to giving consideration to the sharing of weather data collected for the Mary River Project with Environment Canada to post on its public weather network.	In-Compliance Refer to summary sheet for PC Condition No. 5.
60	58	Baffinland is committed to monitoring fugitive dust emissions on vegetation along the first few kilometres of the Railway leaving both terminals (Mary River and Steensby Inlet). This monitoring will be extended if it is identified that other areas of	In-Compliance Refer to summary sheet for PC Condition No. 58.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
		the project site are also being impacted by fugitive dust emissions.	
61	7, 8	Baffinland is committed to conducting passive monitoring of SO ₂ at the Steensby Inlet camp.	In-Compliance Refer to summary sheets for PC Condition No. 7 and 8.
62	7	Baffinland is committed to estimating marine shipping vessel emissions associated with the Mary River Project.	In-Compliance Refer to summary sheet for PC Condition No. 7.
63	3	Baffinland and its shipping partners are committed to working with shipyards to reduce fuel consumption by 20% or more.	Not Applicable Refer to summary sheet for PC Condition No. 3.
64	41	Baffinland is committed to carrying out ongoing characterization of the waste rock to ensure that effluent discharge criteria associated with waste rock storage areas are met at all times.	In-Compliance Refer to summary sheet for PC Condition No. 41.
	46		Partially-Compliant Refer to summary sheet for PC Condition No. 46.
65	20, 30, 41	Baffinland is committed to developing a Quarry Management Plan for each of the quarries developed for the Mary River Project and to ensure that all quarry materials used are non-acid generating and non-metal leaching in chemical characteristics.	In-Compliance Refer to summary sheets for PC Condition No. 20, 30, and 41.
66	N/A	Baffinland is committed to the development and implementation of a monitoring program during the construction and other phases of the Mary River Project.	In-Compliance Baffinland maintains on going monitoring programs at all Project sites.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
67	36	Baffinland is committed to carrying out the monitoring plans for native plant species and vegetative health.	In-Compliance Refer to summary sheet for PC Condition No. 36.
68	37	Baffinland is committed to examining invasive species as well as carry out reclamation experiments on re-vegetation options and practices within the Mary River Project area.	Not Applicable Refer to summary sheet for PC Condition No. 37.
69	N/A	Baffinland is committed to undertaking the required or relevant monitoring for both terrestrial wildlife and vegetation throughout the life of the Mary River Project to verify predictions made as well as to confirm compliance with applicable regulations. The information would be used to support adaptive management strategies and required mitigation measures.	In-Compliance Baffinland undertakes annual monitoring of the terrestrial environment. Annual monitoring reports are available on Baffinland's Document Portal.
70	50	Baffinland is committed to developing and implementing a Terrestrial Environment Management Plan and track progress of the plan to assist in guiding adaptive management strategies slated for implementation at the Mary River Project.	In-Compliance Refer to summary sheet for PC Condition No. 50.
71	53	Baffinland is committed to investigating any mortality to caribou resulting from project activity, and to investing in a precautionary monitoring and adaptive management program to mitigate caribou responses to development activities.	In-Compliance Refer to summary sheet for PC Condition No. 53.
72	N/A	Baffinland is committed to implementing appropriate measures to ensure that all caribou carcasses linked to the project activities are discarded in accordance with applicable regulations and guidelines.	In-Compliance This will be incorporated into the Terrestrial Environment Monitoring and Management Plan (BAF-PH1-830-P16-0027) in advance of railway operations. Wildlife compensation is also addressed in the IIBA.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
73	53	Baffinland is committed to implementing traffic controls along the Railway if it is determined that the caribou mortality rate is impacted by the Railway.	In-Compliance Refer to summary sheet for PC Condition No. 53.
74	55	Baffinland is committed to monitoring the effects of the Mary River Project on wolf and wolf denning areas.	Not Applicable Refer to summary sheet for PC Condition No. 55.
