2015-2016 Annual Monitoring Report
for
Baffinland Iron Mines Corp.'s Mary River Project

Nunavut Impact Review Board
File No. 08MN053
October 2016

Report title:	The Nunavut Impact Review Board's 2015-2016 Annual Monitoring Report for the Mary River Project (NIRB File No. 08MN053)
Project:	Mary River Project
Project location:	Qikiqtani (North Baffin) Region, Nunavut
Project owner:	Baffinland Iron Mines Corporation 2275 Upper Middle Road East, Suite 300 Oakville, ON L6H 0C3
Monitoring Officer:	Solomon Amuno
Monitoring period:	September 2015 – September 2016
Date issued:	October 26, 2016
Cover photo:	Aerial view of the Milne Port, Steensby Area and Mary River old camp

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1 INTRODUCTION

The Nunavut Impact Review Board (NIRB or Board) Project Certificate [005] was issued for the Mary River Project on December 28, 2012 following an extensive public review of the ecosystemic and socio-economic effects of the proposed project, and pursuant to Section 12.5.12 of the Nunavut Land Claims Agreement (NLCA).

On January 13, 2013 Baffinland Iron Mines Corporation (Baffinland or the Proponent) applied to the NIRB for the Early Revenue Phase (ERP) proposal, which included amendments to its project development activities and schedule. The Board determined that it was appropriate to assess the potential ecosystemic and socio-economic effects of the ERP and to reconsider, under Section 12.8.2 of Article 12 of the NLCA, modifications to the terms and conditions of the original Project Certificate to reflect the potential effects of the ERP proposal.

Following a thorough reconsideration process, on March 17, 2014 the NIRB issued its public hearing report to the Minister of Aboriginal Affairs and Northern Development for the ERP proposal. The report indicated that the proposed works and activities could be permitted to proceed subject to new and amended project-specific terms and conditions. Following the acceptance of the NIRB's report by the Minister, which included revised terms and conditions, on May 28, 2014, pursuant to Sections 12.5.5 and 12.8.2 of Article 12 of the NLCA, the NIRB issued an *Amended* Project Certificate for the Mary River Project. The amendment allowed the Project to proceed in accordance with Terms and Conditions as contained therein.

The NIRB is required to monitor the Mary River Project in accordance with Section 12.7.1 and 12.7.2 of the NLCA and as outlined within the Mary River Project Certificate. As a result, this report has been prepared to provide findings for the 2015-2016 monitoring period with respect to Baffinland's compliance with the terms and conditions of the Mary River Project Certificate, and the adequacy of the monitoring program to mitigate the potential ecosystemic and socio-economic impacts of the Project.

1.1 Project Description

The Mary River Project involves exploration, construction, operation, closure and reclamation of an open pit iron ore mine at what is known as Deposit No. 1, and includes mining at a rate of 18 million tonnes per year (Mt/a). There are three (3) main project locations – the Mine site, Milne Port located north of the Mine site, and Steensby Port located south of the Mine site. The Milne Port is connected to the Mine site by the Tote Road, approximately 100 kilometers (km) in length. The Project as originally proposed was to include construction of a railway approximately 150 km in length to connect the Mine Site to Steensby Port. It was anticipated that facilities at Steensby Port and the railway would take up to four (4) years to construct.

As currently approved and in accordance with Baffinland's development plans, the extracted ore would be transported by truck along the Milne Inlet Tote Road and shipped from Milne Port to European markets during the open water season using contracted vessels. The approved Project also includes additional facilities at Milne Port, including the construction of a fixed ore dock, 4.2 Mt ore stockpile and reclaim area, 3,500 tonnes per hour ship loaders, a camp to accommodate workers, and the extension or relocation of the airstrip to the west of the proposed

ore stockpile. The ERP operations are expected to continue for the duration of the mine life (i.e., 21 years), and would continue in conjunction with the Mary River Project as originally proposed, once developed.

1.2 Project Development Status

Within its 2015 Annual Monitoring Report to the NIRB, Baffinland reported that operational activities for the first half of 2015 focused on ongoing construction of approved project components under the original Project Certificate, including planning and procurement activities in order to facilitate the deliveries of equipment and materials to Milne Port during the 2015 open water shipping season to support ongoing construction activities.[1] Baffinland reported that the main construction activity for the monitoring period was the completion and commissioning of the ship loader at Milne Port, and included other project-related activities such as mining at Deposit No. 1, hauling ore over the Tote Road and stockpiling at Milne Port. No development activities were undertaken along the railway or at Steensby Port in 2015.

Baffinland further reported that on August 7, 2015, the MV Federal Tiber sailed out of Milne Port with 53,624 tonnes of Mary River ore, the first commercial shipment under the approved project, which was significantly less than the total allowable 4.2 Mt/a for exportation. Other project-related activities undertaken in 2015 included the following:

- Progressive reclamation of areas associated with historic drilling and bulk sample programs;
- Development of a regional mineral exploration field program;
- Continuation of environmental monitoring programs;
- Completion of various engineering and environmental baseline studies supporting the proposed Phase II Project design;
- Care and maintenance of the inactive Steensby Port camp;
- A geotechnical drilling program to characterize the geology beneath the proposed life of mine waste rock dump located immediately west of Deposit No. 1, and infrastructure at Milne Port; and
- Operation of helicopter and fixed wing aircraft to service regional exploration, environmental baseline studies, environmental monitoring, and other general site activities.

Human Resources Reporting

Baffinland reported that in 2015, iron ore prices were low and that the current market situation constituted a strain on the profitability of the Mary River Project thereby leading to work force optimization and salary cuts across the organization; however it continued to work towards the establishment of a minimum Inuit employment goal with the Qikiqtani Inuit Association (QIA). Baffinland also reported that in 2015, a total of 1,844,081 hours of labour was performed, which is equal to approximately 887 full time equivalent positions. Baffinland also indicated that 307, 570 hours were worked by local study area (LSA) residents, representing about 16% of the total number of hours worked on the Project, and that as of December, 2015 there were 557 employees on site. Baffinland also reported within its 2015 Annual Monitoring Report to the NIRB that the following employee training programs were conducted in 2015 and included:

[1] Page I of XX of 2015 Annual Report to the Nunavut Impact Review Board (March 2016)

- Mandatory cultural awareness and site orientation training;
- Health and safety programming;
- Vehicle and Equipment Simulator Training;
- Human Rights in the Workplace, Code of Business Conduct, and Data Protection Procedure training (requirements under ArcelorMittal policies);
- Ship loader Training Program; and
- Mining Matters presentations to staff and school children in North Baffin communities.

Consultation

In its 2015 annual report Baffinland further reported that it continued consultation with stakeholders regarding the ongoing construction activities at the Mary River site, and provided updates regarding the inaugural shipping season, employment opportunities, monitoring activities, as well as information with respect to future phases of the Mary River project. Baffinland also reported on the activities of three working groups, the Terrestrial Environment Working Group (TEWG); the Marine Environment Working Group (MEWG); and the Mary River Socio-Economic Monitoring Working Group (MRSEMWG). Baffinland specifically reported that the TEWG and MEWG met twice in 2015, and the MRSEMWG convened once. It was also noted that Baffinland consulted the existing Community Advisory Group (CAG) and the QIA on several project related items, as well as called for nominations to the newly formed Mary River Community Group (MRCG); in 2015, Baffinland met with the MRCG four (4) times.

1.3 Current Regulatory Instruments for the Approved Project

Baffinland reported that the following regulatory instruments and authorizations were applicable to various project activities undertaken in 2015 for the Mary River Project:

Qikiqtani Inuit Association (QIA)

- Inuit Owned Land Commercial Lease Q13C301

Baffinland obtained a 30-year Commercial Lease from QIA on September 6, 2013 to allow for the construction and operation of the Project on Inuit Owned Land (IOL), including a Quarry Concession Agreement for the development of rock quarries and borrow areas on IOL until December 31, 2043.

Nunavut Water Board (NWB)

- Type "A" Water Licence (No. 2AM-MRY1325) for Mine Development:

Baffinland noted that its Type A Water Licence No. 2AM-MRY1325 was issued by the Nunavut Water Board (NWB) in June 2013 and is current until June 2025. An application to amend the Type "A" Water Licence to account for activities approved for the ERP was submitted to the NWB on July 16, 2014; on July 31, 2015 the NWB issued an Amended Water licence (2AM-MRY 1325/Amendment No. 1) to Baffinland.

- Type "B" Water Licences for operations of additional facilities:

Type "B" Water Licence 2BE-MRY1421: was issued in April 2014 and covers exploration facilities and other activities not covered under the Type "A" Water Licence and remains valid until April 16, 2021.

Type "B" Water Licence 8BC-MRY1416: was issued in August 2014 as a temporary licence in order to allow for ERP related activities pending an amendment to Baffinland's Type "A" Water Licence. The license was cancelled in February 2016 as all activities therein are now covered by the amended Type "A" Water Licence.

Indigenous and Northern Affairs Canada (INAC)

- Lease 47H16-1-2 Foreshore Area for Milne Port Ore Dock

Baffinland reported that Crown Land Lease No. 47H16-1-2 was obtained for the area of the Milne Port and ore dock in order to allow for the construction, operation, maintenance and eventual reclamation of an ore dock. The license expires on June 30, 2035.

- Land Use Permit N2014Q0016 Tote Road and Borrow Area 1

Land Use Permit No. N2014Q0016 was obtained to address activities within, approximately, a five (5) km section of the Tote Road over crown land, as well as one of the borrow areas on crown land. This permit expired on June 30, 2016.

- Land Use Permits for Steensby Camp and Bruce Head

Baffinland indicated that Land Use Permit No. N2014C0013 was renewed covering the Steensby camp area, and that a new Land Use Permit No. N2014J0011 was issued in 2014 for the monitoring camp at Bruce Head in Milne Inlet with both licenses expiring on June 30, 2016.

Fisheries and Oceans Canada (DFO)

- Authorization 06-HCAA-CA7-0084 for Crossings along the Tote Road

In 2007, Baffinland obtained authorization 06-HCAA-CA7-0084 under the *Fisheries Act* from Fisheries and Oceans Canada (DFO) to allow for the installation of watercourse crossings in fish bearing waters along the Milne Inlet Tote Road. Within its annual reporting to the NIRB, Baffinland indicated that this authorization remains valid and was amended over the years and that monitoring and reporting activities to DFO occurs annually. In addition, Baffinland requested that sea crossings STA17 (CV128), STA 62 (BG50), and STA 80 (CV217) remain in place until no later than December 31, 2016, and noted that this request was approved by DFO on September 30, 2015.

- Letter of Advice NU-07-0050 for Upgrades to the Tote Road Crossings

DFO issued a letter of advice to Baffinland, which included mitigation measures to be applied to avoid serious harm to fish and fish habitat regarding the culvert and bridge construction along the Milne Inlet Tote Road in 2014.

- Ore dock Construction Authorization 14-HCAA-00525

Authorization 14-HCAA-00525 was issued by DFO to Baffinland in order to allow for the construction of the ore dock under the new *Fisheries Act* legislation for serious harm, and prescribed offset measures for the replacement of fish habitat lost due to the dock construction. Baffinland reported that a monitoring report for the construction of the ore dock was submitted to DFO on January 4, 2016.

Transport Canada (TC)

- Approvals under the *Navigable Waters Protection Act*

Transport Canada (TC) issued approvals under the *Navigable Waters Protection Act* for construction of watercourse crossings within four (4) watercourses along the Milne Inlet Tote Road (BG50, CV128, CV217, and CV223). Further, Baffinland also obtained an authorization of "Occasional-Use of Marine Facility" (4306-2-6P/B) following the approval of the Milne Inlet Marine Facility Security Plan from TC on June 5, 2015.

Natural Resource Canada (NRCan)

- Licence under the *Explosive Act*

Natural Resource Canada issued Baffinland's explosive contractor a Division 1 Factory Licence to allow for the construction of the emulsion plant at the Mine site.

2 MONITORING ACTIVITIES

The NIRB's monitoring program is focused on compliance and effects monitoring in order to determine the extent that the land or resource use in question is carried out within the predetermined terms and condition as stipulated pursuant to section 12.7 of the NLCA and within the Mary River Project Certificate No. 005. The monitoring program may also contribute the information base necessary for agencies to enforce terms and conditions of land or resource use approvals.

2.1 Compliance with Reporting Requirements

During the 2015–2016 monitoring period, Baffinland demonstrated compliance with most of the reporting requirements in accordance with the Project Certificate. As part of Baffinland's commitment towards mitigating the potential ecosystemic impact of the Mary River Project, the following materials were submitted to the NIRB for the current monitoring period:

a. Air Quality and Noise Abatement Management Plan
b. Cultural Heritage Resource Protection Plan
c. 2015 Annual Terrestrial Monitoring Report
d. Health and Safety Management Plan
e. Human Resource Management Plan
f. Terrestrial Environment Mitigation and Monitoring Plan
g. Stakeholder Engagement Plan
h. Road Management Plan
i. Shipping and Marine Wildlife Management Plan
j. Blasting Management Plan
k. Borrow Source Management Plan
l. Quarry Management Plan
m. Emergency Response Plan
n. Spill Contingency Plan
o. Environmental Protection Plan
p. Water Sewage Management Plan
q. Hazard Risk Assessment
r. Surface Water and Aquatic Ecosystem Management Plan

s. Aquatic Invasive Species Monitoring Report
t. Waste Management Plan
u. Life of Mine Waste Rock Management Plan
v. Exploration Closure and Reclamation Plan
w. Polar Bear Safety Plan
x. Sustainable Development Policy
y. 2014-2015 Lake Sedimentation Monitoring Report
z. 2015 Core Receiving Environment Monitoring Program Report
aa. 2015 Hydrology Program Summary Report
bb. Marine Environment Monitoring Reports
cc. Socio-economic Environment Monitoring Reports
dd. East Bay Island Field Report
ee. Hudson Strait Field Season Report
ff. 2015 Milne Inlet Marine Spill Response Exercise
gg. Working Groups Meeting Notes
hh. Site Inspection Reports and Correspondence

However, the following information or updates have not been forwarded to the NIRB as part of the monitoring for the current reporting period:

a. Results of ongoing monitoring of relative sea levels and storm surges at Milne Port (Conditions 1 and 83).
b. Blasting Management Plans for Q18 and P1 (borrow pit) pursuant to Condition 20 of the Project Certificate.
c. Evidence of conducting 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 (Condition 83a).
d. Evidence of updating ballast water discharge impact predictions through the use of more detailed bathymetry collected from Steensby Inlet and Milne Inlet (Condition 86).

2.2 Comment Requests on Baffinland's 2015 Annual Report

On April 9, 2016 the NIRB received Baffinland's 2015 Annual Monitoring Report for the Mary River Project. The NIRB circulated the report to its distribution list and requested that interested parties provide comments within their areas of expertise or jurisdiction as related to both effects and compliance monitoring. The NIRB received comments from the following parties regarding Baffinland's 2015 Annual Monitoring Report:

- **Qikiqtani Inuit Association (QIA)**
- **Government of Nunavut (GN)**
- **Environment and Climate Change Canada (ECCC)**
- **Fisheries and Oceans Canada (DFO)**
- **Indigenous and Northern Affairs Canada (INAC)**
- **Natural Resources Canada (NRCan)**
- **Transport Canada (TC)**
- **World Wildlife Fund Canada (WWF)**

The comments received identified specific areas that may require further attention or discussion in addressing environmental and socio-economic concerns resulting from the development of the Mary River Project. In addition, the NIRB requested that Baffinland provide a response to a number of the comments received; the comments and Baffinland's responses were considered throughout the remainder of this report. Refer to Section 2.4 of this Report for further details regarding authorizing agencies' comments on effects and compliance monitoring of the Mary River Project.

2.3 Compliance with the NIRB Project Certificate

During the 2015-2016 reporting period, Baffinland complied with most of the requirements of the Project Certificate which were relevant and applicable to the current phase of the Mary River Project. The following section summarizes Baffinland's compliance status with respect to term and conditions of Project Certificate No. 005.

2.3.1 **Meteorology and Climate (including Climate Change)**

Condition 1

> *"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."*

Condition 83

> *"The Proponent shall install tidal gauges at the Steensby Inlet Port and Milne Inlet Port sites to monitor relative sea level and storm surges."*

The Proponent is required to annually report monitoring results of sea levels and storm surges at both Steensby Port and Milne Port. Within its 2015 Annual Report to the NIRB,[2] Baffinland reported that a tidal gauge was installed in Milne Port by the Canadian Hydrographic Services (CHS), and that CHS was not able to retrieve the tidal gauge during the 2015 open water season. Baffinland further reported that it will attempt to retrieve data from the gauge during the 2016 open water season. Baffinland also indicated that the tides at Steensby Inlet were not specifically monitored in 2015 due to the lack of an established presence and activities at Steensby Port.

Condition 2

> *"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."*

Condition 3

> *"The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions."*

Pursuant to Condition 2 of the Project Certificate, the Proponent is required to provide new or revised assessments and studies on information regarding climate change impact predictions, and effects of the project on climate change. Baffinland reported within its annual reporting that

[2] Refer to page 38 of 111 of the 2015 Annual Report Submitted to the NIRB (March 2016)

since the project is still at the early phase of development, no determination of climate change effects have been concluded.[3] However, with respect to initiatives to reduce greenhouse gas emissions (GHG) pursuant to term and condition 3 of the Project Certificate, Baffinland reported within its 2015 Annual Report that it would ensure that the mobile and power generation equipment procured for its operational use onsite meets current standards and regulatory requirements for minimizing GHG emissions.

Condition 4

> *"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."*

Within its 2015 Annual Report to the NIRB, Baffinland reported that a number of Inuit employees have been involved in its environmental monitoring programs;[4] however for the 2015 monitoring period Baffinland indicated no climate change related studies or research were specifically undertaken.

Condition 5

> *"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"*

Baffinland is required to implement measures to ensure that weather-related information for various project sites is readily accessible to the public on a continual basis throughout the life of the Project. Within its 2015 annual report to the NIRB,[5] Baffinland noted that weather related information as pertaining to the Project site is being displayed for public access on Baffinland's company's website.

2.3.2 Atmospheric Environment

Condition 6

> *"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".*

Pursuant to Condition 6 of the Project Certificate, Baffinland is required to provide results of emissions, particularly for sulphur dioxide (SO_2), nitrogen oxide (NO_x) and greenhouse gases generated from the Project areas. Baffinland reported that the emissions generated from the Project varied between equipment types used onsite, and that it conservatively estimated emissions based on fuel consumption by equipment with the highest emission factors, such as front-loaders. Baffinland reported that emission estimates for SO_2 and NO_x were 1.74 tonnes

[3] Refer to Section 7.2.1.1 of the 2015 Annual Report Submitted to the NIRB (March 2016)
[4] Refer Sections 3.1 and 7.2.1.1 of the 2015 Annual Report Submitted to the NIRB (March 2016)
[5] Refer to Section 7.2.1.1 of the 2015 Annual Report Submitted to the NIRB (March 2016)

and 193.35 tonnes respectively,[6] and that in 2015 the Mary River Project consumed approximately 30,605,662 litres (L) of diesel fuel and 1,886,274 L of Jet A fuel.[7]

Condition 7

> *"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."*

Baffinland reported that it has implemented land based emission (SO_2 and NO_x) monitoring at the Mine site and Milne Port site annually since 2014, and that no emission monitoring was undertaken in 2015 along the proposed railway area and at Steensby Port given that there are no current Project activities at these sites.[8] Baffinland also indicated that an updated Air Quality and Noise Abatement Management Plan was included as Appendix J1 of the 2015 Annual Report.

Condition 8

> *"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."*

The Proponent is required to ensure that emissions remain within predicted levels at the Mine site, Milne Port, and at Steensby Port, and where applicable, within limits established by all applicable guidelines and regulations. Baffinland's 2015 Annual Report indicated that emission monitoring for SO_2 and NO_2 were undertaken in each quarter of 2015 at Milne Port and Mine site respectively, but not at the Steensby Port area as project activities have not yet started in the area. Baffinland also reported that its 2015 gaseous emission monitoring at both the Mine site and Milne Port generated the following results and conclusions:[9]

- SO_2 levels have been low throughout the year and do not exceed the 1-hour or 24-hour limits.
- NO_2 levels peaked during the cold winter months (November to March) and were significantly lower during the warmer months (April to September), but never exceeded the 1-hour or 24-hour limits.

Condition 9

> *"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,*

[6] Table 7.1 of the 2015 Annual Report submitted to the NIRB (March 2016)
[7] Section 7.2.1.2 of the 2015 Annual Report Submitted to the NIRB (March 2016)
[8] Section 7.2.1.2 of the 2015 Annual Report Submitted to the NIRB (March 2016)
[9] Appendix K1 of 2015 Annual Report Submitted to the NIRB (March 2016)

fuel consumption as measured by Baffinland's purchase and use as well as the fuel use of its contractors and sub-contractors."

Baffinland reported that the estimated total annual emissions of SO_2 and NO_x generated by the Mary River Project in 2015 were 1.74 tonnes and 193.35 tonnes respectively and that the estimated total emission of GHG generated from different Project sources in 2015 was 125.05 carbon dioxide (CO_2) equivalent kilotonne (CO_2-eq kilotonnes) for the year.[10] [11]

Condition 10

"The Proponent shall update its Dust Management and Monitoring Plan to address and/or include the following additional items:

a) Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site.

b) Identify the specific adaptive management measures to be considered should monitoring indicate that dust deposition from trains transporting along the rail route is greater than initially predicted.

c) Outline specific plans for monitoring dustfall at intervals along and in the vicinity of the Milne Inlet Tote Road to determine the amount and extent of dustfall.

d) Identify the specific adaptive management measures to be considered if monitoring indicates that dust deposition from traffic on the Milne Inlet Tote Road is greater than initially predicted."

A dust monitoring program was included within the Air and Noise Abatement Management Plan submitted by Baffinland,[12] which includes measuring dustfall at 34 locations on a monthly basis throughout the year at the Mine site, along the Tote Road, and at Milne Port. Baffinland reported that 26 dustfall monitoring stations were already established in 2013, and that one year of monitoring has been completed at the 26 original stations, with future monitoring planned to investigate dust fall at all 34 sites. Pursuant to condition 10d, Baffinland presented results of its 2015 dust fall monitoring program noting the following changes:[13]

<u>Mine Site</u>

- Dustfall at stations located within the zone predicted in the Final Environmental Impact Statement (FEIS) or the FEIS Addendum to receive a high threshold level of deposition received deposition levels within the high threshold range. However, no seasonal differences in dustfall levels were observed.

<u>Tote Road</u>

- Dustfall at stations within one (1) km of the road and within the zone predicted to receive a moderate threshold range of deposition received a high level of dustfall exceeding the predicted threshold range. However, it was indicated that dust fall levels were higher in the summer than winter seasons.

[10] Section 7.2.1.3 of the 2015 Annual Report Submitted to the NIRB (March 2016)
[11] Table 7.2 of the 2015 Annual Report submitted to the NIRB (March 2016)
[12] Refer to Attachments 6 and 7 of Appendix J1-Air Quality and Noise Abatement Management Plan
[13] Appendix L2-2015 Annual Terrestrial Monitoring Report

Milne Port

- Dustfall at Milne Port stations within the zone predicted to receive a moderate threshold range of deposition received a high threshold level of deposition, exceeding the FEIS/FEIS Addendum. Average dustfall at one station located closest to the stockpiles and ore dock (station DF-P-05) was higher in summer than winter, but other collection sites at the Port did not indicate meaningful seasonal differences.