75	66, 67	Baffinland is committed to monitoring relevant sections of the project area for nesting and migration activities, noting both areas and patterns, for Falcons, Eiders, Red Knots, sea birds, song birds and shore birds.	In-Compliance Refer to summary sheets for PC Condition No. 66 and 67.
76	N/A	Baffinland is committed to carrying out monitoring over the next few years to look at other types of birds not considered during other research for the Mary River Project.	In-Compliance Addressed in Terrestrial Environment Monitoring and Management Plan (BAF-PH1-830-P16-0027) and via participation in Terrestrial Environmental Working Group (TEWG).
77	74, 75	Baffinland is committed to monitoring migratory marine birds during shipping operations using established methodologies.	In-Compliance Refer to summary sheets for PC Condition No. 74 and 75.
78	N/A	Baffinland is committed to continued contribution to marine bird baseline data collection along southern shipping routes.	In-Compliance Addressed in Marine Environment Monitoring Reports and ongoing support of seabird studies conducted by the Canadian Wildlife Service (CWS) of Environment Canada.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
79	76	Baffinland is committed to undertaking marine mammal and bird surveys/studies to determine information gaps related to shipping-related impacts.	In-Compliance Refer to summary sheet for PC Condition No. 76.
80	121	Baffinland is committed to working with the stakeholders to undertake studies along the marine shipping route to determine the effects of shipping on marine wildlife and mammals, including ship strikes, for the purposes of collecting baseline information, confirming uncertainties, collecting ongoing data, and identifying and implementing future adaptive management strategies.	In-Compliance Refer to summary sheet for PC Condition No. 121.
81	99	Baffinland is committed to monitoring seals on land-fast ice and to limit any potential negative impacts, including reducing the amount of ice disturbed.	In-Compliance Refer to summary sheet for PC Condition No. 99.
82	N/A	Baffinland is committed to carrying out surveys in the Hudson Strait in 2012 to collect additional baseline data on species that might be potentially impacted by the project.	Not Applicable This requirement has been completed.
83	121	Baffinland is committed to developing and implementing a Ship Strike Monitoring Plan to capture relevant data for use in adaptive management strategies.	In-Compliance Refer to summary sheet for PC Condition No. 121.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
84	76	Baffinland is committed to monitoring the potential effects of shipping on the marine environment along the shipping route or other areas potentially impacted by the project's shipping activities.	In-Compliance Refer to summary sheet for PC Condition No. 76.
	81, 85		Not Applicable Refer to summary sheets for PC Condition No. 81 and 85.
	110		Partially-Compliant Refer to summary sheet for PC Condition No. 110.
85	76, 87, 88	Baffinland is committed to monitoring benthic community and water quality in Steensby Inlet to verify effects of ballast dispersal predication.	In-Compliance Refer to summary sheets for PC Condition No. 76, 87, and 88.
	86		Partially-Compliant Refer to summary sheet for PC Condition No. 86.
86	88	Baffinland is committed to screening and treating ballast water from the ships associated with the Mary River Project to meet or exceed all regulatory requirements prior to release into the marine environment. In so doing, Baffinland will prevent or minimize the introduction of invasive species into Nunavut's marine environment. Upon release, Baffinland is committed to monitoring impacts of ballast water effluent in areas proximal to the discharge/ exchange points.	In-Compliance Refer to summary sheet for PC Condition No. 88.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
87	89	Baffinland is committed to monitoring the discharge of ballast water from vessels to ensure that it meets or exceeds applicable regulations, guidelines and discharge criteria and to meet or exceed international standards set for ballast water and any ballast water guidelines approved by Transport Canada.	Partially-Compliant Refer to summary sheet for PC Condition No. 89.
88	N/A	Baffinland is committed to making available to the NIRB and to interested persons, by December 31, 2012, the report for the shoreline studies completed for the Mary River Project in June 2012.	In-Compliance This was completed in 2013 through the TEWG. Minutes of the meetings are located in Appendix F.2 of the 2013 Annual Report to the NIRB.