Baffinland's submission did not identify the specific adaptive management measures to be considered for Milne Port area given the high threshold level of deposition, which was noted to exceed the predicted levels in the FEIS.

Condition 11

"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)."

Condition 12

"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."

Baffinland reported that no additional stack testing was conducted since no new incinerators were commissioned in 2015, and further noted that an updated Incineration Management Plan was included within the Air Quality and Noise Abatement Management Plan,[14] and submitted within the 2015 Annual Report to the NIRB.

2.3.3 Noise and Vibration Monitoring

Condition 13

"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."

A blasting management plan was submitted,[15] which included the Proponent's commitments that all quarry blasting within the Project area would adhere to the Fisheries and Oceans Canada "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters".[16] [17] Baffinland reported that no blasting activities occurred in the marine environment in 2015, and that it was consulting with the Marine Environment Working Group (MEWG) to ensure compliance with this condition.

Condition 14

"The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and

[14] Appendix J1-Air Quality and Noise Abatement Management Plan
[15] Refer to Appendix J11- Blasting Management Plan
[16] Refer to Section 2.1.0 of Appendix J11- Blasting Management Plan
[17] Wright and Hopky (1998). Guidelines for the Use of Explosives in or near Canadian Fisheries Waters

Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development"

Baffinland reported that it conducted noise and vibration monitoring at the Mine site and Milne Inlet Port accommodations in February 2015 and in December 2015 respectively.[18] Noise levels were in the range of 25 to 40 decibels (dBA) within the accommodation building for most measurements, with occasional short-term noise levels reaching 70.1 dBA at the Mine Site and 66.8 dBA at Milne Port. The Proponent did not specify which mitigation measures would be implemented within its existing Air Quality and Noise Abatement Management Plan to address Project related noise exceedances[19]. Further, Baffinland indicated that time-weighted average has not been calculated, and that noise levels were mostly below the recommended threshold (45dBA) with only occasional short-term exceedances within the 12-hour average being above 45 dBA. Baffinland indicated that short-term noise exceedances occurred when heavy equipment was working near the worker accommodation building, and anticipated that these noise sources would be within normal range threshold once construction activities conclude at site and the Project moves into the operations phase.

Condition 14a

"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."

Condition 14b

"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"

Pursuant to conditions 14(a) and 14(b) of the Project Certificate, the Proponent is required, through coordination with the MEWG and Terrestrial Environment Working Group (TEWG), to implement adaptive management strategies to mitigate potential impacts of noise to marine and terrestrial wildlife, including people during project activities. Baffinland reported that a construction monitoring report was submitted to Fisheries and Oceans Canada (DFO),[20] as per the authorization for the construction of the ore dock, in 2015 and that DFO subsequently indicated that the report satisfied the requirement of avoiding serious harm to marine mammal species during construction as per the *Fisheries Act* Authorization 14-HCAA-00525. With respect to condition 14(b), Baffinland reported that compliance with this condition was in progress in consultation with the TEWG.

Condition 15

"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.

[18] Section 7.2.1.6 of 2015 Annual Report to NIRB (March 2016)
[19] Refer to Section 3 of the Air Quality and Noise Abatement Management Plan
[20] Section 5.5.3.3 of the 2015 Annual Report submitted to the NIRB (March 2016)

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."

Baffinland noted within its submission to the NIRB that it would continue to work with the Hamlet of Pond Inlet (the Hamlet) and the QIA regarding safety considerations for travel and public interaction with the Project for those travelling around the Project area.[21] In support of this term and condition, Baffinland noted that in collaboration with QIA, the Mary River Community Group (which includes Hunters and Trappers Organization [HTO] and Hamlet representation) was established, and will continue to work with the marine and terrestrial working groups, of which QIA is a member.

2.3.4 **Hydrogeology and Hydrology Monitoring**

Condition 16

"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 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"

Condition 29

"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."

The Proponent is to ensure that all Project water-related infrastructures or facilities are designed and constructed in such a manner that is consistent with those proposed in the FEIS. Baffinland noted that in 2015 it had submitted construction drawings and summary reports for water-related infrastructures and facilities in accordance with the requirement of its Water Licence (No. 2AM-MRY1325).[22] Baffinland indicated that construction summary reports were submitted for different facilities such as the Mine site ore crushing and screening pad, as well as a diversion ditch.

Condition 17

"The Proponent shall develop and implement effectives measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment."

[21] Appendix E1-Concordance to PC Conditions (Page 8)
[22] Appendices B1 to B3

Baffinland reported that it implemented a water quality monitoring program consistent with its Surface Water, Aquatic Effects, Fish and Fish Habitat Management Plan and further submitted its Annual Report to the Nunavut Water Board which includes results of the ongoing Surveillance Network Program for management of site runoff.[23]

Condition 18

> *"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."*

An Interim Closure and Reclamation Plan (ICRP) was submitted by Baffinland,[24] which indicated that an open pit is not expected to occur onsite until years 10 to 12 of operations at full production. Baffinland indicated that as per requirements of the Type "A" Water License 2AM-MRY1325 Amendment No. 1 and QIA Commercial Lease No. Q13C301, the final ICRP will be developed and submitted no later than one year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities in such a way that they can be subsequently implemented. Baffinland also noted that if future revisions of the referenced Project authorizations were to change, this timeframe would be adjusted accordingly. Baffinland also noted that it anticipate that the open pit would take an estimated 85 to 150 years to passively fill, and that this could be accelerated via pumping water from a nearby water source, with an open pit monitoring program conducted throughout the life of the Project in accordance to all Metal Mining Effluent Requirements (MMER). Baffinland also noted that predictions of pit water quality would be updated throughout the life of the Project as more information becomes available on the geochemistry of the waste rock and pit wall.

Condition 19

> *"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."*

Condition 47

> *"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"*

Baffinland indicated within its annual reporting that the requirement of Condition 19 was fulfilled through inspections of the Tote Road and monitoring of all fish-bearing crossings pursuant to the *Fisheries Act.*[25] Baffinland also reported that fish habitat use and passage upstream of culverts was confirmed at all of the 34 fish-bearing crossings in 2015, and that 11 of these crossings were noted to have some minor issues that will require further monitoring and

[23] Appendix J20
[24] Appendix J19-Interim Closure and Reclamation Plan
[25] Section of 4.1 of Appendix J20-Surface Water Management Plan

possibly mitigation. In addition, Baffinland also identified BG-01 has the crossing with the greatest potential to affect fish passage due to erosion and undercut at the culverts that may cause this crossing to be become impassable in the future.

2.3.5 **Groundwater/Surface Waters**

Condition 20

> *"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."*

Pursuant to Condition 20, Baffinland noted that the effects of explosive residues and related by-products were being monitored through the ongoing Surveillance Network Program and Aquatic Effects Monitoring Program. Baffinland reported that the aquatic effects monitoring in the Mine site area in 2015 identified minor Project-related changes in water and sediment quality of the Camp Lake, due to mine-related nitrate inputs from the mine/quarry. Baffinland also reported that conductivity and concentrations of nitrate, chloride, iron, manganese and/or sodium were the primary constituents that reflected a mine-related signature within the Camp Lake system, and with QMR2 serving as the a key source for these parameters, particularly at CLT1.

In addition, Baffinland reported elevated levels of conductivity within the Sheardown lake system and that concentrations of nitrate, sulphate and potassium are elevated only within the Sheardown Lake tributary 1. Baffinland concluded that there were no adverse mine-related changes to the Sheardown Lake system, but reported subtle changes to benthic communities at Camp Lake due to minor mine-related effects on sediment and water quality.

Baffinland also submitted a Quarry Management Plan and associated Blasting Management plans for Q7, Q11, Q19, Km 104, Km 97, Km 2, D1Q1, D1Q2, Q1, and QMR2, which further documents the Proponent's commitment to contain sources of contamination from operations that could affect water quality, including blasting residues and spills from refueling of equipment. Furthermore, the QMR2 Quarry Management Plan submitted by Baffinland specifically includes commitments that that blasting residue from explosives would be managed by following best practices.[26]

Condition 21

> **"***The Proponent shall ensure that the scope of the Aquatic Effects Monitoring Plan (AEMP) includes, at a minimum:*
>
> *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; and*
> *b. measures for dustfall monitoring designed as follows:*
>
> *i. To establish a pre-trucking baseline and collect data during Project operation for comparison;*

[26] Appendix J13.10-QMR2 Quarry Management Plan

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); and,*
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."*

Baffinland reported that the scope of the updated Aquatic Effects Monitoring Plan included plans to collect runoff from stockpiles and the open pit at the Mine site, including mine effluent discharge at two watercourses, namely Mary River and Camp Lake Tributary 1.[27] Pursuant to part (a) of Condition 21, Baffinland noted that a summary of project effects in 2015 was included within the 2015 Annual Report, which indicated that monitoring of water and sediment quality was undertaken,[28] and that discharge criteria was generally met with the exception of one minor exceedance of the water licence criteria for total suspended solids. Baffinland noted that items under part (b) of Condition 21 were implemented through the ongoing dustfall monitoring program described within the Terrestrial Environment Management and Monitoring Plan.[29]

Condition 22

"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."

Condition 26

"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".

Pursuant to conditions 22 and 26, Baffinland noted its submission of the Surface Water and Aquatic Ecosystem Management Plan,[30] which included mitigation measures for addressing sedimentation and erosion. This plan indicates that the Proponent would utilize flocculants such as soil conditioners and erosion control polymers and/or sediment and turbidity control applicator logs for sediment and erosion control at non-fish bearing watercourses impacted by Project construction activities.

Condition 23

"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."

Baffinland reported on its submission of the Surface Water and Aquatic Ecosystem Management Plan[31] which included details of its ground water monitoring program. This plan specifically indicated that shallow groundwater monitoring stations will be installed downstream of different Project infrastructures, such as the landfill, landfarm, and in other project locations where

[27] Appendix J20-Surface Water and Aquatic Ecosystem Management Plan
[28] Page 1V of XX of 2015 Annual Report
[29] Appendix J7-Terrestrial Environment Mitigation and Monitoring Plan
[30] Section 4 of Appendix J20-Surface Water Management Plan
[31] Section 9.2.3 of Appendix J20-Surface Water Management Plan

environmental risks have been identified. Baffinland also indicated that when possible, samples shall be collected once per year during the period of greatest active zone thickness (in late August), which will be followed by a standard well installation monitoring system and sampling methods. Baffinland also reported that a term of reference for a shallow groundwater study would be submitted to the Nunavut Water Board for review and comment prior to implementation.

Condition 24

> *"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"*

Condition 46

> *"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."*

Baffinland reported it had implemented a fresh water environment monitoring program, which includes the ongoing Surveillance Network Program (SNP) to satisfy the requirements for water licence (2AM-MRY132),[32] and Condition 24 of the Project Certificate. Baffinland also indicated that a total of 42 spills were reported to the Nunavut Spill Line in 2015; 20 of the reported spills occurred at Milne Port, 20 at the Mary River Mine sire, and 2 along the Tote Road.

2.3.6 Geomorphology and Geotechnical Investigations

Condition 25

> *"The Proponent shall undertake the additional geotechnical investigations to identify sensitive landforms, modify engineering design for Project infrastructure, develop and implement preventative and/or mitigation and monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms."*

Within its 2015 Annual Report to the NIRB, Baffinland indicated that additional geotechnical investigations were undertaken in 2015 at Milne Port as well as in the vicinity of the waste rock stockpile area,[33] and that the placement of infrastructure considered landform and permafrost conditions. Baffinland also submitted a Geotechnical Inspection Report,[34] which concluded no adverse effects on various project infrastructure in relation to sensitivity of landforms.

Condition 28

> *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.*

Baffinland indicated that no work occurred on the railway, noting specifically that biannual geotechnical inspections were undertaken at pit walls, quarries, landfills, landfarms, and bulk

[32] Section 7.4 of 2015 Annual Report to the NIRB (March 2016)
[33] Section 7.3.1.1 of 2015 Annual Report to the NIRB (March 2016)
[34] Appendix L1- 2015 Geotechnical Inspection Supplemental to 2015 Annual Report

fuel storage facilities during the periods of July 30 to August 4, 2015 and September 25 to 29, 2015,[35] , and that there were no concerns regarding dyke stability.

2.3.7 **Erosion Management, Quarry Operations and Silt Control Plans**

Condition 30

"The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit."

Condition 43

"Prior to the start of construction, the Proponent must submit a Site Drainage and Silt Control Plan to the appropriate regulatory authorities for approval.

The Proponent is required to develop a site-specific quarry operations and management plan and site drainage/silt control plan.[36] Baffinland noted within its submission that quarry management plans (D1Q1, D1Q2, Q1, Q11, Q19, Q7 and QMR2) were previously submitted to the NWB, QIA, and the NIRB in 2013, 2014 and 2015 respectively pursuant to Condition 30 of the Project Certificate and requirement of water licence 2AM-MRY1325. These plans address issues related to site management measures and encompass assessment of acid rock drainage, blasting operation management, drainage management, dust, and noise as well as closure and reclamation activities. Baffinland also reported that details regarding site drainage and silt control have been included within the Surface Water Management Plan.

2.3.8 **Vegetation Construction, Operations and Monitoring**

Condition 31

"The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint."

Condition 32

"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."

Condition 33

"The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP)."

Baffinland reported that all project activities undertaken in 2015 occurred within the approved footprint for development,[37] and that exotic plant local monitoring surveillance was in place to quantify direct habitat loss as well as measure area of Project disturbance.[38] In addressing the potential for the introduction of invasive species to the Project area, Baffinland reported that all equipment used on site were washed and inspected prior to sealift. Pursuant to Condition 33, Baffinland noted its submission of the Terrestrial Environmental Management and Monitoring

[35] Section 7.3.1.1 of 2015 Annual Report submitted to the NIRB (March 2016)
[36] Appendix J13 – Supplemental to 2015 Annual Report submitted to the NIRB (March 2016)
[37] Section 7.3.1.2 of 2015 Annual Report submitted to the NIRB (March 2016)
[38] Appendix J7-TEMMP-Supplemental to 2015 Annual Report

Plan,[39] which included relevant monitoring and mitigation measures for vegetation, birds and terrestrial wildlife (caribou and wolf), as well as adaptive strategies.

Condition 34

"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."

Condition 35

"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."

Pursuant to Conditions 34 and 35, the Proponent is required to conduct soil sampling in areas with berry producing plants near Project development areas prior to commencing operations, as well as undertake monitoring of baseline metal levels in organ tissue from caribou harvested within the local study area, prior to commencing operations. Baffinland submitted its 2015 Terrestrial Annual Report to the NIRB, which noted that vegetation and soil base metal sampling was suspended in 2015, and further referenced the meeting notes of the Terrestrial Environment Working Group[40] where Baffinland had indicated that monitoring metals in organ tissues including caribou fecal pellet collection was not a priority due to time and financial constraints.

Condition 36

"The Proponent shall establish an on-going monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations."

Condition 37

"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".

Condition 38

"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.

Condition 39

"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."

[39] Appendix J7-TEMMP-Supplemental to 2015 Annual Report
[40] Appendix D2-TEWG 2015 Meeting Notes

Condition 40

"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."

Baffinland reported it had implemented a long term monitoring program to assess potential changes in vegetation abundance used as caribou forage within the regional study area, and noted that this work has been completed in previous years but not in 2015. Regarding exotic invasive plant species monitoring, Baffinland reported within its Terrestrial Environmental Monitoring Plan that its monitoring plan would focus on surveys of the Project footprint and adjacent areas every 3 to 5 years or as triggered by observations of exotic invasive plant species. However, within its 2015 Terrestrial Environmental Monitoring Report, Baffinland indicated that the exotic monitoring program was discontinued in the current monitoring period and may resume in future.[41] Baffinland also reported that adaptive strategies will be implemented when unexpected impacts are observed[42] and that revegetation plans, where applicable, will be included in the future site reclamation plan following consultation with the Terrestrial Environment Working Group.

2.3.9 Freshwater Aquatic Environment (including Biota and Habitat)

Condition 41

"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. "

Condition 42

"The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies."

Pursuant to Conditions 41 and 42, Baffinland is required to maintain a minimum of 100 metres (m) vegetated buffer between the high-water mark of any fish-bearing water bodies, as well as a 30 m buffer between the mining operation and adjacent water bodies. Within its submitted Surface Water and Aquatic Ecosystem Management Plan, Baffinland indicated that its mitigation measures will include maintaining a minimum of 100 m naturally-vegetated buffer between the high-water mark of any fish-bearing water body and all permanent quarries along the Tote Road in order to eliminate the risks of potential for acid rock drainage or metal leaching. Baffinland indicated that its mitigation measures for sedimentation and erosion included measures that will ensure that disposal of debris is at least 31m away from the ordinary high-water mark to prevent sediments from entering water body.[43]

Condition 45

"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."

[41] Appendix L2-2015 Terrestrial Environmental Monitoring Report
[42] Section 6 of Appendix J7-TEMMP
[43] Section 4.1 of Appendix J20- Surface Water and Aquatic Ecosystem Management Plan

Baffinland reported that in 2014 it received approval from DFO to construct the ore dock under the new *Fisheries Act* legislation for Serious Harm determination, and that the associated authorization had prescribed offset measures for the replacement of fish habitat lost due to ore dock construction which continued through 2015.[44]

Condition 48

> *"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)".*

Condition 48a

> *"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."*

The Proponent reported that fulfilment of Condition 48 was ongoing and is currently being addressed through discussions with the Marine Environment Working Group, and that no blasting occurred in or near fish bearing waters in 2015. Baffinland referenced the submission of its Surface Water Management and Aquatic Ecosystem Management Plan, which noted its commitment to engage with DFO and the QIA in establishing possible Project specific thresholds for blasting in or near Canadian Fisheries Waters.

Pursuant to Condition 48a, Baffinland reported that it conducted opportunistic sampling of arctic char for contaminant analyses, and that arsenic, mercury and zinc were present in all fish; however, none of the fish analyzed exceeded Health Canada's guideline for mercury and fish consumption. Baffinland noted that opportunistic sampling of fish at the surveillance level will be continued with tissue samples collected from incidental mortalities for contaminant analysis; however, the Proponent did not indicate how it consulted, or plans to consult, with the Mittimatalik Hunters and Trapper Organization regarding the design, timing, and location of surveys.

2.3.10 Terrestrial Wildlife and Habitat (including Monitoring)

Condition 49

> *"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."*

Conditions 51

[44] Section 5.4 of the 2015 Annual Report to the NIRB (March 2016)

"The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating project-induced impacts. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions."

The Terrestrial Environment Working Group (TEWG) was established with terms of reference for finalized on March 4, 2013, which remained unchanged in 2015. Baffinland submitted its 2015 TEWG Meeting Notes,[45] which indicated that meetings were held in April and November 2015 and focused on prioritizing monitoring programs, and reviewing the Terrestrial Environment Monitoring Annual Report for working group comments. Baffinland noted that the TEWG reviewed the work plan for terrestrial monitoring in 2015, and discussed several items related to caribou harvesting/surveying, vegetation monitoring, dust suppression, den survey results, birds, Polar Bear, and HTO participation. However, the Board specifically notes that on page 73 of the 2015 Terrestrial Environment Annual Monitoring Report (Appendix L2), Baffinland reported that it discontinued vegetation abundance monitoring program, vegetation and soil base metals sampling, exotic invasive plant species monitoring program, den surveys, and roadside waterfowl surveying 2015, all of which are prescribed by conditions 34 through 39; 55a, 65 through 74 of the NIRB Project Certificate.

Conditions 50

"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)."

Conditions 52

"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."

Conditions 53

"The Proponent shall demonstrate consideration for the following:

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.

[45] Appendix D2-TEWG 2015 Meeting Notes

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."*

Conditions 54

"The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include, but not be limited to the following:

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:*

i. *Dust fall (fugitive and Total Suspended Particulates), that addresses methods to reduce risk to caribou forage from dust fall;*

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."*

Baffinland noted submission of its Terrestrial Environmental Management and Monitoring Plan (TEMMP) and the 2015 Terrestrial Environment Annual Monitoring Report, including other relevant Project commitments during the monitoring year. Several key indicators such as vegetation monitoring (exotic invasive species, vegetation health, dustfall), migratory birds (Peregrine Falcon, common and king eider, Red Knot, songbirds, and shorebirds), and wildlife

(caribou and wolf) were identified within the TEMMP for follow-up monitoring in order to ensure that the long-term trends and cumulative effects of Project interactions are identified. Baffinland reported within its TEMMP that it will implement means of deterring caribou from the open pit and other hazardous areas through measures such as installing poles with fluorescent flagging, creating physical barriers (berms or fences), installing auditory deterrent, and/or using wildlife monitors to survey for wildlife in hazardous areas.

Baffinland also noted that items (a) through (e) of Condition 54 were addressed through submission of the TEMMP and that item (f) of the condition, which requires the development of a hunter harvest survey, was yet to be undertaken given the current wildlife management regime for North Baffin caribou. Baffinland reported that from discussions with members of the TEWG, and in consideration of the current moratorium for North Baffin caribou, a Hunter Harvest Study is not possible or practical at this time.

Conditions 55

> *"The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) to ensure compliance with the Nunavut Wildlife Act".*

Conditions 56

> *"The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the Nunavut Wildlife Act. Overall, this will require the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics".*

Baffinland noted that its Terrestrial Environmental Management and Monitoring Plan addresses management and monitoring of wolves, and that discussions regarding adaptive management for wolves and wolf habitat were ongoing with the Government of Nunavut-Department of Environment (GN-DoE) through the Terrestrial Environmental Working Group (TEWG). Baffinland further reported that carnivore monitoring programs completed in the past were discontinued in 2015 noting that TEWG considered these surveys no longer be required due to low abundance; however, the surveys will be conducted in the future should changes occur in carnivore abundance. With the respect to Condition 56, Baffinland reported that its reclamation strategies will evolve over the life of the Project and will be informed by best practices, regulatory consultation with the TEWG, as well as through available reclamation knowledge and site specific considerations.

Conditions 57

> *"The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information:*
>
> *a. Description of all updates to terrestrial ecosystem baseline data;*
> *b. A description of the involvement of Inuit in the monitoring program;*
> *c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report;*

d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings;
e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn;
f. A summary of the chronology and level of mine activities (such as vehicle frequency and type);
g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; and
h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program."

Condition 58

"Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:

a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting;
b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou 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 dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets;
d. A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and 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."

Baffinland reported that it's Terrestrial Environmental Management and Monitoring Plan (TEMMP) has addressed items (a-h) of Condition 57, and that it's ongoing monitoring initiatives as presented within the TEMMP and 2015 Terrestrial Environment Annual Monitoring Report addresses items under Condition 58, except for 58c. Baffinland reported that 58c, which relates to ash content of caribou pellets, was problematic to achieve due to insufficient sample size, and the absence of fresh pellets and financial constraints, which prevented adequate monitoring and implementation of this requirement as prescribed within the NIRB Project Certificate. Baffinland reported that the terrestrial monitoring mammal work completed in 2015 included: Height-of-Land caribou surveys, helicopter flight height analysis, snow tracking surveys, pre-

clearing nest surveys, staging waterfowl surveys, cliff-nesting raptor occupancy and productivity surveys, and snow bank height monitoring.

Condition 59

> *"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."*

Condition 71

> *"Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least:*
>
> *a. 650 m during point to point travel when in areas likely to have migratory birds*
> *b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds*
> *c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site."*

Condition 72

> *"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."*

Baffinland reported that it conducted a helicopter flight-height monitoring to reduce disturbance to wildlife (particularly calving and post-calving caribou and staging waterfowl) pursuant to conditions 59, 71 and 72 of the Project Certificate. Within its 2015 Terrestrial Environment Annual Monitoring Report, Baffinland reported that helicopter flights were not compliant with the Project Conditions' requirement as there was 1,314 total transits flown with the analysis time frame, of which 189 (14%) were within the snow goose area and 1,125 (86%) were outside of the area. Baffinland also reported that the flight heights' greatest level of compliance was in July in the snow goose area, at 70% and during the four months, the lowest level of compliance was in June at 24% in all the area. In addition, Baffinland reported that in 2015, all helicopter pilots received orientation training prior to flying onsite, and were made aware of exclusion zones and informed on when to keep to altitude limits where required and practical; however, a number of factors such as weather, relatively close point to point travel, exploration and slinging activities contributed to flight altitude being lower than the objective prescribed in the Project Certificate. Baffinland also indicated that due to the nature of helicopter use required for the Project, full compliance will not be possible.

Condition 60

"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."

Baffinland noted submissions of its Blasting Management Plan appended to the Quarry Management Plan,[46] which include details of blasting protocol and procedures to be implemented to minimize impacts of blasting on terrestrial wildlife (caribou and carnivores) and birds within the Project areas. Baffinland has also developed several blasting protocols and procedures within its Quarry Blasting Operations Management Plan with one specific to terrestrial wildlife[47].

Condition 61

"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.

Condition 62

"The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting."

Baffinland noted submission of its 2015 Terrestrial Environmental Management and Monitoring Plan, which included a stop work policy that addresses Tote Road-specific mortality mitigation for wildlife encountered within the Project area. Baffinland also noted the submission of its Weapons Onsite Policy,[48] which prohibits weapons that are classed as "non-restricted", "prohibited" and "restricted" by the Canadian *Firearms Act* from entry into the Project site. Baffinland also indicated that should any weapon listed under the categories above be inadvertently brought to site by an employee, or contractor, the weapon will be confiscated by security personnel, except for weapons used by authorized personnel such as bear monitors and security officers. Baffinland also referenced its Hunting and Fishing (Harvesting) Policy,[49] which prohibits employees or contractors from hunting or fishing on lands leased to Baffinland.

Condition 63

"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."

[46] Appendices J13.1 to J13.10
[47] Section 5.1 of Appendix J13.7-Q11 Quarry Management Plan
[48] Refer to Appendix C2-Weapon Onsite Policy (2014 Annual Report to NIRB)
[49] Refer to Appendix C3-Hunting and Fishing (Harvesting) Policy (2014 Annual Report to NIRB)

Baffinland reported that it provided updates to the Hunters and Trappers Organization through engagement with the Pond Inlet Community Advisory Group, of which the Mittimatalik Hunter and Trapper Organization (MHTO) is a member. Baffinland also reported within its TEWG Meeting Notes that HTO meetings occurred in all 10 communities, including at Pond Inlet to get input on caribou harvesting.

Condition 64

"The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures:

a. Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and

b. Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting)."

Baffinland noted within its annual reporting to the NIRB that no incinerator was installed beside the kitchen for safety reasons, and that skirting installation was completed on the accommodation facilities.

2.3.11 **Birds Monitoring**

Condition 65

"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."

Condition 66

"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."

Condition 67

"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."

Condition 68

"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."

Condition 69

"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."

Condition 70

"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."

Pursuant to Condition 65, Baffinland indicated it is developing an awareness of where important waterfowl staging areas are located, so that they may be avoided during sensitive time, and that roadside waterfowl surveys were conducted in previous years (2012, 2013 and 2014) but no areas of concentration have been identified. Pursuant to Conditions 66 and 67, Baffinland noted that its 2015 Terrestrial Environmental Management and Monitoring Plan include project personnel orientation on general mitigation for birds, including protocols for avoiding known nests and large concentrations of foraging or molting birds. Furthermore, Baffinland indicated that to avoid conflicts with nesting birds, in 2015, a total of nine pre-clearing surveys totaling 17.57 person-hours of survey were conducted throughout the breeding bird season at various locations such as quarries, new waste rock stockpile area and the crusher expansion pad; however, no bird nests were located, and therefore no buffers were required. Environmental monitors did note songbirds including snow buntings but no indication of nesting behavior was observed. With respect to Condition 68, Baffinland reported that deterrents were added to the guy-wires on communication towers in November 2015.

Condition 74

"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".

Condition 75

"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.

Within its 2015 annual reporting,[50] Baffinland provided a detailed record of all bird monitoring work completed in 2015 which included the following: pre-clearing nest surveys, communication tower surveys, staging waterfowl surveys, cliff-nesting raptor occupancy and productivity surveys, and cliff-nesting raptor nest site management and effects monitoring. Pursuant to Condition 75, Baffinland indicated that in 2015, activities were confined within the established Project Development Area (PDA), and that the areas disturbed as a result of Project activities and infrastructure within the PDA remain unchanged at 272 hectares (ha); however, an additional 1.2 ha of land within the PDA was disturbed in 2015.

2.3.12 **Marine Environment**

Condition 76 (and 89-91)

> *"The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and identify potential impacts of the Project on the marine environment".*

Condition 76 requires Baffinland to develop a comprehensive Marine Environmental Effects Monitoring Program (MEEMP) to address concerns and identify potential impacts of the Project on the marine environment. Baffinland reported that its marine environmental effects monitoring was undertaken in 2015 in accordance with the draft MEEMP;[51] however, the monitoring did not detect any project-related change in the marine environment but significant differences were noted on epifauna abundance and percentage of macroflora coverage with distance from the Milne Port between baseline (2014) and year one (2015) for two of four transects.

Pursuant to Conditions 89 through 91 as pertaining to ballast water management, Baffinland indicated within its annual reporting to the NIRB that a ballast water monitoring program was conducted in 2015 in accordance with the draft MEEP, with Certificates of Confirmation of Ballast Water Exchange presented in Appendix N3 of the 2015 Annual Report to the NIRB. With respect to Condition 91, Baffinland submitted its Shipping and Marine Wildlife Management Plan which includes plans for anti-fouling sampling, anti-fouling management and consistent with the International Maritime Organization Convention on the Control of Harmful Antifouling Systems on Ships.

Condition 77

> *"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, the Government of Nunavut, the Qikiqtani Inuit Association 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*

[50] Section 7.3.1.3 of 2015 Annual Report to NIRB (March 2016)
[51] Refer to 7.5.1 of 2015 Annual Report to NIRB (March 2016)

consider the draft terms of reference for the MEWG filed in the Final Hearing, but they are not bound by them."

The term of reference for the Marine Environment Working Group (MEWG) was finalized on March 6, 2013, which has remained unchanged during the 2015 monitoring period. During the current monitoring period, Baffinland reported on activities of the MEWG,[52] noting that the meetings held in April and November 2015 focused on updates regarding shipping, community consultation, marine mammal observation, acoustic monitoring, water quality sampling, ore dock construction monitoring, spill modelling, progress of the Bruce Head observation study, Polar Bear survey, and general progress of the Project. However, the Board notes that on July 6, 2016 Baffinland circulated a memo to the MEWG regarding the proposed changes to its 2016 Marine Mammal Aerial Survey, and a planned deferral of both the aerial and acoustic marine mammal surveys for the Mary River Project during 2016 shipping season. On July 21, 2016, the NIRB received correspondence from the World Wildlife Fund Canada with respect to the planned deferral of both the aerial and acoustic marine mammal surveys for the Mary River Project during 2016 shipping season, and the potential for the deferral to introduce significant limitations to the future use of survey data and adaptive management measures as related to narwhals and marine mammals.

In addition, on July 22, 2016 the NIRB received correspondence from the Qikiqtani Inuit Association regarding Baffinland's planned deferral of the aerial and acoustic marine mammal surveys, noting the implications for deferring the marine mammal surveys in the 2016 shipping season.

- The QIA outlined its interpretation of the intent behind Term and Condition 99 as being to obligate Baffinland to work with the Marine Environment Working Group and identify priorities to enhance baseline data on marine wildlife, including shore-based observations of narwhal and bowhead behaviours in response to shipping activities. QIA further reiterated the importance of conducting aerial surveys in summer 2016 in order to monitor the anticipated increase in vessel transits during the busiest shipping season on record for the project.
- QIA noted that aerial surveys are a critical component of any program designed to monitor long term and cumulative effects of shipping activities on marine mammals, and that the potential loss of the 2016 survey data will make it exceedingly difficult to assess vessel noise effects on marine mammal population.

Condition 78

"The Proponent shall update the baseline information for landfast ice using a long-term dataset (28 years), and with information on inter-annual variation. The analysis for pack and landfast ice shall be updated annually using annual sea ice data (floe size, cover, concentration) and synthesized and reported in the most appropriate management plan."

Condition 79

"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."

[52] Section 1.4 of Appendix J10-Shipping and Marine Wildlife Management Plan

Baffinland indicated within its annual reporting to the NIRB that the requirement to update baseline for landfast ice using a long-term dataset was completed and provided to the NIRB prior to the Final Hearing for the Mary River Project in July 2012. Any further updates on Condition 78 will be provided once Baffinland commences execution of the rail project. Baffinland also noted that a collaborative cost-sharing agreement with Canadian Hydrographic Service was ongoing for the nautical charting program in order to meet Condition 79.

Condition 83a

> *"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."*

Condition 84

> *"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".*

Condition 86

> *"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."*

Condition 87

> *"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."*

Baffinland indicated within its Shipping and Marine Wildlife Management Plan that it has developed a baseline sampling program to provide effective monitoring of physical and chemical effects of ballast water discharges, sewage outfall, and bottom scour. The collected data will be used as input for a model to monitor sediment re-distribution at the Milne port site, and for ballast water dispersion modeling.[53] The modeling results, which will be used to inform the marine water and sediment quality monitoring and mitigation programs have yet to be submitted by the Proponent.

Pursuant to Condition 87, Baffinland reported that aquatic invasive species monitoring was undertaken in Milne Inlet in 2015 at the commencement of Project shipping operations, and

[53] Section 7.5.2 of 2016 Annual Report to the NIRB (March 2016) and Section 6.3 of Appendix J10

included the following additional activities: zooplankton sampling, benthic infauna grab sampling, collection of underwater video for identification of epifauna and macroflora, fish and mobile epifauna sampling. Baffinland further indicated that because the 2015 collection was at the onset of shipping and the frequency of shipping in 2015 was considerably less that what is anticipated for future years, the 2015 data will be compiled into the baseline dataset to support the comparison of future monitoring results.

Condition 92

> *"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."*

Baffinland reported that it became an associate member with Oil Spill Response Limited (OSRL) and developed the Spill at Sea Response Plan in 2015 in consultation with OSRL and with authorizing agencies such as Environment and Climate Change Canada, Transport Canada, Qikiqtani Inuit Association, the community of Pond Inlet and Canadian Coast Guard.[54]

Condition 97

> *"Prior to the commercial shipping of iron ore, the Proponent shall conduct fuel spill dispersion modeling that will, at a minimum, consider:*
> *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:*
> *i. Pinch points;*
> *ii. The approaches into Steensby Inlet and Milne Inlet;*
> *iii. 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.*
> *b. Open water and, where applicable, ice-covered conditions;*
> *c. Spill volumes up to and including loss of a full tanker cargo; and,*
> *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."*

Condition 98

> *"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."*

Baffinland indicated that a fuel spill model was developed in 2015 with consultations with various regulators, and that the spill model informed the development of a Spill at Sea Response Plan submitted as Appendix J30 of the 2015 Annual Report to the NIRB.

Condition 100

> *"The Proponent shall update its Shipping and Marine Wildlife Management Plan, to include avoidance of polynyas and mitigation measures designed for potential fuel spills*

[54] Sections 5.6 and 5.8 of Appendix J10-Shipping and Marine Wildlife Management Plan

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."

Baffinland indicated it has updated its Shipping and Marine Wildlife Management Plan (SMWMP) and that upon commencement of winter shipping it would prepare annual reports to the NIRB regarding Project-related ship track and sea information, as well as summarize all incidents of significant deviations from the nominal shipping route as presented in the Project Environmental Impact Statement and ERP Addendum for traffic to/from Milne Port and Steensby Port including any implications for environmental effects. Baffinland also indicated within the SMWMP that an overlay of ship tracks onto ice cover imagery will be provided to illustrate avoidance of polynyas and shore leads, and that a record of all reports on marine bird and mammal species present in the ship tracks would be included in its annual report to the NIRB.

Condition 101

"The Proponent shall incorporate into the appropriate monitoring plans the following items:

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:
    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 Monitoring strategy focused on assessing and mitigating interaction between humans and wildlife at the port site(s)."

Baffinland indicated that requirements of Condition 101 (a), (f) and (h) have been deferred as they relate to activities on Steensby Inlet. With respect to Condition 101 (b), (c), (d) and (e), Baffinland indicated that these items were addressed through the ongoing activities of the MEWG and the Shipping and Marine Wildlife Management Plan.[55] Baffinland also reported that aerial marine mammal surveys were conducted in 2015 in accordance with Condition 101(g),

[55] Section 7.5.6 of the 2015 Annual Report to the NIRB (March 2016)

and that the results of shore-based monitoring conducted within Milne Inlet in 2015 as required under Condition 101(g) was submitted in Appendix N7.

Condition 102 (also applicable to 164 and 166)

> *"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.*

Baffinland indicated that during the shipping season, information regarding ship tracking will be made available on Baffinland's company website portal which is live during the shipping season and tracks project ship movement.[56] Baffinland also noted that an automated ship tracking mechanism was activated in 2015, and with portal access provided specifically to Parks Canada (PC) and the QIA. The Proponent further noted that "real time" tracking in remote environments may not be possible or feasible.

Condition 103

> *"The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including:*
>
> *a. A record of all ship tracks taken along both shipping routes covering the entire shipping season;*
> *b. 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 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. Marine bird and mammal species and number of individuals attracted to ship tracks in ice."*

Baffinland indicated that because ice breaking activities have not been undertaken to date, a number of items under Condition 103 are not currently applicable; however, routing information for shipping in and out of Milne Inlet during the open water season was submitted in the 2015 Bruce Head shore-based narwhal monitoring study,[57] where it specifically noted observations of 20 large vessels, including 1 large eco-tourism vessel and small vessels transiting through the stratified sampling area.

Condition 104

> *"Subject to safety considerations and the potential for conditions as determined by the crew of transiting vessels, to result in route deviations,*
>
> *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*

[56] http://www.baffinland.com//mary-river-project/logistics/location/
[57] Appendix N7-Marine Mammal Monitoring 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.
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."

Baffinland reported that in 2015, shipping activities did not occur along the southern shipping route, and that with respect to the northern shipping route, there were no significant deviations from the nominal shipping route during 2015 monitoring period.

Condition 105

"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:
a. 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;
b. Reduced shipping speeds where ship-marine mammal interactions are most likely; and
c. 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."

Baffinland indicated that conditions 105(a) and 105(c) were not applicable because there was no shipping during winter months nor shipping in the Hudson Strait in 2015. In regards to Condition 105(b), Baffinland referenced its Shipping and Marine Wildlife Management Plan, noting its commitment to adhere to adaptive management protocols and mitigation measures for marine wildlife impacts.

Condition 106 *(including 121-123; 126)*

"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."

Condition 107

"The Proponent shall revise the proposed "surveillance monitoring" to improve the likelihood of detecting strong marine mammal, seabird or seaduck responses occurring too far ahead of the ship to be detectable by observers aboard the ore carriers. A baseline study early in the shipping operations could employ additional surveillance to detect potential changes in distribution patterns and behavior. At an ambitious scope, this might be achieved using unmanned aircraft flown ahead of ships, or over known

areas of importance for seabirds or haul-out sites in the case of walruses, in accordance with the requirements of their Special Flight Operations Certificate."

Condition 108

"The Proponent shall ensure that data produced by the surveillance monitoring program is analyzed 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 seaducks in the Regional Study Area. It is expected that data from the long-term monitoring program be treated with the same rigor.

Baffinland reported that fuel tanker and sealift vessel traffic in and out of Milne Port provided the opportunity to conduct ship-based observations between Pond Inlet and Milne Port in 2015,[58] and that the future ship-based observer monitoring will include observers placed on Baffinland ore carriers during Project operation. Baffinland further noted the submission of its Ship-Observer and Shore-Based Marine Mammal Monitoring Program reports, including Environment and Climate Change Canada's migratory bird research in the shipping route area.

Conditions 109-112

Baffinland noted the submission of its MEEMP, which presents monitoring data to test the null hypothesis of whether or not marine mammal distribution, relative abundance, or behavior of narwhals or marine mammals do not change in the presence of open-water shipping. Baffinland reported that the establishment of clear thresholds for determining if negative impacts are resulting from vessel sound is not possible due to the large degree of natural variation in narwhal distribution, and the difficulty in attributing changes to due to the passage of large vessels. Pursuant to Condition 110 and 111, Baffinland indicated that a monitoring protocol for environmental effects for marine mammal disturbance was completed in July 2012, and additionally, a protocol for marine mammal monitoring was developed prior to ERP approval, and was submitted to DFO for implementation in 2015 for the Northern Shipping route.

Pursuant to Condition 112, Baffinland reported that DFO approved its's monitoring and mitigation plan for construction of the Milne ore dock, which addressed monitoring criteria and threshold such for turbidity, marine mammal surveying, underwater noise verification, and offsetting measures for addressing significant effect to the marine environment. With reference to item (f) of Condition 112, Baffinland noted that blasting activities in marine waters did not occur in 2015, and that it will consult with DFO prior to undertaking any blasting activities in marine waters.

Conditions 113

"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."

[58] Section 7.5.6.2 of 2014 Annual Report to the NIRB (March 2015).

Within its annual reporting to the NIRB, Baffinland noted the submission of its MEEMP, which includes monitoring results for finfish and arctic char.[59]

Condition 114

> *"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."*

Baffinland reported no update on this condition, given that commercial fishery has not been developed in either of the Steensby Inlet or Milne Inlet-Eclipse Sound areas.[60]

Condition 115

> *"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."*

Baffinland reported that an off-set was determined under DFO's Serious Harm legislation for the ore dock located at Milne Port,[61] and that until a decision is made regarding the development of Steensby Port, no further a progress or plans will be required or possible.

Conditions 116-118

Within its annual reporting to the NIRB, Baffinland indicated that no blasting took place near marine areas in 2015,[62] and that prior to undertaking any blasting operations around marine areas it would ensure that adequate mitigation plans are in place to minimize any blasting effects on the marine environment.

Condition 119

> *"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."*

Baffinland reported that the requirement of Condition 119 will be fulfilled when shipping through ice commences along the southern shipping route.[63]

[59] Section 7.5.1 of 2015 Annual Report to the NIRB (March 2016)
[60] Section 7.5.1 of 2014 Annual Report to the NIRB (March 2016)
[61] Appendix E1-Concordance to PC Conditions
[62] Appendix E1-Concordance to PC Conditions
[63] Section 7.5.1 of 2015 Annual Report to the NIRB (March 2016)

Condition 120

"The Proponent shall ensure that, subject to vessel and human safety considerations, all project shipping adhere to the following mitigation procedures while in the vicinity of marine mammals:

a. Wildlife will be given right of way;

b. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior; and

c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area."

Condition 121

"The Proponent shall immediately report any accidental contact by project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada respectively, by notifying the appropriate regional office of the:

a. Date, time and location of the incident;
b. Species of marine mammal or seabird involved;
c. Circumstances of the incident;
d. Weather and sea conditions at the time;
e. Observed state of the marine mammal or sea bird colony after the incident; and,
f. Direction of travel of the marine mammal after the incident, to the extent that it can be determined."

Condition 122

"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."

Condition 123

"*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."*

Baffinland indicated that its 2015 ship-based observers program took place between Milne Inlet and Pond Inlet,[64] and that its onboard observers did not observe any collisions with whales, or any human-polar bear interactions or marine wildlife mortalities. Baffinland also noted that appropriate mitigation procedures regarding marine mammals are included within the Shipping and Marine Wildlife Management Plan, and that in the event of any accidental contact with marine mammals by project vessels it would report such incidences to Fisheries and Oceans Canada, Environment Canada, and to the NIRB in the annual report.

[64] Section 7.5.6.5 of the 2015 Annual Report to the NIRB (March 2016)

Condition 124

> *"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."*

Baffinland indicated that this Project condition has been addressed by way of the hunting and harvesting policy that was appended to the 2013 Annual Report previously submitted to the NIRB.[65]

Condition 125

> *"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"*

Baffinland reported that acoustic deterrent devices have neither been used nor contemplated for now. [66]

Condition 125(a)

> *"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."*

Baffinland reported that in 2015, the Qikiqtani Inuit Association and Mittimatalik Hunters and Trappers Organization were included in emergency response planning for the northern shipping route. [67]

Condition 126

> *"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."*

Baffinland reported that in 2015 it recruited Inuit employees from North Baffin communities, and held community consultation meetings to discuss various project related activities, including the northern shipping route. [68]

[65] Refer to Appendix W.1 in 2013 Annual Report to the NIRB
[66] Appendix E1-Concordance to PC Conditions
[67] Appendix E1-Concordance to PC Conditions
[68] Appendix E1-Concordance to PC Conditions; and Section 4.3.4 of 2015 Annual Report to the NIRB (March 2016)

Condition 127 (including 164)

> *"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."*

Baffinland reported that a live website portal has been implemented, and that an automated ship tracking mechanism was activated in 2015 to address this term and condition.[69]

Condition 128

> *"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)."*

Baffinland reported that the off-setting alternative which had been presented during the assessment process of the ERP was deemed sufficient by DFO, and had been constructed in 2014.[70]

Condition 129

> *"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."*

Baffinland reported that it met with the Mary River Socio Economic Monitoring Committee (MRSEMC),[71] a subgroup of the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC), to identify and agree upon socio-economic monitoring priorities and Terms and Conditions.

Condition 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 noted that the interests of communities would be served by working with the Qikiqtaaluk Socio-Economic Monitoring Committee and the Mary River Socio Economic Monitoring Committee, and that data collected and presented will have to remain at a fairly high level to prevent identification of individuals in specific communities.[72]

[69] Appendix E1-Concordance to PC Conditions
[70] Appendix E1-Concordance to PC Conditions
[71] Appendix E1-Concordance to PC Conditions
[72] Appendix E1-Concordance to PC Conditions

Condition 131

"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."

Baffinland reported as in previous years' Annual Report to the NIRB that the Qikiqtaaluk Socio-Economic Monitoring Committee indicated interest in monitoring demographic changes, and will work with the Government of Nunavut to improve the gathering of information and align with data provided by Baffinland where possible.