89	N/A	Baffinland is committed to hiring practices that are consistent with the terms and conditions in the memorandum of understanding for the IIBA.	In-Compliance Addressed in IIBA Annual Forum Report.
90	N/A	Baffinland is committed to hiring Inuit at all levels in the company for the Mary River Project and intends to put a targeted recruitment program in place to ensure that Inuit, especially Inuit of the North Baffin Region, are hired.	In-Compliance Addressed in IIBA Annual Forum Report.
91	N/A	Baffinland is committed to the preferential hiring of employees from the defined points of hire, which include the communities of Pond Inlet, Igloolik, Hall Beach, Arctic Bay and Iqaluit. Baffinland may consider other points of hire if it deems that there are sufficient numbers individuals available in those communities who want to work at the project.	In-Compliance Addressed in IIBA Annual Forum Report.
92	136, 137, 138, 141	Baffinland is committed to implementing a targeted training plan to build capacity among Inuit to fulfill positions within the organization; some of the capacity building initiatives include refresher training, work ready training and education support programs.	In-Compliance Refer to summary sheets for PC Condition No. 136, 137, 138, and 141.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
93	135	Baffinland is committed to providing a cross-cultural training to both Inuit and non-Inuit employees and to institute ant discriminatory policies and mechanisms to minimize any potential cultural conflicts in the workplace.	In-Compliance Refer to summary sheet for PC Condition No. 135.
94	136	Baffinland is committed to providing training linked to specific job positions and to endeavor to implement job- creation partnerships with interested organizations.	In-Compliance Refer to summary sheet for PC Condition No. 136.
95	N/A	Baffinland is committed to distributing information related to available employment at the Mary River Project through its website, community newspapers and other methods of advertising.	In-Compliance This is ongoing on Baffinland's website as well as ads in community newspapers and in BCLC offices in North Baffin communities.
96	153, 157	Baffinland is committed to instituting and providing a professional employee assistance and counseling program to assist employees and their family members both at site and at home communities. As part of this program, Baffinland is committed to hiring at least one Inuit Elder to be stationed at each of the Milne and Mary River sites at all phases of the project to assist in counseling.	In-Compliance Refer to summary sheets for PC Condition No. 153 and 157.
97	162	Baffinland is committed to having Inuit Elders visit the Steensby site in 2012 to assist in identifying and ensuring that archaeological sites in the area not impacted by project activities.	In-Compliance Refer to summary sheet for PC Condition No. 162.
98	N/A	Baffinland is committed to providing training to its employees regarding the protection of archeological resources within the project area.	In-Compliance This is ongoing and within current onsite training and orientation program.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
99	N/A	Baffinland is committed to working with the Government of Nunavut to provide details on the design of medical facilities for the Mary River Project during the regulatory phase of the project.	In-Compliance This commitment was satisfied with the MOU signed with the GN in 2013.
100	N/A	Baffinland is committed having an on-site medical facility staffed by a registered nurse or certified paramedic in order to attend to any injury that workers might experience on-site, and is further committed to providing medi-vac services as may be required from the mine site to Iqaluit.	In-Compliance Baffinland currently has an on-site medical facility staffed by a registered nurse. This was also satisfied with the MOU signed with the GN in 2013.
101	N/A	Baffinland is committed to implementing mitigation measures which offset the inconvenience and hardship created for Inuit hunters and travelers that have traditionally used the areas encompassed by the shipping route.	In-Compliance Baffinland has established a Wildlife Compensation Fund in the event Project related vessels interfere with a harvest. Ship locations and movements are also publicly disclosed on Baffinland's website.
102	N/A	Baffinland is committed to ensuring that, during key harvesting periods, Inuit employees are given priority to utilize vacation time over southern workers.	In-Compliance Addressed in IIBA signed in September of 2013.