Condition 132

"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."

Baffinland reported that it is working with the GN-Department of Family Services to deliver skills upgrading programs for pre-work and site employees.

Condition 133

"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."

Within its 2015 Annual Report to the NIRB, Baffinland indicated it had designed an online "residency and housing" survey, presented to the Qikiqtaaluk Socio-Economic Monitoring Committee in the spring of 2013, and that the survey has not been implemented by the collaborative monitoring partners and would require a broad sample of respondent from multiple employment situations in order to generate meaningful results.

Condition 134

"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;
d. The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire."

Baffinland reported that a total of 557 employees were on staff at the end of 2015,[73] of which 92 were Inuit based in the North Baffin Local Study Area, and that by comparison with 2014, Baffinland had a total of 495 employees, of which 100 were Inuit. Baffinland also noted that the vast majority of its non-Inuit employees were based in Canadian locations outside of Nunavut, with Ontario having the most (274 staff) and Yukon having the fewest (1 staff). Baffinland indicated that while the total employee numbers increased in 2015, the proportion of Inuit employees decreased by 4 percent and noted that the staff reduction measures and hiring freeze, as well as higher labour requirements put in place by 2015 are likely contributing factors to the decreasing numbers of Inuit employees.

2.3.13 **Education and Training**

Condition 135

"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)."

Baffinland reported that a heavy equipment operator training program was in progress,[74] and is expected to evolve into a Community Simulator Program that will see the installation, programming and training on a general purpose truck simulator located in Pond Inlet. Baffinland also noted that heavy equipment operator training is in process on site.

Condition 136

"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."

Within its 2015 Annual Report to the NIRB,[75] Baffinland indicated it will continue to develop and implement new initiatives to support education and capacity building for Inuit beneficiaries particularly from the North Baffin region and across Nunavut in order to develop new skill sets for advancement. Baffinland indicated that in 2015 it delivered a "Courageous leadership

[73] Section 7.6.1.3 of 2015 Annual Report submitted to the NIRB (March 2016)
[74] Section 3.2.4 of 2015 Annual Report to the NIRB (March 2016)
[75] Section 3.2.1 of 2015 Annual Report to the NIRB (March 2016)

program" to enhance supervision skills for experienced managers, and that in 2016 it will deliver a modified version of this training program to supervisors.

Condition 137 (including 141)

> *"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 licenses 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"*

Baffinland reported that it provided 18 formal certificates and licences that were acquired via on-site training,[76] and noted it will continue to work with the QIA pursuant to the provisions of the Inuit Impact Benefit Agreement (IIBA) regarding Inuit employment.

Condition 138

> *"The Proponent is encouraged to work with the Qikiqtani Inuit Association to ensure the timely development of effective Inuit training and work-ready programs."*

Within its 2015 Annual Report to the NIRB,[77] the Proponent indicated that pursuant to the requirement of the IIBA, Baffinland and QIA Inuit Training and Employment Coordinators will be working together with the Executive and Management Committees to ensure the timely development of training and meaningful programming.

Condition 139

> "*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"*

Baffinland indicated it had submitted its labour market analysis noting that employment preference is given first to local Inuit and local non-Inuit employees before sourcing talent from rest of Nunavut and additional locations across Canada if necessary.[78] Baffinland also noted that its Inuit Human Resource Strategy includes commitments made under the Human Resource Management Plan and Inuit Impact Benefit Agreement and will cover the following four areas: Inuit employment, training and education, monitoring and reporting, Inuit content in contracts and sub-contracts.

[76] Section 3.2.1 of 2014 Annual Report to the NIRB (March 2015)
[77] Section 3.2.1 of 2014 Annual Report to the NIRB (March 2015)
[78] Appendix O2-2014 Labour Market Report of the 2014 Annual Report to the NIRB (March 2015)

Condition 142 (condition 155)

> *"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."*

Within the 2015 Annual Report to the NIRB,[79] Baffinland indicated that it continued to provide key training delivery in Inuktitut for Inuit staff onsite.

Condition 143

> *"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."*

Pursuant to Condition 143, Baffinland reported that while all communication tools are primarily focused on meeting the needs of the Project operations, internet and telephone access is available free of charge to employees in the new accommodation facility and in some common areas.[80]

Condition 144

> *"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, language abilities."*

Baffinland indicated that its job postings identify many of these requirements,[81] which are made clear to potential employees during career fair events, community meetings, and pre-screening for Work Ready training. Baffinland also noted that pre-employment requirements such as background checks, criminal record checks, and medical checks are included in the employment agreement new employees receive and sign.

Condition 145

> *"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."*

Baffinland reported on its continuous engagement with the Qikiqtaaluk Socio-Economic Monitoring Committee noting that it will address issues for women in the workplace and the associated barriers in consultation with the QIA pursuant to Section 7.1.5 of the IIBA.[82] Within its 2015 Annual Report submitted to the NIRB,[83] Baffinland specifically indicated that in 2015, approximately 9.1% of hours worked on the Project were worked by women, which was

[79] Appendix E1-Concordance to PC Conditions
[80] Appendix E1-Concordance to PC Conditions
[81] Appendix E1-Concordance to PC Conditions
[82] Appendix E1-Concordance to PC Conditions
[83] Section 4.3.3 of 2015 Annual Report to the NIRB (March 2016)

considerably less than their male counterparts in 2015. Baffinland further noted that the hours worked by Inuit women compared to Inuit males on the Project was much higher than non-Inuit women compared to non-Inuit males in 2015. Baffinland also indicated its intention to work with the Mary River Socio-Economic Monitoring Committee in 2016 to identify ways in which the potential barriers to employment for women can be effectively monitored in the future.

Condition 147 (and 151)

> *"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."*

Baffinland reported that housing is the responsibility of the Government of Nunavut and Nunavut Housing Corporation, and that it will continue to engage with these parties on housing related issues as requested. Baffinland had reported in previous years' annual reports to the NIRB that the introduction of paid employment to Nunavut based employees would help introduce employees to banking activities and programs including savings and investment accounts and possible access to mortgages and similar assistance, all of which are expected to help employees with eventual home ownership.

Condition 148

> *"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."*

Baffinland reported that food security issues are raised and discussed in the Qikiqtaaluk Socio-Economic Monitoring Committee and Mary River Socio-Economic Monitoring Committee.[84]

Condition 149 (including 169)

> *"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."*

Baffinland referenced its Closure Scenario Report submitted on September 25, 2014. The submitted report entitled "Potential Effects of a Mine Closure" included an analysis of the potential economic, social and cultural effects of closure of the Mary River project.[85] The report as submitted to the NIRB indicated that intermittent or temporary closure of the mine may result in the temporary or permanent layoff of staff employed at the Mary River project. The report stated that in the event a permanent closure of more than 45 days was to occur, the mass termination provisions of Section 14.07 (1) of the *Nunavut Labour Standards Act* would come into effect, with Baffinland providing up to 16 weeks of paid working notice to employees.

[84] Appendix E1-Concordance to PC Conditions
[85] Appendix O3-Socioeconomic Effects of Mine Closure (2014 Annual Report to the NIRB)

It was further indicated within the report that during layoff a Labour Market Partnership Program would be jointly established by Baffinland and the Government of Nunavut to assist affected employees by offering social services, including job-search assistance, resume preparations, interview skills, vocational and educational counselling and personal support in dealing with stress of job loss, as well as information on starting small businesses. In the event of a temporary layoff of less than 45 days, the report indicated that an Employee Assistance Program would be established to assist affected employees and their families on stress and financial management. With respect to the potential economic impacts, it was indicated that a temporary mine closure of up to 45 days would result in decline of employment income of more than $545,000 in the North Baffin area. The Proponent noted that Pond Inlet, Arctic Bay and Iqaluit are likely to be the most affected communities in the event of a temporary or permanent closure. [86]

Condition 150

"The Proponent will ensure the following:

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."*

Baffinland noted within its 2015 Annual Report to the NIRB that it informed pilots on the Project conditions and has addressed flight altitude requirements through contracts with flight carriers and operators.[87] Pursuant to conditions 150 (b-d), Baffinland reported that since 2014 it worked with Parks Canada to develop a trilingual brochure for kayaking safely around large ships in English, French and Inuktitut, which is located in the Pond Inlet office.

Condition 153 (including 157)

"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."

Baffinland reported that its ongoing Employee and Family Assistance Program offers all permanent employees and their dependents access to professional short-term counselling on an as need basis.[88] However, it was noted that Baffinland did not provide any specific information regarding employee's access to a mental health professional while working on site.

[86] This calculation was based on hypothetical average weekly salary of Baffinland's North Baffin employee and assumed weekly Employment Insurance payment over a temporary layoff of 45 days.
[87] Section 4.1 of 2014 Annual Report to the NIRB (March 2015)
[88] Appendix E1-Concordance to PC Conditions

Condition 154

"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."

Within its 2015 Annual Report to the NIRB, Baffinland reported that as part of its socio-economic reporting framework it will provide reliable and quantifiable data to the Government of Nunavut and Qikiqtaaluk Socio-Economic Monitoring Committee to address this condition, and will ensure that the privacy rights and expectations of its workforce is maintained.[89]

2.3.14 Human Health and Well-being

Condition 156

"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."

Baffinland reported that the llagiiktunut Nunalinnullu Pivalliajutisait Kiinaujat Fund has been established to address and mitigate potential impacts of the employee's absences from home and community.[90] While it was noted within the 2014 Annual Report that the QIA was responsible for the administration of this fund, Baffinland indicated that the activities to be supported by the fund will include community projects, youth and elder program, family and community-wide activities and other social activities as indicated in Arctle 12, Section 12.2.13 of the Inuit Impact and Benefit Agreement.

Condition 158

"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."

According to this condition, the Proponent is required to work with the GN and other parties to develop a Human Health Working Group. Within its annual reporting to the NIRB, Baffinland indicated that this condition was being addressed through the Memorandum of Understanding signed with the Department of Health-Government of Nunavut on November 2013, and that in 2015 a Safety Observation program was launched, and allowed Baffinland personnel to report on unsafe acts/conditions as well as near misses and positive reinforcements during project activities. Further information has yet to be provided in 2015 on the specific monitoring

[89] Appendix E1-Concordance to PC Conditions
[90] Appendix E1-Concordance to PC Conditions

initiatives to be adopted in Iqaluit and other North Baffin communities in order to ensure that the health and social services provided are not affected due to potential in-migration of employees.

Condition 159

> *"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."*

Baffinland indicated that it will continue to engage with the Qikiqtaaluk Socio-Economic Monitoring Committee, participate with the Mary River Socio-Economic Monitoring Committees, and that should the Government of Nunavut choose to undertake such studies as noted under this condition, it will provide the GN with the relevant data to support the studies, if available.

2.3.15 Community Infrastructure and Public Services

Condition 161

> *"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."*

Baffinland reported that senior staff meeting was held in Pond Inlet in 2014 to update the Royal Canadian Mounted Police (RCMP) on Project development;[91] however, the Security Working Group, which include the Government of Nunavut, Transport Canada, RCMP and Custom Canada did not meet in 2015 to specifically address implementation of an integrated approproach for managing Project-related demographic changes and crimes.

Condition 162

> *"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."*

Baffinland indicated that it hired two Elders in Residence on site, and that feedback from these persons will be added to Inuit Qaujimajatuqangit insight for monitoring programs and mitigation measures.[92]

Condition 163

> *"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*

[91] Appendix E1-Concordance to Project Conditions- 2014 Annual Report to the NIRB (March 2015)
[92] Appendix E1-Concordance to PC Conditions

activities, and more importantly, in order that the Proponent's management and monitoring plans continue to evolve in an informed manner."

Baffinland reported that two Elders were in residence at the the Mary River project, and working cross-shifts on a rotational schedule.[93] The Elder's job description include being a resource for Northern employees, hosting workshops, language lessons, and any other events that were considered popular with Nunavummiut and employees from the rest of Canada to date.

Condition 167

"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.

Baffinland reported that as of September 2013, it had issued a letter of invitation to the Government of Nunavut with reference to this condition, and that a response was yet to be received.[94]

Condition 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 Qikiqtani Socio-Economic Monitoring Committee."

Baffinland reported on its engagements with the Qikiqtaaluk Socio-Economic Committee and Mary River Socio-Economic Committee, and further indicated that different socio-economic monitoring priorities, including terms and conditions, will be identified, agreed upon, and reported in future reports.[95]

2.3.16 **Accidents and Malfunctions**

Condition 170

"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."

Baffinland referenced its updated TEMMP that it will monitor caribou movement within the zone of influence and will implement monitoring programs to address effects of the Tote Road including: road maintenance activities, caribou movements using snow track surveys, snow bank height monitoring, and remote motion-sensing cameras.[96] Baffinland reported that analyses for

[93] Section 4.4 of the 2015 Annual Report to the NIRB (March 2016)
[94] Appendix E1-Concordance to PC Conditions
[95] Appendix E1-Concordance to PC Conditions
[96] Section 4.5.2 of Appendix J7

caribou movement patterns would be carried out by the GN through the satellite collaring program.

Condition 173

> *"The Proponent shall employ best practices and meet all regulatory requirements during all ship-to-shore and other marine-based fuel transfer events."*

Pursuant to Condition 173, Baffinland reported that it employs best practices for all of its fuel transfer events and updates its Oil Pollution Emergency Plan annually, which is submitted to Transport Canada for review.

Condition 174

> *"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."*

Baffinland indicated that it conducted a spill training exercise in August 2015 at Milne Port, and that a Spill at Sea Response Plan was finalized with input from various stakeholders in 2015. The Proponent did not provide any indication of annual training to communities along the shipping route, nor was any mention made of equipment provided to these communities or indication of the involvement of the Canadian Coast Guard.

Condition 176

> *"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 travellers."*

Baffinland reported it has contracted expert consultants to conduct spill modeling for its Spill at Sea Response Plan, and that modeling and the plan were finalized in 2015, in consultation with the Marine Environment Working Group.

Condition 177

> *"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."*

Baffinland reported that all ships used will be contracted, and that the ship operators will be responsible for enrolling the vessel with the appropriate agencies.[97] Baffinland committed implementing Condition 177 by making it a term and condition of its charter contracts.

[97] Appendix E1-Concordance to PC Conditions

2.3.17 **Transboundary Effects**

Conditions 180-181
Within its 2015 Annual Report to the NIRB, Baffinland noted that the Makivik Corporation is an active member of the Marine Environment Working Group.[98]

3 COMPLIANCE & EFFECTS MONITORING

On May 12, 2016 the NIRB requested that authorizing agencies with a mandate or jurisdictional responsibility for the Mary River project provide comments and information with respect to compliance and effects monitoring. Specifically, comments were requested regarding the following as it pertains to compliance monitoring, and assessment undertaken by regulators and other authorizing agencies to establish whether or not the Project is being carried out within defined regulations, commitments and agreements:

a) How the authorizing agency has incorporated the terms and conditions from the Project Certificate into their permits, certificates, licences or other government approvals, where applicable;
b) A summary of any inspections conducted during the reporting period, and the results of these inspections; and
c) A summary of Baffinland's compliance status with regard to authorizations that have been issued for the Project.

The NIRB also requested comments with respect to effects monitoring, including:
a) Whether the conclusions reached by Baffinland in the *Mary River Project 2015 Annual Monitoring Report* are valid; and
b) Any areas of significance requiring further supporting information.

The following is a summary of the comments received from authorizing agencies regarding compliance and effects monitoring.

3.1 Qikiqtani Inuit Association (QIA)

- **Compliance Monitoring**

Site Visit and Inspections:

The operation of the Mary River Project on Inuit Owned Land is governed by QIA's Commercial Lease (Q13C301), Inuit Impact Benefit Agreement and Water Compensation Agreement. On June 25-30, 2015, the QIA conducted site inspection on portions of the Mary River Project that are part of the commercial lease, which was submitted by Baffinland as an appendix to its 2015 Annual Report to the NIRB.[99] The QIA reported that during the inspection of the Project area, it observed 24 items requiring action plans pertaining to fuel spills, berm condition, waste management, landfarm facility, snow dump, burned maintenance shop, ore stockpile, quarry management, and borrow source. QIA inspectors recommended that

[98] Appendix D3 – Supplemental to 2015 Annual Report submitted to the NIRB (March 2016)
[99] Appendix F2-QIA Inspection Reports and Baffinland Responses

Baffinland complete site-wide clean up annually, treat pooled water in the Mine site fuel berm, and address other site clean-up issues around the burned maintenance shop.

On July 23-28, 2015, the QIA conducted another inspection which focused on the current state of the Tote Road, assessment of the Tote Road borrow sources, and materials used in construction of the road upgrades since September 2013. QIA inspectors reported that approximately 19.5 km of the Tote Road were identified as having been upgraded and realigned, and recommended that Baffinland provide QIA notification prior to completing any construction activities on the Tote Road that differs substantially from the proposed construction drawings. QIA inspectors further recommended that a new topographic survey of the Tote Road be completed to calculate the volume of material that has been used in the Tote Road upgrades, and that new satellite imageries of the Project area should be acquired to aid in identifying any disturbed areas.

On September 18-22, 2015, the QIA conducted another inspection as a follow-up to the June 2015 inspection and July 2015 inspection, as well as follow-up on Baffinland's commitments from the 2015 Audit. QIA inspectors identified 8 items requiring action plans as pertaining to remediation of contaminated soil, food waste management, construction of a new access road to the crushing pad, construction of a new refueling station at Milne Port, old Tote Road alignment, and hazardous waste berm. QIA inspectors also identified 5 outstanding items pertaining to waste oil, berm quality, waste management, and water management structures around the Milne port ore stockpile, which still required follow-up actions pursuant to the recommendations from the June 2015 inspection. Furthermore, QIA identified 3 outstanding items to be addressed by Baffinland pertaining to the upgrade at KM 49 and 51 as well as general improvement of the Tote Road following the July 2015 inspection.

- **Effects Monitoring**

The QIA noted several information gaps within the 2015 Annual Report and specifically commented on 78 items which are summarized below under the following headings:

Climate Change

- Recommended that the Proponent develop a climate change impacts monitoring plan in consultation with regulators, QIA, and the affected communities pursuant to Condition 2 of the NIRB Project Certificate.

General Comments

- Noted the potential for crossing BG-01 to become impassable to fish in the future, and recommended that the Proponent address this concern before it impedes fish passage;
- Noted that the annual report was missing information specific to seal observation during the waterfowl surveys, and recommended that seal observation data be provided in order to assess the value of the marine monitoring program;
- Recommended that the Proponent undertake sea trials in order to determine wake characteristics at various speed and distances from the vessels used by the project pursuant to Condition 82 of the NIRB Project certificate;

- Requested that the Proponent provide additional documentations in support of its conclusion regarding compliance with the requirement of the *Fisheries Act* Authorization and as pertaining to the effects of construction noise on marine mammal presence;
- Recommended that the Proponent clarify timelines for implementation of an anti-fouling system and that it provide additional details regarding on how Inuit in impacted communities are involved in the interpretation of monitoring program results;
- Noted inconsistencies in the circulation of draft reports to the Marine Environment Working Group (MEWG) for review prior to issuance of the reports as final document, and recommended that the Proponent work with all MEWG members, regulatory agencies and other interested parties to establish a schedule for draft report submission including established deadlines;
- Recommended that the Proponent provide the relevant information on open-water shipping, and not wait until the commencement of winter shipping before making such information available;
- Requested clarification on whether or not the Proponent emission calculations as pertaining to greenhouse gas emissions have been included in the 2015 Annual Report, and recommended that the Proponent include these data including additional information on the plans for identifying and undertaking climate-change related studies and research;
- Noted that a section of the Shipping and Marine Wildlife Management Plan is outdated, and recommended that it be updated to reflect the current status and that it should identify which Appendix of the Annual Report it is in;
- Recommended that the Proponent provide clarity on the timelines and plans for updating ballast water dispersion modelling and describe the way these updated results will be used to inform the current monitoring;
- Recommended that the Proponent provide a schedule for updating environmental impact statement predictions pursuant to its commitment to update modeling as new baseline information is collected, as well as provide an update on the status of the Milne Port information manual;
- Recommended that the Proponent provide additional information on the ballast water management plan employed by charter vessels, including details on what is included in the plan and whether or not they are available for review, and how the proponent ensures that these plans are sufficient;
- Requested additional information with respect to where ballast water release occurs in relation to the sites identified in the Aquatic Invasive Species Monitoring Study Design;
- Recommended that the Proponent provide additional details on the current status of the Milne Inlet species Inventory work completed in 2014, as well as the 2015 Invasive Species Environmental Effects Monitoring, Milne Inlet, and that it provide the timeline for the draft completion;
- Recommended that the Proponent explain how effective loss of pre-project data will affect the ability to detect Project-related changes in sediment metal concentrations and as related benthic epifauna; and
- Requested clarification on whether or not the Proponent emission calculations as pertaining to GHG emissions were included in the 2015 Annual Report, and

recommended that the Proponent include these data plus additional information on the plans for identifying and undertaking climate-change related studies and research.

Socio-economic Effects

- Requested that the Proponent address terms and conditions related to monitoring of demographic changes, employee and family health and well-being, including counselling and treatment programs pursuant to conditions 122, 153, 154, 157, and 158 of the Project Certificate;
- Commented on the employee information survey administered by the Proponent and requested that the Proponent clarify whether it provided the survey in Inuktitut and English;
- Noted that data regarding in-migration and out-migration of Inuit and non-Inuit residents on the North Baffin Local Study Area is insufficient, and that data regarding employee residence, housing and migration status were not available for 2015 as required under Condition 133 of the Project Certificate;
- Recommended that that the Proponent provides the Inuit Employee Turnover rate on an annual basis and analyze whether the market for consumer goods and services across the LSA is expanding;
- Requested that the Proponent provide data for non-Inuit LSA residents and contractors employees who reside in the LSA;
- Noted that the draft Socio-economic Monitoring Plan is lacking information with respect to compliances with Conditions 135-137, 142, 155 and 156 of the Project Certificate; and
- Recommended that the Proponent include data regarding contractor employees in the Socio-Economic Monitoring Report.

Additionally, QIA included five sets of technical review comments filed to the Marine Environment Working Group as pertaining to the following reports:[100]

Marine Mammal Aerial Surveys in Eclipse Sound, Milne Inlet and Pond Inlet:

- Noted that the report was deficient on information regarding bathymetric data, estimation of narwhal abundance including the potential effects of aerial surveys on the shore-based study of narwhals at Bruce Head, and has yet to fully address concerns with respect to disturbance on narwhal population;
- Requested justification on why the Proponent excluded Tremblay Sound in its photo analysis and potential for possible biases in subjective classifications;
- Requested clarification on several items pertaining to statistical analyses/modeling; photo analyses, tide position, and mitigation and monitoring; and
- Recommended that the Proponent describe the study results for Inuit in Inuktitut and that it discuss how these data can contribute to mitigation and adaptive management.

[100] Please refer to the QIA's submission filed as "160629-08MN053-QIA Appendix to Comments-IA1E".

Shore-based monitoring of Narwhals and Vessels at Bruce Head, Milne Inlet

- Commented on the relatively small sample sizes and recommended that the Proponent improve its analyses by collecting larger samples, in addition to addressing the lack of information regarding power analysis not included in the 2015 report;
- Requested information on how to mitigate shore-based observer limitation, and recommended that the Proponent improve the frequency of aerial surveys as a complementary data collection and monitoring tool;
- Requested clarification on how results generated from the monitoring program would to be utilized to inform mitigation and adaptive management, as well as requiring reporting on changes in behavior of narwhals as a result of vessel presence; and
- Recommended that the Proponent presents the study results for Inuit in Inuktitut.

Marine Environmental Effects Monitoring Program (MEEMP) Milne Inlet Marine Ecosystem

- Noted the report was lacking information regarding availability of the Automatic Identification System data;
- Noted specific water quality guidelines and exceedances of Canadian Council of Minister of the Environment (CCME) guideline values, and further requested information as pertaining to content of metals and statistical analyses of hydrocarbon in sediment samples from the vicinity of the ore dock; and
- Requested information pertaining to classification of marine vegetation and video data for determination of epifaunal abundance.

Report on 2015 Ship-Based Observer Program

- Noted the short length of transits and the inability for observers to work from a dedicated observation point and the potential for this to affect observations, as well as the potential for limited field of view to cause observers to miss wildlife.

Acoustic Monitoring Near Koluktoo Bay, Milne Inlet

- Noted report missing information specific to the integration of marine mammal sound data with other data such as Bruce Head and aerial survey observations; and
- Noted that the report was lacking a detailed discussion of how these data can contribute to mitigation and adaptive management.

Summary of Baffinland's Response to Comments Received from QIA:

- With respect to the potential for crossing BG-01 to become impassable to fish in the future, Baffinland indicated that an action plan is under development for improved Tote Road and crossing maintenance.
- In response to implementation of an anti-fouling system, Baffinland indicated that a revised SMWMP would be submitted which would clarify the anti-fouling system to be used for commercial vessels used at present and the future custom-built vessels.
- Regarding the inconsistencies in the circulation of draft reports to MEWG prior to issuance of the finalized documents, Baffinland indicated that it will work with the MEWG to establish a schedule for draft report submission and review so that feedback can be sought from the MEWG prior to the MEWG spring meeting and submission of the annual report to the NIRB.

- With respect to involving impact communities in the interpretation of monitoring program results, Baffinland clarified that it had involved the Mittimatalik Hunters and Trappers Organization in Pond Inlet, and will include discussion of expanded community-based monitoring programs in the fall 2015 MEWG meeting, and look for other opportunities for inclusion of local communities interpreting monitoring results.
- Regarding updating ballast water dispersion modeling, Baffinland indicated that the empirical model was completed to address the request to re-run model with newly available data, to assess the effect of ice cover on ballast water exchange, and also to address ballast water exchange at proposed trans-shipment sites.
- In response to monitoring of demographic changes including employee and family health and well-being, Baffinland indicated it had addressed this condition through an "Elder-in-residence" to provide encouragement and non-professional counselling on an as-needed basis and implemented an Employee and Family Assistance Program, which offers all permanent employees and their dependents professional short-term counselling on as-needed basis.
- Regarding in-migration and out-migration of Inuit and non-Inuit residents on the North Baffin Local Study Area and data insufficiency pertaining to employee residence, housing and migration status pursuant to Condition 133 of the Project Certificate, Baffinland indicated that it will address this data gap in the 2016 socio-economic monitoring report. In addition, data collected through an upcoming survey will provide additional information on employee migration.

3.2 Indigenous and Northern Affairs Canada (INAC)

- **Permitting and Regulatory Comments**

INAC noted within its comments to the NIRB regarding Baffinland's 2015 Annual Report, that in July 2007 it issued Land Use Permit No. N2007F0004 to the Proponent for development of a portion of the Tote Road not located on Inuit Owned Land; however, as the Permit for the Tote Road was issued prior to the issuance of the NIRB Project Certificate, INAC reported it was not practicable to incorporate terms and conditions into the permit. INAC also indicated that Land Use Permit No. N2014Q0016 and Quarrying Permit for the Tote Road, and permit for Steeensby and Milne Inlet No. N2014C0013, as well as a Land Lease 47H/16-1-2), and Land Use Permit No. N2014X0012 for the Milne Foreshore area were all issued in 2014.

INAC also reported that in 2015, Baffinland's Project activities and monitoring were conducted under the following water licences: Type "A" Water Licence No. 2AM-MRY1325, the new exploration Type "B" Water Licence No. 2BE-MRY1421, and the new construction Type "B" Water Licence No. 8BC-MRY1416.

- **Compliance Monitoring**

Water Quality Inspections

INAC reported that from March 9 to 12, 2015, its Water Resource Officers conducted site inspections at the Mary River Mine site, the Tote Road and Milne Port area sites for compliance with the Type "A" Water Licence No. 2AM-MRY1325 as issued by the Nunavut Water

Board.[101] INAC reported some concerns related to drainage, material storage, and mitigation measures, but noted no major issues of non-compliance.

From June 16 to 17, 2015, a second inspection by INAC inspectors was conducted to observe the seasonal changes and site conditions related to freshet, and to determine compliance with the previous water licence inspection conducted in March 2015. While no major issues of non-compliance were reported, INAC noted concerns related to water management structures, culvert/bridges, mitigation measures, and material storage that was not apparent during the winter months. In addition, the inspection report specifically noted that the deposition of large quantities of snow containing high levels of sediments and debris near water was unacceptable, and further identified erosion and sedimentation as other major concerns during the inspection. INAC recommended that Baffinland implement best practices and sediment and erosion control measures prior to, and during, construction at km 76.5 of the Tote Road to ensure that flowing water was properly channeled through a berm into a tributary.

From July 30 to August 3, 2015, another water licence inspection was conducted around the Mary River Site, the Tote Road, the Milne Port Area, Steensby Inlet, and Mid-Rail Camp. No major issues of non-compliance were found on site; however, concerns were identified related to water management structures, erosion/sediment, mitigation measures, and storage and hazardous waste. In addition, INAC inspectors identified localized sections of the Tote Road that were prone to sloughing/soil sliding down slopes, excessive wetness, and silt loading as well as significant levels of dust created from vehicular traffic on the Tote Road which is deposited into nearby waters. INAC also noted that there was no installation of culverts or use of armor stone in ditches that receive high levels of flow prior to freshet, and that diversion ditches were not installed around the ore stockpile pad at Milne Inlet. INAC reported that Baffin land committed to using drainages and erosion protection measures prior to freshet in 2016.

From October 6 to 8, 2015, the fourth water licence inspection was conducted at the Mary River site, the Tote Road, and the Milne Port area. No major issues of non-compliance were identified on site during the inspection, only minor concerns regarding waste water, water management structures, erosion/sediment, mitigation measures, and fuel spills. In addition, significant erosion was observed at the Jetty at Camp Lake; however, Baffinland submitted a preliminary action plan to address this concern. INAC also reported that that 22 of the 30 spills reported at Mary River involved sewage, and that by the end of 2015, Baffinland reported 27 untreated sewage spills out of a total of 42 spills. From December 6-8, 2015, INAC visited the Mary River site for the purpose of completing an inspection related to water licence 2AM-MRY1325 and other INAC territorial Land permits; however due to inclement weather, the inspection was not completed on site, and therefore no inspection report was generated.

- **Incorporation of Terms and Conditions into INAC Authorizations**

INAC also reported specifically on how it had incorporated Conditions from the Project Certificate into its licensing for various aspects of the Mary River Project. The Conditions and where it was incorporated in the INAC licence (N2014Q0016) are included in Table 1 below.

[101] Appendices G2-G6 INAC Inspection Reports and Baffinland Responses

Table 1: Incorporation of Conditions into INAC Authorizations

Condition	***Subject***	***INAC Document and reference***
Condition 10	Dust Management and Monitoring Plan	Land Use Permit N2014Q0016 Part 31 (1) (m), 48
Condition 11	Incineration Management Plan	Part F, Item 8 as pertaining to the incineration and disposal plan for waste ash in barrels
Condition 14	Noise and vibration	Part 31 (1) (m) 49 of Land Use Permit N2014Q0016
Condition 16	Water Infrastructure	Part D, which require that engineering drawings be provided upon request.
Conditions 17, 18, and 24	Effluents and Mine Pit Lake	Requirements for monitoring effluent and fill time for mine pit lake were incorporated into Parts E and F, including Item 3 and I of its authorization.
Condition 19	Culverts	incorporated into Parts B, D, E and I
Condition 47	Aquatic Effects	Part E, Item 23, and Part 31 (1) (f) 16 of the Land Use Permit
Condition 20	Blasting Management Plan and Aquatic Effects Monitoring	Part E, item 24; Part I, item 23 as well as Part D, Item 18g of its authorization
Condition 21	Blasting Management Plan	Part I of its authorization
Condition 44	Aquatic Effects Monitoring	partially incorporated as Part E, Item 24, which require that the Licensee submit a Blasting Management Plan and a Construction Monitoring Report (Part D, Item 18) to ensure such measures are implemented
Condition 25	Geotechnical Investigations	Part D, Item 19 and Part I, Item 12 for water infrastructure
Condition 29	Engineering Drawings	Part D, Item 2 and Part E, Item 23
Condition 26	Erosion Management Plan	Part 31 (1) (m) 50, of the Land Use Permit as well as Parts D, E, and F
Condition 28	Effect of Project on Permafrost	effects of the Project on the permafrost along the railway as well as other Project affected areas as Part D, Item 11 of its authorization
Condition 30	Quarry Operations and Management Plans and Project Footprint	Part D, Item 7, and 31 (1) (m) 51 of the Land Use Permit, and that the Permittee shall ensure that the Quarry Management Plan is developed and submitted to the Land Administration office in Iqaluit
Conditions 39 and 40	Revegetation Program	into Part J, Items 10 and 11 of its authorization, and noted there is no requirement to use test plots for reseeding and replanting

Condition	***Subject***	***INAC Document and reference***
Conditions 41 and 42	Buffer Zone	Part D (Item 13 and14 and as Part E, F and H)
Condition 43	Silt Control	Part D, Item 2 to its authorization to address this requirement
Condition 46	Runoff	Part F of its authorization
Condition 53	Caribou Mortalities	Parts 31 (1) (h) 36-38, and 31 (1) (m) 52 of the Land Use Per
Conditionon 64	Environmental Protection Plan	Part 31 (1) (g) 27, of the Land Use Permit, and Part F, Item 7 of the Water Licence, authorizes the incineration of all acceptable food waste.
Condition 92	Oil Spill Response	Part H, Item 5, and Part 31 (1) (g) 30, 31 of the Land Use Permit
Conditions 129, 131, 133, 145, 148, 154, 159, 165, 168 and 169	Socio-Economic Monitoring	INAC reported that it continues to work collaboratively with Baffinland and the Government of Nunavut, including the different working groups to develop a socio-economic monitoring program

- **Effects Monitoring**

INAC provided several comments with respect to effects monitoring, and questioned the validity of Baffinland's conclusions regarding the following terms and conditions as outlined below:

Noise and Vibration Monitoring

INAC commented on the occasional short-term exceedances reported by Baffinland during the winter, but noted it was unclear whether summer monitoring occurred or why sampling did not occur in the summer months.

Caribou Mortality

INAC noted that the Caribou Disturbance Decision Tree within the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) did not consider the possible scenario of darkness or low visibility where caribou would be more difficult to observe. INAC also noted that several snow bank measurements exceeded the height recommendation of 1 metre, and as such these exceedances may present barriers to caribou movement and increase the likelihood of caribou mortality as a result of decreased driver visibility.

Project Infrastructure in Watercourses

INAC referenced page 66 of the 2015 Annual Report noting that one (1) culvert at CV049 was obstructed with snow/ice, and that 11 of 34 fish-bearing crossings had minor issues that will require monitoring and potentially mitigation, including the crossing at BG-01 that may become impassable in the future.

Treatment of Effluent Discharge

INAC referenced page 29 and Section 7.4.3 of the 2015 Annual Report noting several exceedances regarding water quality contaminant concentration within Mine site lakes and streams above the established water quality guidelines.

3.3 Government of Nunavut (GN)

- **Compliance Monitoring**

The GN did not report any concerns with respect to compliance monitoring associated with the Mary River Project for 2015.

- **Effects Monitoring**

The GN provided general comments with respect to effects monitoring, and recommended the following as outlined below:

Terrestrial Wildlife Monitoring

- Recommended that the Proponent contribute to the regional monitoring efforts (distribution of tissue sample kits, and providing support for aerial caribou surveys) led by the GN and commented that this would be a far more efficient way to conduct caribou monitoring.

Polar Bear monitoring

- Recommended that the Shipping and Marine Wildlife Management Plan be updated to include methodology that will provide reliable baseline and monitoring information for polar bears on the sub-population(s) scale that has the potential to be impacted by the Project.

Vegetation Monitoring

- Recommended that the Proponent continue consultation and assessment of vegetation monitoring programs' efficacy within the existing TEWG forum and that it makes an assessment of whether revisions to vegetation monitoring programs have adequately addressed GN and NIRB concerns.

Summary of Baffinland's Response to Comments Received from GN:[102]

- With respect to terrestrial wildlife monitoring, Baffinland responded that it will support the GN's fall 2016 aerial survey, and would be willing to distribute sample kits to hunters that travel through the site when the GN provides those kits to Baffinland.
- Regarding Polar Bear monitoring, Baffinland indicated it will follow up with the GN and the MEWG on its recommendation to learn more about potential collaboration with the GN-Department of Environment and assess potential changes to the SMWMP.
- In response to vegetation monitoring, Baffinland indicated that its vegetation monitoring program has been revised as per suggestion by the TEWG, and that an update on the vegetation monitoring will be provided in the 2016 annual report.

[102] Please refer to: 160821-08MN053-BIMC Ltr NIRB Re Response to Annual Report Comments-OT5E

3.4 Environment and Climate Change Canada (ECCC)

- **Compliance Monitoring**

Site Visit and Inspections

ECCC reported that on July 10, 2015, Baffinland's Mary River Project became subject to the Metal Mining Effluent Regulation (MMER) under the *Fisheries Act* after discharging more than 50 cubic metres of effluent per day from a Mine waste-rock settling pond. ECCC also reported that as required under sections 8 and 9 of the MMER, Baffinland has provided ECCC with the relevant Mine identification information and details regarding the Mine's final discharge points. While ECCC indicated that Baffinland submitted its 3rd and 4th quarter reports as per the MMER requirement, no non-compliance issues were identified during the review of those reports.

ECCC also noted it has not issued any authorizations to Baffinland, and that no site inspections were conducted at the Mary River site in 2015.

- **Effects Monitoring**

In commenting on Baffinland's 2015 Annual Report, EC noted some issues regarding effects monitoring, which includes the following items:

Results for Water and Sediment Quality

- Noted the need for a summary of baseline data to support how water quality and sediment quality differ between previous year's data and the 2015 sampling period, and recommended that the MEEMP report should be appropriately referenced;
- Noted that the water quality sampling program was only conducted at 4 sampling locations in August of 2015 (August 11, 19 and 30), and specifically noted that only a single duplicate QA/QC sample (August 11) was collected during these three sampling times, and recommended that QA/QC sampling should be completed with each sampling event;
- Noted two different sampling methods for fish sampling, and recommended that the Proponent provide some discussion on how the use of the two methods, which may preferentially select for different fish, could bias the understanding of the population and the fish species which are present Milne Inlet; and
- Noted the similarities in the maximum spring tides reported for Milne Inlet and the ASL study and questioned whether monitoring activity is timed to be at a comparable tide stage for each year or what effects does the tide have on the field monitoring.

Summary of Baffinland's Response to Comments Received from ECCC:

- With respect to the results for water and sediment quality, Baffinland responded that the water quality program for 2015 was focused on the runoff discharge from the port infrastructure and that all previous water quality data were collected from a variety of locations to describe baseline conditions at Milne Port and as such are directly comparable;
- Regarding the sampling methods for fish and mobile epifauna, Baffinland indicated that the two methods was previously used as they have different catchability and target

different habitats and species, and as such considered to help fully describe the fish community at Milne Port. In addition, Baffinland indicated that the baseline sampling and EEM monitoring has adequately characterized the fish community at Milne Inlet; and

- In response to the monitoring of spring tides, Baffinland indicated that tidal cycle has not been considered in the Environmental Effects Monitoring sampling strategy, and that the timing of the sampling to coincide with the tidal cycle would severely constrain the sampling activities and program.

3.5 Department of Fisheries and Oceans (DFO)

- **Compliance Monitoring**

DFO Site Visit and Inspections

On September 1 to 3, 2015, DFO conducted a compliance monitoring site visit at selected Tote Road crossings and around the Milne Inlet ore dock. During observation of the Tote Road crossing, DFO inspectors noted that four (4) bridge structures had been installed as proposed, and that no adverse impacts to fish and fish habitat was observed. DFO inspectors also reported that the removal of the existing seacan crossings has been deferred until the end of December 2015. While at the Milne Inlet ore dock, DFO inspectors noted that the ore dock construction and associated offsetting measures had been completed and with no compliance issues identified. Based on the observations from the site visit, and the review of Baffinland's 2015 Annual Report, DFO concluded that Baffinland was in compliance with conditions of the *Fisheries Act* authorization.

- **Effects Monitoring**

Within its comment submission to the NIRB, DFO reported concerns regarding the 2015 Annual Report noting the following items:

<u>Appendix N2-Aquatic Invasive Species</u>

- Requested information regarding the qualifications and experience of the two (2) taxonomists contracted to do the identification work for zooplankton and benthic invertebrates;
- Requested information on the specific numbers of individuals that were identified for each sample, and that it provide clarification to the abundance of the uncertain taxa; and
- Requested clarification on how uncertain taxa were included in the analyses, the impact this inclusion may have on the findings, and clarification on whether or not the analyses were run to include every unidentified individual or excluded all individual that were not identified at the species level.

<u>Appendix N6-Aerial Marine Mammal Monitoring Report</u>

- Requested clarification on whether there is any plan to assess the proportion of calves or juveniles from the photos, and that the Proponent confirm whether or not double counts were used or clarify whether only two or more experienced observers in the front were used; and

- Noted lack of clarity on which observations are used, the statistical methodology utilized in the report and noted issues with the visual model, negative prediction of narwhal density, collinearity, photo analysis, measure of dispersion and statistical programs utilized.

Appendix N7-Shore-based Marine Mammal Monitoring Report

- Requested that the Proponent provide an example of the datasheet used in the field;
- Requested that the Proponent indicate whether there are plans to combine the shore-based observation data with the acoustic data; and
- Requested that the Proponent redefine the terms *undisturbed*, *entering*, and *existing* in relation to received noised emitted by ship cargo and the effects on narwhals, and that it clarify the role played by hunting outside of the study area on narwhal presence and behavior including model prediction of negative number of narwhals and choice of size of the moving average.

Appendix N9- Marine Acoustic Monitoring Report

- Noted lack of assurance whether the calibration and equalization of the hydrophone response were adequate;
- Recommended that the Proponent undertake a comparison with other environment in describing the underwater soundscape, and further noted that the report was missing details on low-frequency strum and flow noise that often contaminates low-frequency measures and that it provide information on how this was handled in data processing;
- Requested that the dynamic range of the recording system be provided for the two (2) hydrophones of the instruments;
- Noted that the narwhal visual observation and call analysis as presented in the report did not map the noise radiated from the ships at different frequencies and what level and frequency trigged the behavioral reactions; and
- Noted that the report was missing details regarding the third-octave levels between 10 hertz (Hz) and 32 Hz, and that information regarding ship speed should be included.

Summary of Baffinland's Response to Comments Received from DFO:

- With respect to aquatic invasive species, Baffinland indicated that the taxonomist used for benthic and zooplankton identification are very experienced with biota from the north Atlantic and eastern Canadian Arctic; and that the number of individual counted during the sampling varied by sample and by depth strata;
- Regarding aerial marine mammal monitoring report, Baffinland indicated that due to time constraints, a draft version of the report was not provided to the MEWG for review, and that the Proponent will follow-up with DFO and the MEWG, and incorporate comments received into a revised draft for review by the MEWG prior to finalization of the report; and
- With respect to the Shore-based Marine Mammal Monitoring Report, Baffinland indicated that it will follow-up with DFO and the MEWG on this monitoring plan, and noted that an integration report will be prepared in 2016 based on 2015 and earlier monitoring activities.

3.6 Natural Resources Canada (NRCan)

Navigation Protection & Marine Safety and Security

NRCan commented on Baffinland's 2015 Annual Report noting that the Explosive Factory Licence F76068 issued to Baffinland`s contractor, Dyno Noble had satisfied the requirements of the Explosive Act and Regulations as outlined for the amended Mary River Project Certificate No. 005.

3.7 Transport Canada (TC)

Navigation Protection & Marine Safety and Security

TC noted in its comments to the NIRB regarding Baffinland's 2015 Annual Report that Baffinland remains compliant with all required approvals within the *Navigable Waters Protection Act* for construction conducted to date. TC indicated that because Baffinland received an approved Milne Inlet Marine Facility Security Plan and an Oil Pollution Emergency Plan, which were reviewed by TC, it is satisfied that the Proponent has met the regulatory conditions that fall within TC's mandate, and as outlined in the amended Mary River Project Certificate No.005.

3.8 World Wildlife Fund (WWF)

WWF provided general comments regarding the 2015 Annual Report, which focused on two (2) major items: the NIRB monitoring program (and adaptive management), and the designation of Lancaster Sound National Marine Conservation Area. However, with respect to effects monitoring, WWF reported concerns regarding the 2015 Annual Report noting the following items:

Updates to Monitoring Commitments

- Noted the Proponent's plan to defer further acoustic surveying to summer 2017, and alternate option to direct efforts towards completing the 2015 report and to possibly prepare an integration report for release in the fall of 2016.

Review of Data and Trends to Inform Program Changes

- Provided feedback on the Proponent's marine mammal monitoring protocol, and requested clarification on if and how the protocol has been implemented to date, as well as whether the Marine Environmental Working Group or other parties have provided contribution or advice to the Proponent regarding the ongoing monitoring program and its results.

Marine Environment Working Group

- Noted that after participating to provide feedback on various study designs, the WWF has not been provided an opportunity to consider feedback on the subsequent results of the monitoring programs and therefore does not support the Proponent's conclusion that it has meaningful engagement with the Marine Environment Working Group.

Modification to Terrestrial Wildlife Monitoring

- Noted that the Proponent has made modifications to the terrestrial wildlife monitoring activities, such as foregoing the hunter harvest study and carnivore surveying that were

expected to be carried out as requirement of the NIRB Project Certificate, with limited engagement on the changes before-hand;

- Noted that this lack of engagement with all parties, and especially the Terrestrial Environment Working Group on the studies being conducted as part of the Terrestrial Environment Mitigation and Monitoring Plan, has limited public awareness and transparency of the changes; and
- Requested that the Proponent maintain consistency in its observation methods for caribou surveys between years, especially on height of land surveys, and obtain both scientific opinion and Inuit Qaujimajatuqangit on the appropriate timing and duration of these caribou surveys.

Snow Track Survey

- Requested that the Proponent clarify why snow track surveys were undertaken only during one day and via truck instead of by snow machine during early winter and spring as committed to in its Final Environmental Impact Statement and Terrestrial Environment Mitigation and Monitoring Plan submissions.