103	N/A	Baffinland is committed to establishing policies related to Inuit visitation and wildlife harvesting for Inuit employees that is consistent with Baffinland's policies and which also allows for the secure storage of firearms.	In-Compliance Addressed in Hunter and Visitor Site Access Procedure (BAF-PH1-830-PRO-0002). It is noted Baffinland has a no hunting policy on site. Baffinland supports NIRB condition 62 prohibiting employees and contractors from bring firearms to site.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
104	N/A	Inuit monitors will be present at the project site, at all times, and during all phases of the project (construction, operation, closure and post closure).	In-Compliance
105	142	Baffinland is committed to ensuring employees who are unilingual Inuktitut speakers will not face barriers to employment at the Mary River Project by hiring Inuktitut translators. Baffinland is also committed to providing work training programs and other relevant employment information in both Inuktitut and English.	In-Compliance Refer to summary sheet for PC Condition No. 142.
106	94	Baffinland is committed to seeking and utilizing external expertise to assist them with the development of emergency response planning and to provide formal training specific to accidents and emergency response for the Emergency Response Team, which will be stationed at site at all times. This training would include responding to Railway specific emergencies.	Not Applicable Refer to summary sheet for PC Condition No. 94.
	98		In-Compliance Refer to summary sheet for PC Condition No. 98.
107	N/A	Baffinland is committed to conducting routine training exercises and strategically placing resources and equipment on site for spill response.	In-Compliance Addressed in Emergency Response Plan (BAF-PH1-840-P16-0002), Spill Contingency Plan (BAF-PH1-830-P16-003), Milne Port Oil Pollution Emergency Plan (BAF-PH1-830-P16-0013) and Spill at Sea Response Plan (BAF-PH1-830-P16-0042).
108	92, 174	Baffinland is committed, during operations, to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills and invite the relevant communities of the North Baffin Region to participate.	In-Compliance Refer to summary sheets for PC Condition No. 92 and 174.

Commitment No.	Relevant PC Condition	Description of Commitment	Status
109	N/A	Baffinland is committed to meeting on a regular basis with the emergency response and preparedness working group to review emergency preparedness.	<p>In-Compliance</p> <p>Since 2012, Baffinland has had annual spill response exercises whose participants include Petronav (fuel vessel), Baffinland and representatives of the community of Pond Inlet are 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.</p>
110	92, 174	Baffinland is committed to ensuring that adequate resources are allocated to the development and deployment of emergency and spill response capabilities.	<p>In-Compliance</p> <p>Refer to summary sheets for PC Condition No. 92 and 174.</p>

Commitment No.	Relevant PC Condition	Description of Commitment	Status
111	N/A	Baffinland is committed to requiring that all project vessels have Shipboard Oil Pollution Emergency Plans (SOPEPs) in place which meets or exceeds the international standards set out in the Port State Control Memorandum of Understanding, as well as trained personnel on board to respond to spills. Baffinland will be self-sufficient for spill response and will contract the services of an established Response Organization to enable the Company to escalate response capabilities to deal with spills of up to 10,000 tonnes. This Response Organization will have expertise in recovery and cleanup of spills along coast line and involving wildlife.	<p>In-Compliance</p> <p>This commitment is satisfied by Transport Canada regulations. Baffinland has an agreement with Oil Spill Response Limited (OSRL) for spills up to 10,000 tonnes along the shipping route. A Spill at Sea Response Plan (BAF-PH1-830-P16-0042) was developed in 2015 that follows the international and Canadian best practice, ISO 15544, the IMO Manual on Assessment of Oil Spill Risk and Preparedness (2010) and the Spill Contingency Planning Guidelines and Reporting Regulations for Nunavut.</p>
112	N/A	Baffinland is committed to ensuring that all spills are reported in accordance with the relevant spill contingency planning and reporting regulations and guidelines.	<p>In-Compliance</p> <p>Addressed in Spill Contingency Plan (BAF-PH1-830-P16-003).</p>
113	N/A	Baffinland is committed to exploring and implementing measures designed to recover residual fuel from spills under the surface of sea ice.	<p>Not Applicable</p> <p>No update at this time. Bulk fuel associated with the Project is not transported in the marine environment during ice cover conditions.</p>