Summary of Baffinland's Response to Comments Received from WWF:

- With respect to updates to monitoring commitments, Baffinland indicated that an integration report will be prepared in 2016 based on 2015 and earlier monitoring activities, and will include recommendations for ongoing monitoring and adaptive management;
- Baffinland noted that the integration report was discussed briefly on the MEWG's August 4, 2016 meeting, and that Baffinland has committed to discussing content of the integration report with the MEWG;
- Regarding the Marine Environment Working Group, Baffinland indicated its plans to establish a schedule for draft report submission and review with the MEWG at its next meeting, and suggested that draft monitoring reports will be issued early enough that feedback can be sought from the MEWG prior to the MEWG spring meeting and the submission of the NIRB Annual report on March 31;
- Regarding modification to the Terrestrial Wildlife Monitoring, Baffinland indicated that the TEWG has been engaged in all aspects of terrestrial environment mitigation and monitoring and that all changes to field programs are discussed during TEWG meetings and noted in annual reports, which are public when submitted to NIRB.
- With respect to Snow Track Survey, Baffinland indicated that the change in methods were discussed in the 2014 Terrestrial Environment Annual Monitoring Report (Section 4.4.2), and that sparse results and sampling efforts have been discussed at several TEWG meetings and details provided in annual reports beginning in 2014.

3.9 NIRB Review of Baffinland's 2015 Annual Report

The NIRB noted several information gaps which bring into question the validity of the conclusion reached by Baffinland in the 2015 Monitoring Report. The following summarize the specific issues noted in NIRB's review of the 2015 Annual Report:

Climate Monitoring, including Shoreline Effects and Sediment Redistribution

Baffinland had noted within its 2013, 2014 and 2015 annual reports to the NIRB that the Canadian Hydrographic Service had installed a tidal gauge at Milne Port since 2014 pursuant to conditions 1 and 83 of the Project Certificate, but has been unable to retrieve data from the gauge at Milne Port. The Board notes that since the objective of these terms and condition is to provide timely feedback on the impacts that climate change might be having on port facilities, it is necessary for Baffinland to clearly address within the annual reporting why it has not fulfilled these conditions. This report should note any specific site condition or logistic challenges that may be contributing to its inability to retrieve data and how it plans to address this in subsequent monitoring periods in order to inform climate related effects monitoring.

Quarry Management Plans for Q18 and P1

Pursuant to Condition 20, Baffinland noted that the effects of explosive residues and related by-products were being monitored through the Surveillance Network Program and Aquatic Effects Monitoring Program. Baffinland also indicated that in 2015, the aquatic effects monitoring in the Mine site area identified minor Project-related changes in water and sediment quality of Camp Lake, and increased productivity likely due to mine-related nitrate inputs from the mine and quarry operations. While Baffinland referenced the submissions of a quarry management plan and blasting management plans for Q7, Q11, Q18, Q19, Km 104, Km 97, Km 2, D1Q1, D1Q2, Q1, and QMR2, the Board notes that blasting management plans for two (2) quarry sites namely Q18 and P1 were missing from the 2015 submission. The Board considers the submission of these documents important in order to monitor the Proponent's commitment to contain sources of contamination at quarry sites.

Potential Suspension of Sulphur Dioxide Monitoring

The Proponent is required pursuant to Condition 8 of the Project Certificate to ensure that SO_2 and NO_2 emissions remain within predicted levels at Mine site, Milne Port, and at Steensby Port, and where applicable, within limits established by all applicable guidelines and regulations. Baffinland referenced the submission of its 2015 Gaseous Emission Monitoring Report (Appendix K1) as addressing compliance with this condition, and noted that emission monitoring for SO_2 and NO_2 were undertaken in each quarter of 2015 at Milne Port and Mine site respectively. At both sites, SO_2 levels have been low throughout the year and do not exceed the 1-hour or 24-hour limits. The NIRB further notes that the referenced report contains three (3) recommendations with respect to the ongoing air quality program, with a recommendation specifically stating that Baffinland "discontinue all continuous SO_2 monitoring at both sites". The Board requests that any contemplated changes to the ongoing air quality monitoring program, including rationale for the potential suspension of any monitoring parameters (SO_2 and NO_2) must be provided to the NIRB and other authorizing agencies prior to terminating such monitoring activities.

Improvement to Fish Health Monitoring

Baffinland indicated on page 62 of the 2015 Annual Reporting to the NIRB that in 2015, the Core Receiving Environment Monitoring Program (CREMP) approach was transitioned from a characterization-based study to an effects-based approach. This approach incorporated standard environmental effects monitoring techniques to provide a stronger basis for the evaluation of any mine-related effects within aquatic systems that potentially receive mine deposits. The Board

also notes that the 2015 Marine Environmental Effects Monitoring Plan indicated that Baffinland would undertake fish health assessment for finfish species, sculpins and arctic char, and would integrate monitoring targets that would give information regarding specie abundance, fish health including morphometric (length, weight, sex, age, and body condition) and contaminant burden. In addition, Baffinland concluded within the 2015 Annual Report to the NIRB, that larger and faster growing juvenile arctic char that were found at Camp Lake compared to the reference lake in 2015, and that no ecologically meaningful differences in the health of juvenile or adult arctic char were indicated between the 2015 and baseline periods at Camp Lake.

The NIRB notes that the conclusion of "no meaningful difference in health" of fish was not fully substantiated anywhere in the Annual Report including in the MEEMP report, and that Baffinland only utilized morphometric (length, size, weight and age) and metal bioaccumulation trends in ascertaining fish health from the control and impact areas. The NIRB also notes that other key biochemical parameters which are important indicators of fish health have not been included in the CREMP, which brings into question the validity of the conclusion of no effects on arctic char population. One way to potentially overcome this challenge is for Baffinland to monitor and compare baseline biochemical changes and sublethal effects using markers of oxidative stress, antioxidant enzyme activities and histopathology of gill, liver and gonads in its determination of mine-related effects on fish population. This is particularly important given that the 2015 CREMP report indicated that iron concentration were elevated at the Camp Lake system (CLT1); the Board notes that excessive iron uptake can induce cellular injuries, oxidative stress, lipid peroxidation and alteration in antioxidant enzyme activities and can threaten fish health at the population level. The NIRB believes that the inclusion of some of these biochemical parameters into the ongoing monitoring program will provide an improved understanding of fish health population within the local study area.

Terrain Stability

Regarding permafrost degradation and identification of sensitive landforms pursuant to conditions 25 and 28 of the Project Certificate, Baffinland indicated in its 2015 Annual Report to the NIRB that additional geotechnical investigations were undertaken in 2015 at Milne Port as well as in other site areas, and that there was no observable site condition that would represent concerns regarding dyke stability in the project areas were identified. The Board also notes that Baffinland had previously reported within in its 2013 Annual Report to the NIRB that in September 2014, the Tote Road and borrow sources were subject to a geotechnical inspections which reported that several of the borrow pits had been excavated into thaw-sensitive or ice-rich soils. Of the 101 locations investigated along the Tote Road, seven (7) % of sites were ranked as requiring a higher priority for stabilization. The NIRB notes that Baffinland's 2015 Annual Monitoring Report as submitted to the NIRB does not contain any specific details or information regarding what measures have been undertaken since 2014 to address the terrain issues noted by the geotechnical experts in order to comply with conditions 25 and 28 of the Project Certificate.

Suspension of Terrestrial Environmental Monitoring Program

On page 73 of the 2015 Terrestrial Environment Annual Monitoring Report (Appendix L2), Baffinland reported that it discontinued the vegetation abundance monitoring, vegetation and soil base metals sampling, exotic invasive plant species monitoring, den surveys, and roadside waterfowl survey in 2015. While Baffinland indicated its rationale within the 2015 Annual

Terrestrial Environment Monitoring Report and noted that the decision to discontinue these programs was informed through discussion with the TEWG, the Board notes it was unaware of these changes to the monitoring program and reiterates the need for Baffinland to communicate the rationale to the NIRB and other authorizing agencies including affected communities prior to discontinuing such monitoring activities.

Hydrodynamic modelling in the Milne Inlet Port area

Baffinland indicated within its Shipping and Marine Wildlife Management Plan that it has developed a baseline sampling program to provide effective monitoring of physical and chemical effects of ballast water discharges, sewage outfall, and bottom scour by ship props pursuant to conditions 83(a) through 87 of the Project Certificate.[103] Baffinland further noted within the aforementioned Plan that the collected data will be used as input to a hydrodynamic model to monitor sediment re-distribution at the Milne port site, and for ballast water dispersion modeling. However, the Board notes that the modeling results which are intended to be used to inform the marine water and sediment quality monitoring and mitigation programs have yet to be submitted by the Baffinland for the monitoring period. In addition, Baffinland`s 2015 Annual Monitoring Report did not provide any evidence of when and how it utilized more detailed bathymetry from Milne Inlet to model the anticipated ballast water discharges from ore carriers prior to commercial shipment in 2015, and to what extent the results from modeling was used to update ballast water discharge impact predictions, including when and how additional sampling was undertaken to validate the model and associated monitoring plan.

Accidents and Malfunctions

Pursuant to Condition 174, Baffinland and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to improve response times in the event of a spill. Baffinland indicated within its 2015 Annual Monitoring Report to the NIRB that it conducted a spill training exercise in August 2015 at Milne Port, and that a Spill at Sea Response Plan was finalized with input from various stakeholders in 2015. However, the Board notes that the Proponent did not provide any information regarding conducting annual training to communities along the shipping route, nor was any mention made of equipment provided to these communities or indication of the involvement of the Canadian Coast Guard or affected communities.

Adaptive Strategies for Dust Deposition

The NIRB notes that the current version of the Roads Management Plan (Appendix J9, Part 1) submitted by Baffinland as part of its 2015 Annual Report to the Board was missing the referenced appendix entitled “Attachment A-Dust Management Protocol” and other appendices (B through D), as these referenced documents (Appendix A through D of Appendix J) were blank and missing content information. In addition, the NIRB noted that the Dust Management Protocol for the Mary River Project Roads as submitted as Part 2 of the 2015 Road Management Plan has yet to be updated with information that reflects the Board’s 2015 recommendation to specify within an updated Plan which mitigation measures and adaptive management measures would be implemented in the event of high threshold level of dust deposition, exceeding levels predicted in the FEIS or FEIS Addendum.

[103] Section 7.5.2 of 2016 Annual Report to the NIRB (March 2016) and Section 6.3 of Appendix J10

3.10 NIRB Site Visit- July 2016

As an integrated part of the NIRB's continuous monitoring program of the Project, the NIRB's Monitoring Officer visited the Mary River site between July 13 and 14, 2016. For a comprehensive review of the NIRB's 2016 site visit and observations, please refer to the NIRB's 2016 Mary River Site Visit Report, included as Appendix I of this report.

Once at the Mary River site, a tour around the Mine site was undertaken, which included observational visits to the following locations:

- Quarry area (D1Q2/QMR2),
- Crusher,
- Explosive magazine area,
- Deposit No. 1,
- Jetty proximal area including waste rock storage area,
- Incinerator,
- Former bladder farm,
- Sewage outfall area, and
- Landfill.

On Thursday, July 14, 2016 the tour around the Mine site continued, which also included a helicopter-assisted travel to the Steensby Inlet as well to Milne Inlet, and Bruce Head. While at Milne Inlet, the Monitoring Officer made observational visits to the following locations:

- Ore stockpile area,
- Incinerator,
- fuel tank farm,
- Landfarm,
- Settling pond area,
- Conveyor system,
- Docking area, and
- Accommodation facilities.

Upon completion of the tour around Milne Inlet, the condition of the Milne Inlet Tote Road was observed by truck. Due to the ongoing development of the Mary River project, it was noted that many terms and conditions as contained within the NIRB Project Certificate No. 005 may not be applicable for this monitoring period and/or have not yet been thoroughly implemented at this time by Baffinland. In order to meet the requirements of the Project Certificate terms and conditions, and to ensure that potential adverse impacts to the environment are adequately mitigated, the NIRB has identified several issues that require follow-up and corrective action. The following outline the major findings from the site visit:

Used Tires

During the site visit, used tires appear to be a significant waste stream across the Project sites, particularly around the mine site and Mile Port. While the NIRB Project Certificate does not have any specific terms and conditions for addressing this particular waste stream; the management measures committed to by Baffinland in both the Final Environmental Impact Statement and the Environmental Protection Plan which stated used tires were expected to be

stockpiled for shipment offsite (e.g., re-treading, reuse, or disposal). Alternatively, in 2011 as part of the design of the Mine Site Landfill/Landfarm Site Layout Plan submitted to the Nunavut Water Board tires would be disposed of on-site in a segregated area within the landfill facility. During the 2016 site visit, a designated used tire storage area was not found within the landfill and used tires were found to be inconsistently disposed of at different locations across the Project sites visited.

Waste Landfill

Although there are no specific terms and conditions in the NIRB Project Certificate regarding the regular operation of the landfill, general waste management practices at the Project site were expected to be consistent with best practices. The current version of the Environmental Protection Plan as submitted by Baffinland to the NIRB as part of the 2015 Annual Monitoring Report incorporates provisions for landfill facility operations, monitoring, inspection, and maintenance. During the NIRB site visit, it was observed that waste materials contained within the landfill were appropriately covered with soils, although it is noted that the use of soil covers increased the height of the landfill as compared to previous observations.

Further, the Monitoring Officer observed further deterioration to the protective mesh and incomplete fencing of the landfill footprint which raises concerns with respect to the potential dispersal of waste materials off site. No significant dispersal of waste materials offsite was noted at the time of the visit. The NIRB's 2014 Recommendation 11 required a follow up from Baffinland due to the deterioration of the protective mesh around the landfill, to which Baffinland responded that due to the expanding footprint of the landfill, and the strong winds often observed, the fence required periodic relocation, maintenance, and repair which was undertaken on a regular basis. Baffinland further indicated to the Board that overall, the effectiveness of the current fence type and configuration was deemed to be acceptable while it examining potential alternative fence types and designs based on its operational experience to date.

The NIRB's 2015 Recommendation 17 required Baffinland to provide description of how it has incorporated the recommendation from Indigenous and Northern Affairs Canada (INAC) to replace the landfill fences with new fencing that would have greater long-term durability. As well, INAC requested a discussion of how Baffinland would ensure that wastes disposed at the landfill were properly contained, and would not become dispersed offsite due to wind or runoff. Baffinland responded that at the time of INAC's site visit on June 3, 2015 a small quantity of windblown material was observed outside the litter fence that had been damaged over the course of the winter and the recent melting snow had exposed the small quantity of litter. Baffinland stated that the fence was repaired shortly after the time of the inspection and any litter observed adjacent to the landfill site was cleaned up.

At the time of the current site visit, most the protective mesh around the landfill area was completely removed from the supporting poles as previously observed in 2014 and 2015. The NIRB further notes that the condition of the fencing around the landfill was not significantly improved compared to previous years as Baffinland has yet to install a more durable fencing materials consistent with best practices and as recommended by INAC.

Uncontrolled Seepages from Waste Rocks

Condition 17 and 46 require the Proponent to develop and implement effective measures to ensure that runoff, including effluent from Project-related facilities and/or activities, satisfied all discharge criteria prior to release into the receiving environment. Baffinland reported within its Waste Rock Runoff Management Plan that the first phase of runoff management for years one (1) through four (4) for the waste rock stockpile area would consist of channels formed by berms around the stockpile perimeter produced by two (2) roads, one (1) on each of side of the waste stockpile. These would then channel the runoff downstream of the waste rock stockpile to the sedimentation pond.

Baffinland had predicted within its Waste Rock Management Plan that snow would accumulate in the waste rock stockpile during the winter and during the summer the melted snow, along with any rainfall, would seep through the active zone, runoff to the sides of the dump, and/or drain from the base of the perimeter of the dump. Additionally, Baffinland predicted that the water quality from the stockpile would meet Metal Mining Effluent Regulation discharge limits. However, as the runoff management committed to in the Final Environmental Impact Statement and ERP of the Mary River Project (i.e., bermed channels) were not in place at the time of the site visit the NIRB cannot assess compliance of conditions 17 and 46.

Landfarm - Contaminated Snow, Soil and Synthetic Liners

The landfarm management and monitoring protocol outlined within Baffinland's Surface Water and Aquatic Ecosystem Management Plan, stated that the 2016 Work Plan included the ongoing management of hydrocarbon impact soils within the existing landfarm facility. As noted in the previous site observations and current site visit, the protocol related to proper management of disposed synthetic liners entrenched in contaminated soils does not appear to have been addressed pursuant to the Board's 2014 and 2015 recommendation. As such, Baffinland still remains non-compliant in implementing effective measures for addressing the landfarm management issues noted by the NIRB.

Aesthetic Quality

Condition 27 requires Baffinland submit a public consultation report on the thoughts expressed by affected communities regarding the Project's changes to the topography and landscape of the area and how this has impacted the aesthetic or visual value of the Project area. During the site visit the Monitoring Officer observed the poor aesthetic quality of some locations of the Project area noting the need for general clean-up of areas with unused materials, steel pipes, tires, metals, salt bags, wooden materials, synthetic materials, drums particularly around contractor laydown areas, incinerator, and other locations. The NIRB notes the need for the Proponent to adopt best practices for maintaining visual and aesthetic quality of the Project area.

Terrain Stability and Maintenance

Conditions 25 and 26 require that Baffinland 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. As noted during the 2016 site visit, several locations particularly along Milne Inlet Tote road and the sewage outfall area showed signs of terrain instability, and could pose a fall risk to workers unfamiliar with the site. Due to the prevalence of deteriorating soil and permafrost conditions and extensive erosion issues noted in

several areas across the project sites, the expectations of conditions 25 and 26 are not being met and the mitigation measures in the applicable plans should be reconsidered

Dust Suppression Measures

Condition 10 requires the implementation of a dust management and monitoring plan at site to prevent impacts to air quality from dust dispersion. At the time of the site visit, trucks were observed applying water and calcium chloride to the Tote road; however, some areas of the road, especially the areas close to the Mine site, did not appear to have adequate dust suppression as dust was observed during truck movement. In comparison with the site observations in 2015, dust plumes were reduced; however, more efforts are still needed to ensure consistency in applying dust suppression measures along the Tote road and other locations especially in areas of high traffic.

3.11 Follow Up to NIRB's 2014-2015 Recommendations

As a result of the NIRB's 2014-2015 monitoring program, the Board made twenty-three (23) recommendations to Baffinland in order to provide guidance on compliance to the Mary River Project Certificate. The recommendations are outlined below, including updates from the Proponent and the Board's follow up on the items:

Recommendation 1 (Public Consultation Report)**:** *The Board requests that Baffinland provide a rationale for not submitting a public consultation report, including records of issues discussed with the Pond Inlet Community Advisory Group in May, July, October and December 2014. It is recommended that this condition be addressed by way of Baffinland soliciting comments directly from affected communities or through an established community advisory group, which will take into consideration concerns with respect to the changes to topography or landscape due to project development. It is requested that a public consultation report, including summary of items discussed by Baffinland with the Community Advisory Group and issues expressed by other community members, be provided and incorporated in Baffinland's next annual reporting to the NIRB.*

Baffinland responded that it did not interpret Condition 27 as referring to a separate public consultation report to its Annual Report to the NIRB, nor did it understand the requirement for the inclusion of meeting notes. However, Baffinland indicated that summary notes from 2015 would be included in a public consultation report, where available, on March 31, 2016, and that moving forward, Baffinland would continue to provide a summary in the annual report and append meeting notes. While Baffinland reported within its 2015 Annual Report to the NIRB that it continued consulting with stakeholders regarding ongoing construction activities at the site, and specifically engaged with three working groups established as a Project Certificate requirement, and additionally the Community Advisory Group (CAG) and the newly formed Mary River Community Group (MRCG), it is noted that a public consultation report, including summary of items discussed by Baffinland with the CAG and MRCG as well as issues expressed by other community members, was not provided with or incorporated in Baffinland's 2015 Annual Reporting to the NIRB.

Recommendation 2 (Adaptive Strategies for Dust Deposition)**:** *The Board request that Baffinland specify which mitigation measures within its existing Air Quality and Noise*

Abatement Management Plan will be implemented to address the high threshold level of deposition, exceeding levels predicted in the FEIS or FEIS Addendum; as well as a description of how and where specific adaptive management measures is to be used to ensure that dust deposition levels return to normal range threshold. It is requested that this information be provided within an updated Air Quality and Noise Abatement Management Plan and incorporated in Baffinland's next annual reporting to the NIRB.

Baffinland responded that this recommendation would be addressed in the Roads Management Plan and Air Quality and Noise Abatement Management Plan. However, as previously indicated in Section 3.9 of this report, the NIRB notes that Baffinland's submissions of the Roads Management Plan and Air Quality and Noise Abatement Management Plan has yet to specifically address the 2015 recommendation of the Board to specify within an updated plan which mitigation measures and adaptive management measures will be implemented in the event of high threshold level of dust deposition, exceeding levels predicted in the FEIS or FEIS Addendum

Recommendation 3 (Noise Level Exceedances)**:** *The Board request that Baffinland specify which mitigation measures within its existing Air Quality and Noise Abatement Management Plan will be implemented to address Project related noise exceedances; as well as a description of what specific measures will be undertaken by the Proponent to ensure that noise levels return to normal range threshold in the event that site construction activities persist for an extended period than anticipated. It is requested that this information be provided within an updated Air Quality and Noise Abatement Management Plan and incorporated in Baffinland's next annual reporting to the NIRB.*

Baffinland responded to the Board that short term duration of the noise exceedances were related to construction noise that was expected during construction, and that it expected that such noise sources will not be normal occurrence once construction concludes and the Project moves into the operations phase. Baffinland also indicated if it is determined that noise levels are exceeding predicted noise levels for an extended duration during operations, then mitigation options will be explored.

Recommendation 4 (Survey of Nunavummiut Employees)**:** *The Board requests that Baffinland provide details of its survey of Nunavummiut employees, and include additional information on the level of education obtained as well as further clarify whether or not incoming employees resigned from a previous job placement or educational institution in order to take up employment with the Project. It is requested that this survey be conducted for all Nunavummiut employees with the results provided and incorporated in the Proponent's next annual reporting to the NIRB.*

Baffinland indicated that at the encouragement of conditions 133 and 140, it is investigating ways to track and report meaningful socio-economic data.

Recommendation 5 (Mercury in Lichens and Soils): *The Board requests that Baffinland provide its rationale for not including detailed discussion of mercury deposition in lichens relative to surrounding soils. It is suggested that this condition be addressed through the Proponent's discussion of any natural factors or site specific activities influencing the spatial*

distribution and elevation of mercury in lichens relative to surrounding soils, as well as noting the implication for terrestrial wildlife. It is requested that this information be provided and incorporated in the Proponent's next Terrestrial Environmental Monitoring Report.

Baffinland indicated mercury was not identified as a contaminant of potential concern for the Mary River project owing to the fact that there is no identified pathway for mercury deposition from Project related activities. In addition, Baffinland noted that baseline soil and lichens samples collected within the regional study area mercury analyses showed that that mercury was present at undetectable to low background concentration in the soil and vegetation, and was not included as a target analyte to considered further, and concluded that incremental addition of mercury into the environment due to ore deposition and other mining activities is insignificant.

Recommendation 6 (Lead Deposition on Lichens): *The Board requests that Baffinland provide a discussion on the lead deposition on lichens, as well as an explanation for lead exceedances in lichens samples in several sampling locations. Further, the Board requests a discussion of why the current levels of lead accumulation in lichens for the 2014 monitoring period differ from the 2012 and 2013 monitoring periods, and the implication for terrestrial wildlife foraging on the vegetation. It is requested that this information be provided and incorporated in the Proponent's next Terrestrial Environmental Monitoring Report.*

In response to addressing the Board's concern with respect to the increased lead deposition on lichens in several sampling locations, Baffinland indicated that the lead concentration in lichens was incorrectly reported in Table D2, D-3, D-4 of Appendix D, 2014 Annual Terrestrial Monitoring Report. The Project threshold for lead concentration (5 mg/kg) was exceeded only at one (1) site (L-64), and with repeat sampling of L-64 planned for the next round of trace metals monitoring.

Recommendation 7 (Vegetation and Soil Trace Metal Monitoring Program): *The Board requests that Baffinland consider improvements to its trace metal monitoring program for soils and vegetation (lichens) and strengthen the conclusion of source apportionment of trace metals in the Project area. This could be done by differentiating natural background of elements from anthropogenic sources, and critically examine the potential for relative contribution of atmospheric sources of elements in its discussion of trace element distribution in soils and uptake by vegetation, particularly lichens. It is requested that this information be provided in the Proponent's next Terrestrial Monitoring Report, especially in support of any assumptions or conclusions regarding source apportionment of metal enrichment in the Project Development Area.*

Baffinland clarified that from 2012 to 2014, it collected baseline data on soils and vegetation from 16 control locations further than 9 kilometres from the Project Development Area. Baffinland further noted that laboratory results of the analyses of soil and vegetation samples confirmed that trace metals were non-detectable at control site locations, which indicates that these sites represent important background concentration in area of the regional study area that are not affected by Project activities. Furthermore, Baffinland clarified that the potential for relative contribution of atmospheric sources of trace metals in vegetation and soil will be examined by comparing metal levels in dustfall to metal concentration in vegetation and soil.

Recommendation 8 (Sample Size for Vegetation and Soil Trace Metal Monitoring): *The Board request that Baffinland consider, in consultation with the GN, improvements to its sample size for trace metal monitoring in soils and vegetation (lichens) taking into account increased sample size representative of the Project Development Area, and where possible incorporate other field techniques such as use of high resolution remotely sensed images to improve overall vegetation abundance monitoring. Additionally, the Proponent must consider whether the sample size is of sufficient size for monitoring baseline levels of metals in soil and vegetation using the power of detection of change methodology. It is requested that this information be provided and incorporated in Baffinland's next annual reporting to the NIRB.*

In addressing the recommendation to improve sample size for trace metal monitoring in soil and vegetation, Baffinland indicated that it would implement an improved study design within the dust fall monitoring programs, to include new sample sites at varying distances from the Project Development Area in order to compare metal concentration in soil and vegetation between impacted and control sites. Baffinland also indicated information that blue berries was removed from trace metal monitoring, due to the limited availability on the landscape, but proposes continued opportunistic sampling for blueberry, where collections can be made during other field sampling programs. In addition, Baffinland noted that willow was also removed from the trace metal monitoring program due to its metal tolerance capacity, and with concerns that further assessment of this plant would likely misinform threshold values. With respect to the vegetation abundance monitoring, Baffinland responded to the NIRB that the current study design and methodology for the vegetation abundance monitoring remains valid and is supported by power analysis, as per the 2014 Annual Terrestrial Monitoring Report.

Recommendation 9 (Ash Content of Caribou): *The Board request that Baffinland provide results and analyses of the ash contents of caribou pellets collected from the regional study area since 2011. It is requested that this reporting gap be addressed and incorporated in the Proponent's Terrestrial Monitoring Report and presented in next annual reporting to the NIRB.*

Baffinland indicated that a monitoring program to determine ash content in caribou pellets as influenced by project-related activities is not possible for the monitoring period due to very low abundance of caribou in the regional study area. Further, Baffinland indicated that the analysis of ash content in caribou pellet is a secondary study to the understanding of dust dispersal and metals in vegetation, and that there is no valid reason to pursue an analysis of ash content of caribou pellets at this time.

Recommendation 10 (Disturbance Effects from Ship Noise)*: The Board request that Baffinland provide information regarding disturbance effects of ship noise on marine wildlife, and submit its report regarding underwater sound monitoring program. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland responded that it had submitted the technical report providing results of shore-based narwhal monitoring in 2014 as Appendix N3 to the Annual Report; however, the acoustic monitoring report was not drafted in time for the 2014 Annual Report to the NIRB and therefore was not included. The Board notes that an interim acoustic report was included within Baffinland's response to the 2015 Board recommendations along with a finalized version of the

marine acoustic monitoring report submitted as Appendix N9 of the 2015 Annual Report to the NIRB.

Recommendation 11 (Missing References)*: The Board requests that Baffinland address the inconsistent references and related omissions as pertaining to items under Project Certificate Conditions 1, 5, 6, 7, 8, 9, 14b, 25, 26, 42, 71, 109, 113, 124, 125, and 128. Further, the Board requests that Baffinland provide the NIRB, where applicable, with the relevant missing appended documentations which were indicated to be provided, but not submitted within the 2014 AnnualReport to the NIRB, and further clarify whether any missing appended documentation or inconsistent references as noted in the concordance table to Project Certificate is to render a condition incomplete with respect to compliance. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland submitted its acoustic monitoring report conducted near Kuluktoo Bay, Milne Inlet (2014), as well as provided clarification through submission of an updated concordance table to address reporting inconsistencies and missing references identified by the Board during the review of the 2013-2014 Annual Monitoring Report.

Recommendation 12(Apprenticeship Programs and Contractor Employment): *The Board requires Baffinland, in consultation with the QIA, to consider improvement to the apprenticeship program, noting number of Inuit participant, selection criteria, hours of training and successful completion rate, as well as to include contractors' employment data within its annual reporting to the NIRB. It is requested that this information be provided and incorporated in Baffinland's next annual reporting to the NIRB.*

Baffinland noted to the Board that it currently has four (4) Inuit employees enrolled in apprenticeship programs in Nunavut, and that its goal is to add three (3) to five (5) more apprentices into programs by the end of 2016. Within its 2015 Annual Report to the NIRB, Baffinland reported that its apprenticeship program included trades in oil burner mechanic, welding and heavy duty equipment, and that currently there are four apprentices enrolled in various stages of the program, with the intent of doubling the numbers by the end of 2016.

Recommendation 13 (AANDC Inspection Report): *The Board request that Baffinland address this information gap by submitting AANDC's Inspection Report for November 2014, and that this request be provided within 45 days' receipt of the Board's recommendations*.

Baffinland indicated that AANDC's Inspection Report was unintentionally omitted, and submitted the requested report within its response to the 2015 Board recommendations.

Recommendation 14 (Flight Altitude): *The Board request that Baffinland comply with authorized flight altitude during use of onsite helicopters, particularly in areas considered as key sites for moulting snow geese. Further, Board requests that Baffinland provide helicopter track log data, including compiling and analyzing data in relation to the Snow Goose Management Area. It is requested that this information be provided and incorporated in the Proponent's next Annual Monitoring Report to the NIRB.*

Recommendation 15 (Mortality of Migratory Birds): *The Board requests that Baffinland improve its reporting of Project related mortalities, particularly for migratory birds, and address*

all the discrepancies noted by Environment Canada as pertaining to missing a table of all project-related mortalities, as well as details regarding two long-tailed ducks that flew into an operational sheet piling crane. It is requested that this information be provided and incorporated in the Proponent's next Annual Monitoring Report to the NIRB.

Baffinland noted within its response to the NIRB that it would address this item in the terrestrial report in consultation with Environment and Climate Change Canada at the TEWG. However, within its 2015 Terrestrial Environment Annual Monitoring Report, Baffinland reported a long-tailed duck mortality incident onsite due to collision of two (2) ducks with operational sheet piling cranes in the vicinity of the ore dock during construction. Baffinland reported that reduced visibility during duck migration as well as cranes' light were factors leading up to the incident. Furthermore, Baffinland indicated that most of the areas it operated in June through September were likely to have migratory birds, and that its analysis showed that there were helicopter flights that were not compliant with the Project Conditions' requirement of maintaining the minimum flight altitude.

Recommendation 16 (Dust Suppression Measures): *The Board requests that Baffinland provide an explanation as to why dust suppression measures committed to in the Final Environmental Impact Statement and Early Revenue Phase Addendum on which the acceptable limits were based for deposition rates, and which were expected to trigger adaptive management strategies in Baffinland's Air Quality and Noise Abatement Management Plan, are not in place onsite. In addition, the Board requests that Baffinland discuss how it plans to implement the recommendation of Workers' Safety and Compensation Commission inspectors with respect to appropriate use of dust control measures at the crusher and screening plant to prevent health hazards to workers. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland acknowledged in its response to the 2015 Board recommendations that during the summer of 2015 there were constraints in implementing the dust suppression program due to delays in receiving its amended Type "A" Water Licence from the Nunavut Water Board, and that equipment and methods to address potential human health issues associated with fugitive dust from the crushers and screening plants were currently being implemented.

Recommendation 17 (Waste Landfill): *The Board requests that Baffinland provide an explanation for the disposal of waste materials, including scrap metals outside the landfill footprint, and describe how it has incorporated the recommendation of AANDC to replace the landfill litter fences with new fencing that has greater long-term durability. Additionally, the Proponent is to provide a discussion of how it will ensure that wastes disposed of at the landfill are properly contained, and does not become dispersed off-site due to wind action or runoff. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland indicated within its response to the 2015 Board recommendations that at the time of Aboriginal Affairs and Northern Development Canada's (AANDC; now Indigenous and Northern Affairs Canada) inspection on June 3, 2015 a small quantity of windblown material was observed outside the litter fence which had been damaged over the course of the winter, and that the snow pack had recently melted, exposing a small quantity of litter. Baffinland further noted that the fence was repaired shortly after the time of AANDC's inspection and any litter

found adjacent to the landfill site was cleaned up. Baffinland also indicated that subsequent to the NIRB site visit, photographs of the repaired fence were provided via e-mail attachment to the NIRB Monitoring officer (September 17, 2015).

Recommendation 18 (Communication Towers for Bird Deterrence): *The Board requests that Baffinland provide updates on its bird deterrence efforts, as required pursuant to Condition 68 and include details of the progress of installation of bird reflectors on the tower. It is requested that this information be provided within 45 days' receipt of the Board's recommendations.*

Baffinland noted within its response to the 2015 Board recommendations that bird deflectors were installed on the 30 m high communication towers at Km 68 and Km 34 on November 1, 2015, and that further information would be included in the 2015 Annual Report to the NIRB. In addition to discussing this within the 2015 Terrestrial Environment Monitoring Report, t, it was further discussed during the NIRB site visit that the reflectors could be attracting birds as well. Baffinland's response within the 2015 Terrestrial Environment Monitoring Report satisfied the board's request, and further follow up will be conducted on the possible effect of the reflectors as an attractant.

Recommendation 19 (Landfarm): *The Board requests that Baffinland continue to adhere to industry best practices for landfarm operations, including for management of contaminated snow and waste synthetic liners. It is further requested that Baffinland address the offsite dispersal of small pieces of synthetic liners from the landfarm footprint to the adjacent tundra. It is requested that an update regarding this recommendation be provided within the next Annual Report to the NIRB.*

Baffinland indicated within its response to the 2015 Board recommendations that pieces of liner have become entrained in excavated soils during the progressive reclamation of the historical bladder farm at Milne Port, and that during the excavation of the liner and soils at the bladder farm, pieces of liner became mixed in during the removal of soils that were transported to the landfarm facility. Baffinland noted that as the summer of 2015 progressed, a concerted effort was made to segregate and remove much of the entrained pieces of liner, and that efforts were undertaken subsequent to the NIRB inspection to provide updated photographs of the landfarm, which demonstrated the substantial clean-up efforts undertaken throughout the summer period.

Recommendation 20 (Aesthetic Quality)**:** *The Board requests that Baffinland continue to address the general clean-up of the site, and in addition to broken salt bags and pallets, remove the other unused scrap materials and unused items, such as corrugated steel pipes, synthetic materials, and drums stored at various Project locations to improve the visual quality of the site. It is requested that this information, including a plan for removal of other scrap materials be provided within 45 days' receipt of these recommendations.*

Baffinland indicated within its response to the 2015 Board recommendations to the Board that photographs and a description of clean-up activities for the salt storage area at Milne Port were previously provided by an e-mail to the NIRB on September 17, 2015. Baffinland also indicated that Annual Clean-Up Days are scheduled periodically throughout the summer to improve general conditions and promote good housekeeping practices.

Recommendations 21 (Silt Fences): *The Board recommends that Baffinland provide an explanation for the washouts and silt fence failures noted at the various locations along the Milne Inlet Tote Road, and describe what plans are in place to ensure their long-term functionality, durability and efficiency for the protection of adjacent streams, lakes and rivers from the contamination by silt, sediment and construction debris. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland indicated within its response to the 2015 Board recommendation that it request further information from the NIRB as to which specific locations are being referred to, and does not agree that washouts and silt fence failures is a widespread concern at the site. Baffinland also noted within its response that as Tote Road improvements are still underway, sediment control structures such as new silt fences, silt curtains, drainage ditches, rip rap and check dams will be in place to ensure sediment control.

Recommendation 22 (Safety Measures and Language)**:** *The Board recommends that Baffinland provide a plan of action as to its incorporation of Inuktitut for use of all signage, particularly around the vicinity of blasting areas. It is requested that Baffinland provide the Board with its plan of action to include Inuktitut within 45 days' receipt of the Board's recommendations.*

Baffinland noted within its response to the 2015 Board recommendations that it has endeavored to create bilingual signage in much of the accommodations and work areas in the interest of the bilingual workforce, while noting that the primary language of operation is English and so it is to be expected that English signage would still be observed.

Recommendation 23 (Road Stability and Maintenance)**:** *The Board recommends that Baffinland provide information regarding how it plans to address the terrain stability issues for Project roads, particularly roads leading to the effluent discharge area and to Deposit No. 1 in relation to impacts caused by freshet events or spring thaw. It is requested that this information be provided within 45 days' receipt of these recommendations.*

Baffinland noted within its response to the 2015 Board recommendations that Project roads are being continuously maintained, improved, and upgraded by means of installation of additional culverts, improvements to ditching, rip rap and armoring, as well as road embankment widening and thickening.

4 FINDINGS AND CONCLUSIONS

During the 2015–2016 monitoring period, 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; however, the Board notes several deficiencies with respect to terrestrial and marine environment monitoring including mitigation measures. Pursuant to the NIRB's 2015 Recommendation to the Proponent, the Board has identified several outstanding items requiring follow-up action by Baffinland in order to ensure that Baffinland achieves full compliance with the Mary River Project Certificate. Where the NIRB recommended to the Proponent that it include additional reporting information within its 2015 Annual Report, Baffinland either submitted the required additional information, or provided its rationale for not reporting on the items.

During the site visit in July 2016 the NIRB did not observe many items of significant concerns, however the Monitoring Officer discussed items including used tire storage, waste landfill, uncontrolled seepages from waste rocks, the landfarm, aesthetic quality, terrain stability, and dust suppression measures in more detail in the site visit report (Appendix I). While certain Terms and Conditions of the Project Certificate pertain to later phases in the Mary River project's development and are not applicable at this stage in the NIRB's monitoring program, it was noted that Baffinland has not provided updates or information with respect to the following items:

a. Results of the monitoring of sea levels and storm surge at Milne Inlet, including a plan as to how and when logistic issues affecting data retrieval will be addressed in the coming year pursuant to conditions 1 and 83 of the Project Certificate.
b. Provide the referenced quarry management plans for two quarries, namely Q18 and P1 that were not included within the 2015 Annual Monitoring Report to the NIRB.
c. Ensure that authorizing agencies including the NIRB and affected communities are properly informed and engaged prior to cessation of sulphur dioxide monitoring onsite in order to ensure compliance to terms and conditions 8 and 9 of the Project Certificate.
d. Improve fish health monitoring program pursuant to conditions 48(a) and 113 by assessing baseline biochemical parameters in fish, in addition to improving sample sizes for contaminant trend analyses.
e. Address the terrain stability issues noted along the Tote Road and rroadside borrow pits, and provide a site action plan for the affected areas, particularly for the areas identified as requiring a higher priority for stabilization.
f. Provide clarification as to the rationale for the cessation of Terrestrial Environmental Monitoring Programs (vegetation abundance monitoring program; vegetation and soil base metals sampling; exotic invasive plant species monitoring program, den surveys, and roadside waterfowl survey).
g. Provide evidence of how it utilized more detailed bathymetry from Milne Inlet to model the anticipated ballast water discharges from ore carriers, and how results from this modeling were used to update ballast water discharge impact predictions. In addition, where possible, indicate when and how additional sampling was undertaken to validate the model and monitoring plan.
h. Provide details as to how it engaged Canadian Coast Guard and affected communities along the shipping route during the 2015 monitoring period, and noting whether or not spill response equipment was provided to the communities and their participation level in the annual training.
i. Provide an updated plan regarding adaptive management measures for dust generation, which is to be incorporated into the Road Management Plan and Air Quality and Noise Abatement Management Plan.
j. Address all monitoring gaps as pertaining to terrestrial and marine environment including socio-economic effects as indicated by various authorizing agencies and interested parties during the commenting period for the 2015 Annual Monitoring Report for the Mary River project.
k. Revisit the operational framework of the terrestrial and marine environment working groups, and proactively engage members of the working groups in soliciting advice and recommendations in connection with mitigation measures for the protection of the

terrestrial and marine environment, including monitoring of effects and implementing adaptive management plans. Specifically, there is need for Baffinland to ensure that consensus-based or quorum decision-making is sought prior to deferral, suspension or modification of any component of the terrestrial and marine environmental monitoring.

5 SUMMARY

Baffinland commenced construction of the Mary River Project in May 2013, and to date the project is being conducted as committed to in the Final Environmental Impact Statement and Early Revenue Phase Addendum submitted by Baffinland. Since issuance of the original NIRB Project Certificate in December 2012 and the amended certificate on May 28, 2014, Baffinland has continued to work towards compliance with the Terms and Conditions of the Project Certificate that apply to the current phase of the development of the Mary River project. However, several issues noted during the NIRB's site visit, and as discussed throughout this report remain outstanding, which require Baffinland's attention. These issues are further addressed in the Board's 2016 Recommendations issued to the Proponent. Pursuant to NLCA Sections 12.7.2 and 12.7.3, the NIRB will continue to work with Baffinland and other authorizing agencies in order to undertake the required evaluation of Project information, conduct and coordinate monitoring efforts, and to review results and Project compliance in accordance with the requirements set out in the Mary River Project Certificate No. 005.

Prepared by: Solomon Amuno, PhD.
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Date: October 26, 2016
Signature:

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Date: October 26, 2016
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Appendix I: July 2016 Site Visit Report

2016 Site Visit Report

for the NIRB's Monitoring of
Baffinland Iron Mines Corp.'s Mary River Project

Nunavut Impact Review Board

October 2016

Report title:	2016 Site Visit Report for the Nunavut Impact Review Board's Monitoring of Baffinland Iron Mines Corp.'s Mary River Project (NIRB File No. 08MN053)
Project:	Mary River Project
Project Location:	Qikiqtani (North Baffin) Region, Nunavut
Project Owner:	Baffinland Iron Mines Corporation 2275 Upper Middle Road East, Suite 300 Oakville, ON L6H 0C3
Proponent Contact:	Wayne McPhee, Director, Sustainable Development
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Visit conducted by:	Solomon Amuno, Technical Advisor II
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Site visit dates:	July 13-14, 2016
Last Site Visit:	June 3-4, 2015
Report prepared by:	Solomon Amuno, Technical Advisor II
Pictures by:	Solomon Amuno, Technical Advisor II
Cover picture:	Aerial view of Milne Inlet

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1 INTRODUCTION

The Nunavut Impact Review Board (NIRB or Board) was established through Articles 10 and 12 of the Nunavut Land Claims Agreement (NLCA) and is responsible for post environmental assessment monitoring of a Project in accordance with Part 7 of Article 12 of the NLCA.

This report provides the findings that resulted from the NIRB's site visit to the Mary River Project site on July 13 and 14, 2016 as part of the NIRB's monitoring program.

1.1 Objectives & Purpose of Site Visit

The objective of the NIRB's site visit was to determine whether, and to what extent, the land or resource use in question is being carried out within the predetermined Terms and Conditions of NIRB Project Certificate No. 005 issued for the Mary River Project (the Project), in accordance with Section 12.7.2(b) of the NLCA.

The observations resulting from this site visit shall, wherever possible, be incorporated into the measurement of the relevant effects of the Project according to Section 12.7.2(a), as well provide the information necessary for agencies to enforce terms and conditions of land or resource use approvals as required under Section 12.7.2(c). Site-specific observations will also be used to assess the accuracy of the predictions contained in the Project impact statements according to Section 12.7.2(d) of the NLCA.

1.2 Introduction of the Mary River Project

The Mary River Project involves the exploration, construction, operation, as well as the closure and reclamation of an open pit iron ore mine at what is known as Deposit No. 1, and includes mining at a rate of 18 Million tons per year (Mt/a). There are three (3) main project locations – the Mary River Mine (the Mine) site, Milne Port located north of the Mine site, and Steensby Port located south of the Mine site. Milne Port is connected to the Mine site by the Milne Inlet Tote Road, which is approximately 100 kilometers (km) in length. The Project as originally proposed was to include construction of a railway approximately 150 km in length to connect the Mine site to Steensby Port. It was anticipated that facilities at Steensby Port and the railway would take up to four years to construct. The NIRB Project Certificate No. 005 was issued for the Mary River Project on December 28, 2012 following a thorough environmental review process, which included community consultations and a public hearing.

On January 13, 2013 Baffinland Iron Mines Corporation (Baffinland or the Proponent) informed the NIRB that it was proposing an Early Revenue Phase (ERP) that would change the schedule and specific activities associated with the Project as initially approved. The ERP involved an amendment to the Mary River Project, which included the extraction of up to an additional 4.2 Mt/a of iron ore from the Mary River Mine site, with ore to be transported via the Milne Inlet Tote Road and Port at Milne Inlet during the open water season only. As the ERP outlined significant modifications to the activities previously approved under NIRB Project Certificate No. 005 for the Mary River Project, the Board determined that it was appropriate to assess the potential ecosystemic and socio-economic effects of the ERP and to consider modifications to the terms and conditions of the original Project Certificate under Article 12, Section 12.8.2 of the NLCA. On May 28, 2014 pursuant to Article 12, Sections 12.5.5 and 12.8.2 of the NLCA, the

NIRB issued an *Amended* Project Certificate No. 005, allowing the Project to proceed in accordance with the Terms and Conditions issued therein. The Board is responsible for monitoring this Project as stipulated in Sections 12.7.1 and 12.7.2 of the NLCA.

As currently approved and in accordance with Baffinland's development plans, extracted ore is transported by truck along the Milne Inlet Tote Road and shipped by contracted vessels from Milne Port to European markets during the open water season. The approved Project also involves additional facilities at Milne Port, including the construction of a fixed ore dock, 4.2 Mt ore stockpile and reclaim area, 3,500 tonnes per hour ship loaders, a camp to accommodate workers, and the extension or relocation of the airstrip west of the proposed ore stockpile. The ERP operations are expected to continue for the duration of the mine life (i.e., 21 years), and continue in conjunction with the Mary River Project as originally proposed, once developed.

1.3 Preparations for the Site Visit

In preparation for the site visit, the Monitoring Officer reviewed the following items: Mary River Project Certificate; previous NIRB site visit reports, and Baffinland's 2015 Annual Report and associated appendices; as well as the previous year's follow-up correspondence regarding review of Annual Reports and monitoring of the Mary River Project.

2 SITE VISIT

The site visit was conducted on July 13 and 14, 2016 by Solomon Amuno, the NIRB's Monitoring Officer for Project Certificate No. 005 (Monitoring Officer). On Wednesday, July 13, 2016, the Monitoring Officer flew from Pond Inlet to the Mary River site via Baffinland's regularly scheduled aircraft charter, and was met by Baffinland's Environmental Manager, Mr. Jim Millard.

Once at the Mary River site, the Monitoring Officer was provided with a brief health and safety orientation before undertaking a tour around the Mine site which included observational visits to the following locations: quarry area (D1Q2/QMR2), crusher, explosive magazine area, deposit No. 1, jetty area including waste rock storage area, incinerator, former bladder farm, sewage outfall area and landfill.

On Thursday, July 14, 2016 the Monitoring Officer continued the tour around the Mine site (Picture 1), which also included a helicopter-assisted travel to Steensby Inlet (Picture 33), and Milne Inlet (Picture 2), and finally Bruce Head (Picture 63). While at Milne Inlet, the Monitoring Officer made observational visits to the following locations: ore stockpile area, incinerator, fuel tank farm, landfarm, settling pond area, conveyor system, docking area, and accommodations facilities. Upon completion of the tour around Milne Inlet, further observation of the condition of the Tote Road was assessed by truck.

Upon completion of the tour around Project areas, the Monitoring Officer discussed several issues with Baffinland's Project staff. Discussions focused on outstanding items and observations noted during the tour as they pertained to the implementation of the terms and conditions of the Project Certificate. The site visit provided the Monitoring Officer with an

opportunity to observe Project component areas, as well as to note areas with ongoing construction activities.

Picture 1: Aerial view of the Mary River Mine site

Picture 2: Aerial view of the Milne Inlet site

2.1 General Observations based on Progress from Previous Site Visit

The following sections briefly describe the major facilities visited during the tour around the Project Development Area (PDA), and specifically, note observations of overall progress of the site compared to the previous site visit(s). Where applicable, the Monitoring Officer noted compliance with specific terms and conditions of the Project Certificate, and followed up on items where Baffinland had made commitment to mitigate the potential ecosystemic impacts of the Mary River Project.

2.1.1 **Mary River Mine Site**

Jetty-Freshwater Intake Area

The Monitoring Officer conducted a tour around the jetty and the fresh water intake area adjacent to the old accomodation (Picture 3). While at the facility, Mr. Millard indicated that plans were underway to remove the old silt curtains and install a new silt curtain around the jetty area. Mr. Millard noted that upgrades to the facility would include a backup plan for the existing pumping system due to concerns regarding the effects of ice on the piping system.

Picture 3: Jetty and freshwater intake area

Former Bladder Farm Area and Waste Ponds

The Monitoring Officer observed the former bladder farm area located at the Mine site, and noted that the area was properly bermed and in use for collecting waste oils. The Monitoring Officer also viewed a waste-oil treatment facility on site, with drip pans placed underneath stationary equipment in the area (Pictures 4 and 5). All spilled materials observed were contained within the footprint of the area. The bermed wastewater ponds were also visited. The Monitoring Officer did not observe any issues of concern in the area, except for the current use of tires to hold the liners of the wastewater pond in place (Picture 6). The Monitoring Officer was unable to verify whether the practice of using tires to hold liners was consistent with best practices for the operations and maintenance of a waste pond system.

Picture 4: Waste oil pond and treatment area

Picture 5: Use of spill pans at site

Picture 6: Former bladder farm

Deposit No. 1 Reserve and Waste Rock Dump

The drive to the deposit reserve was led by Mr. Millard and included observation of areas within and around the vicinity of the quarry (DIQ2), crusher, explosive magazine storage, as well as a stop at a check dam along the access road leading to the Mine (Pictures 7, 8, 9 and 10). During the 2015 site visit to the deposit reserve, the Monitoring Officer had noted the deteriorating condition of the mine road, and indicated concerns with respect to waste management and generation of dust plumes along the road. During the 2016 site visit, no observations of deterioration, significant dust generation, or waste management issues were noted along the road. While at DIQ2, the Monitoring Officer observed trucks transporting boulders. Mr. Millard stated that the boulders are used for armoring and rip rap around the Mine site to prevent soil erosion and terrain instability. Mr. Millard also described efforts currently undertaken by Baffinland to manage site contact water, as well as identified specific locations where check dams were installed to monitor runoff and sediments. Further, the Monitoring Officer observed the location of the explosives storage area adjacent to the quarry site; however, due to site restrictions, access into the explosives area was not possible.

Picture 7: Active quarry site (D1Q2)

Picture 8: Explosive storage area

Picture 9: Check dam

Picture 10: Pit wall at Deposit No. 1

Picture 11: Tracked excavators

Picture 12: Haul truck

While at the deposit reserve, the pit wall was observed. The only equipment located at the pit wall included two (2) excavators, which were not in use at the time of the visit (Picture 11), and a heavy truck hauling boulders (Pictures 12). During the 2015 site visit, Mr. Millard identified an extensive land area adjacent to the deposit reserve designated for the disposal of potentially acid generating (PAG) rocks. During the 2016 site visit, the Monitoring Officer noted that Baffinland had constructed the designated waste rock storage area and sediment collection pond (Picture 13). During the tour of the waste rock dump, the Monitoring Officer noted major environmental concerns associated with the uncontrolled seepage of potentially contaminated contact water from the piles of PAG waste rocks as well as overburden into the adjacent tundra. The Monitoring Officer observed that the waste rock storage area as constructed lacked adequate ditching systems to properly divert or intercept overland runoff to the nearby sediment pond (Pictures 14 and 16).

Picture 13: Waste rock storage area

Picture 14: Seepage of runoff from waste rock dump

Additionally, the Monitoring Officer noted that the soils on either side of the access road leading to the sediment collection pond, were waterlogged and saturated with runoff and that there were no site-specific drainage measures aimed at reducing the outflow of seepages from the waste rock dump area. The sediment collection pond adjacent to the dump area was under construction and was not fully functional at the time of the visit (Picture 15). To address these concerns, Mr. Millard indicated that Baffinland would construct a ditch or berm to channel the runoff; however, no information was provided to the Monitoring Officer regarding the anticipated timelines for the implementation of this mitigation measure. Further, the Monitoring Officer was unable to verify when and how long the actual seepage occurred, and the extent of waterlogging of the soils by overland runoff. Supplemental information on this site observation is provided in Section 2.2.2 of this report.

Picture 15: Sediment pond

Picture 16: Runoff into adjacent tundra (red arrows showing flow direction)

Crusher Area

During the 2015 site visit, the Monitoring Officer noted the increase in dust plumes generated from the crusher dispersing near the main employee accommodations buildings. During the 2016 site visit, the Monitoring Officer noted a noticeable reduction of dust plumes from the crusher near the accommodations buildings (Picture 17). Mr. Millard and the crusher operator indicated that the reduction in dust emissions over the past year was a result of process optimizations and improvements. Some areas around the facility showed signs of soil erosion due to overland runoff from the crusher area, as there are no channels to drain or direct the runoff flow. However, the Monitoring Officer observed silt fences alongside the crusher area and the construction of a ditching system to address the above concerns (Pictures 18 and 19).

Picture 17: Crusher area

Picture 19: Silt fencing near crusher area

Picture 18: Soil sloughing around crusher area

Sewage Outfall Area

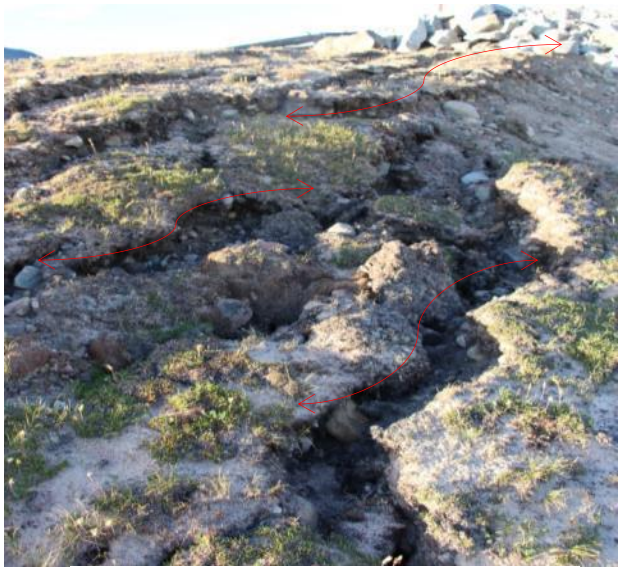
During the 2015 site visit the Monitoring Officer noted that the effluent discharge area/sewage outfall area located at the Mine site was inaccessible due to poor road condition; however, during the 2016 site visit the effluent discharge area was accessible. No issues were noted regarding the proper functioning of the effluent pipeline or with respect to the discharge of treated wastewater into the adjacent tundra (Pictures 20 and 21). However, the Monitoring Officer observed the increasing deterioration of the slopes surrounding the sewage outfall area. Mr. Millard and the Monitoring Officer discussed that the land area could be unstable due to the identified erosion and that appropriate precautions should be taken to ensure the area does not pose any risk to workers or visitors on site (Pictures 22 and 23). The Monitoring Officer was unable to verify the

cause of the slope deterioration or ascertain whether the erosion resulted from overburden pressure due to stress imposed on the soil layers by the weight of overlying materials. Mr. Millard stated that measures would be employed to address this specific terrain concern.

Picture 21: Sewage outfall pipeline

Picture 20: Sewage outfall area

Picture 22: Slope deterioration



Picture 23: Terrain instability near outfall

2.1.2 **Milne Inlet**

Ore Dock and Stockpiles

Mr. Millard led the tour of Milne Inlet, via a helicopter overflight, around the ore dock area, stockpile loading area, and Bruce Head (Pictures 24 and 26). During the 2016 site visit, the Monitoring Officer observed that construction was complete in the ore dock area and further that a ditching system had been built around the ore stockpile area (Pictures 24 and 25). Mr. Millard indicated that over one (1) million tonnes of iron ore was stockpiled would likely be shipped out of the Port later in 2016.

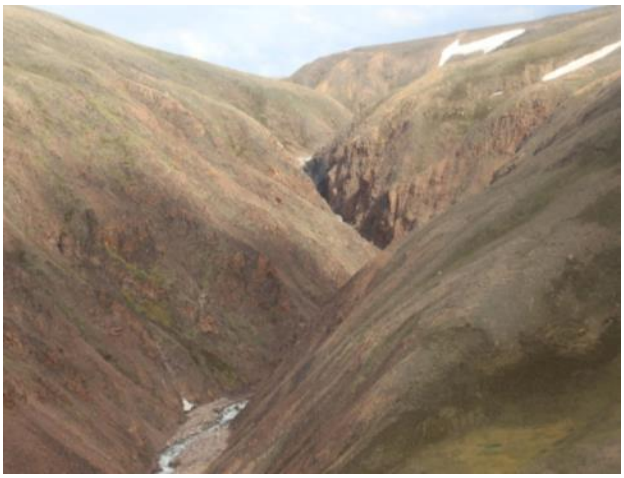
Picture 24: Ore stockpiles

Picture 26: Ditching system around ore stockpile

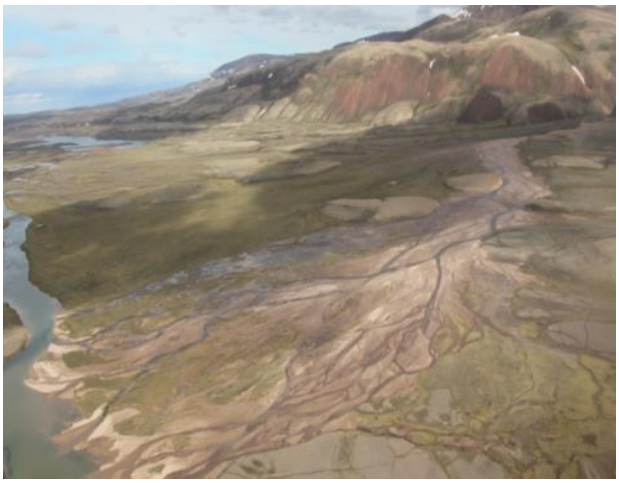
Picture 25: Bruce Head camp area

Embankment Failures and Potential Threats to Fisheries

While travelling by helicopter from the Mine site to Milne Inlet, Mr. Millard pointed out to the Monitoring Officer an area outside of the PDA where recent embankment failures led to the release of significant amounts of sediment into the aquatic environment and eventually Milne Inlet (Picture 27). At the time of the site visit, the Monitoring Officer noted that the mouths of some rivers, particularly those adjacent to the affected embankments, had accumulated significant amounts of sediment, which resulted in the formation of "delta-like" features (Picture 28). Mr. Millard stated that the incident was reported to Environment and Climate Change Canada and Fisheries and Oceans Canada. The Monitoring Officer noted the vulnerability of the specific area to slumping, undercutting, erosion and embankment failures due to high velocity flowing water and terrain instability.



Picture 27: Embankment area failures



Picture 28: Sediment deposition area

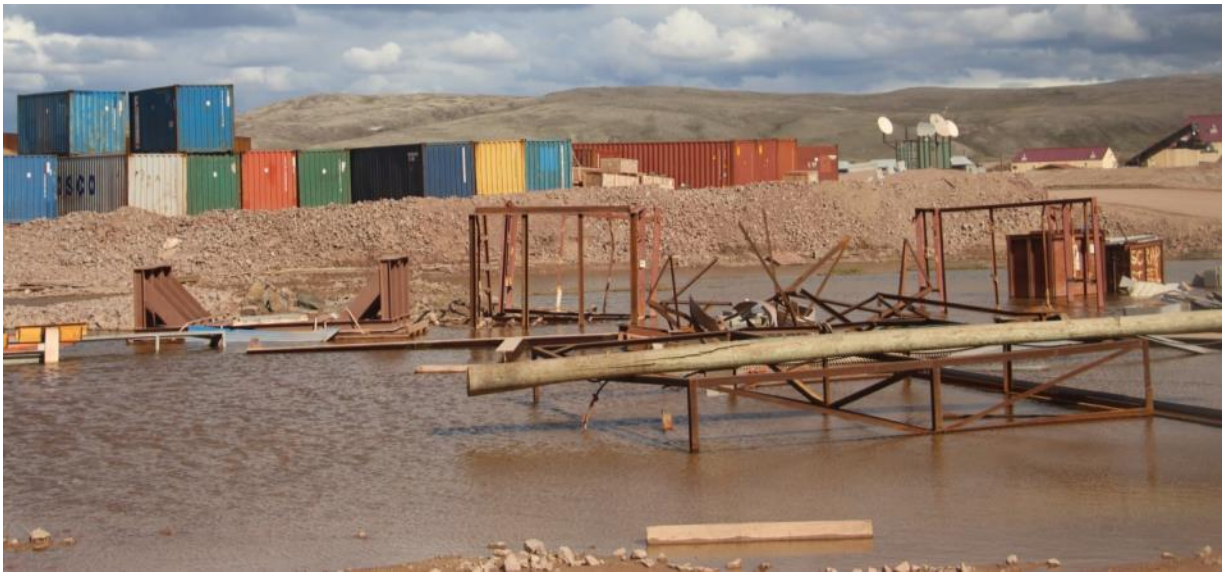
Visual Environment and Aesthetic Quality of Mine Site, Tote Road, and Milne Port

During the 2016 site visit, the Monitoring Officer observed that many areas within and surrounding the PDA, including the Mine site and Milne Inlet, required additional waste management actions due to the accumulation of scrap materials and unused items such as tires, steel pipes, salt bags, wooden materials, various metals, and drums (Pictures 29 and 30). Water pooling also requiring management was observed in an area at Milne Inlet. The Monitoring Officer noted that the stockpiles of scrap or unused materials, including salt bags and tires, do not pose any significant environmental hazards; however, recommended that Baffinland adopt best practices to maintain the visual and aesthetic quality of the PDA (Pictures 31 and 32). Mr. Millard stated that cleanup of the salt bags was being completed but plans have yet been developed to address the tire stockpiles located throughout the various sites.

Picture 29: Wooden Materials at Milne Inlet

Picture 30: Metals and steel pipes

Picture 31: Unused seacans and tires at Milne Inlet



Picture 32: Scrap materials in water pooling area at Milne Inlet

2.1.3 **Steensby Inlet**

Steensby Camp Area

The Monitoring Officer did not visit the Steensby Port area during previous site visits (2013-2015) as the site was not fully operational during the visit. During the 2016 site visit the camp area was visited, however, the area was not operational and no workers occupied the camp facilities. The Monitoring Officer noted that a fence was installed around the camp facility to prevent wildlife from accessing the main camp area (Picture 38); however, caribou tracks were observed at some locations within the main camp (Picture 35). As there was no one at site, the grey water disposal pipeline was not in use during the site visit and the associated area of discharge was dry. The Monitoring Officer noted that fuels (jet fuel and arctic diesel) were properly stored in drums within a bermed area, and that heavy trucks were parked at the site

(Picture 37). Piles of pallets, metals, cables, wooden materials, and seacans were located at laydown areas near Milne Inlet and the area was generally free of wind-blown debris (Picture 39). The Monitoring Officer observed that the main camp building and surrounding area appeared reasonably well kept, except for minor deterioration of select camp buildings. The Monitoring Officer identified that continued deterioration could result in the dispersal of refuse onto the surrounding tundra (Pictures 40 and 41).

Picture 33: Steensby Camp area

Picture 34: Helicopter used for aerial viewing

Picture 35: Caribou track onsite

Picture 37: Unused incinerator stack and materials

Picture 36: Fuel storage area

Picture 39: Camp fencing

Picture 38: Seacans, drums and scrap metals

Picture 41: Torn camp material

Picture 40: Debris from torn camp material

Milne Inlet Tote Road

Along the Tote Road the Monitoring Officer noted upgrades to the roads, and removal of a seacan crossing. Generally, no negative impacts to fish and fish habitat were observed at the various Tote Road crossings. Embankment rip rap and armoring to prevent slumping and loosening of earth material was identified throughout different sections of the road. The major concern observed along Tote Road, particularly during the drive from the Milne Inlet, was the generation of dust by vehicular traffic and embankment failures around km 91. Further description of the observations as pertaining to dust generation and general air quality along the Tote Road is discussed further in Section 2.2.2 .

2.2 Observations Based on NIRB Project Certificate No. 005

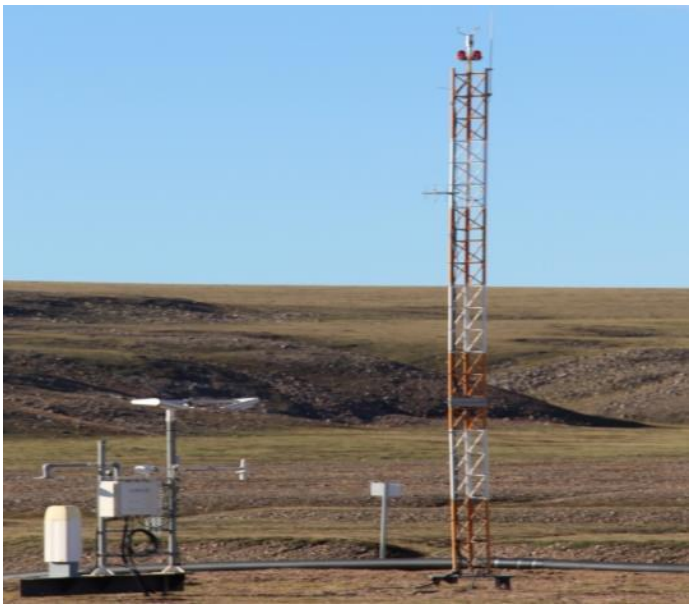
The following are observations made during the site visit that pertain specifically to terms and conditions of Project Certificate No. 005:

2.2.1 Meteorology and Climate – Weather Monitoring Data

Condition 5

> *"The Proponent shall endeavour to explore and implement reasonable measures to ensure that weather-related information for the various Project sites is readily accessable to the public on a continual basis throughout the life of the Project"*

Prior to the 2016 site visit, Baffinland submitted its 2015 Annual Report to the NIRB, and specifically noted within its submissions that weather information is displayed for public on the Company's website.[1] During the tour around the Mine site, the Monitoring Officer confirmed that a weather system was in place, with current weather–related information displayed on the screens located within the main accommodation building (Picture 42).



Picture 42: Weather system in Mary River

[1] Section 7.2.1.1 of 2015 Annual Report Submitted to the NIRB (March, 2016)

2.2.2 Air Quality –Dust Management and Monitoring Plan

Condition 10

"The Proponent shall update its Dust Management and Monitoring Plan to address and/or include the following additional items:

a) Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site.

b) Identify the specific adaptive management measures to be considered should monitoring indicate that dust deposition from trains transporting along the rail route is greater than initially predicted.

c) Outline specific plans for monitoring dustfall at intervals along and in the vicinity of the Milne Inlet Tote Road to determine the amount and extent of dustfall.

d) Identify the specific adaptive management measures to be considered if monitoring indicates that dust deposition from traffic on the Milne Inlet Tote Road is greater than initially predicted."

Condition 21b (iii)

"The Proponent shall ensure that the scope of the Aquatic Effects Monitoring Plan (AEMP) includes, at a minimum:

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."

Condition 58c

"Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:

c. A description of the extent of dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets;"

Prior to the site visit, Baffinland submitted its Air Quality and Noise Abatement Management Plan to the NIRB for the 2015-2016 monitoring period which outlined several mitigation measures employed for specific air quality monitoring programs such as: ambient air quality monitoring, incineration emission testing and expanded regional study of air quality management.[2] During the 2016 site visit, water trucks were observed applying dust suppression along Tote Road, however, some areas close to the Mine site and several other locations around the site did not have dust suppression and dust plumes from vehicle movement was observed (Pictures 43 and 44). In general, dust plumes appeared to be more distinct in high traffic locations with little or no dust suppression. No visible dust plumes related to vehicle movement were observed around the ore dock, within the stockpile area, or Steensby Inlet as no industrial activities were ongoing at the time of the 2016 site visit.

The Monitoring Officer observed that best management practices related to dust suppression were in place in selected areas, including measures described within Baffinland's Air Quality

[2] Appendix J1-Air Quality and Noise Abatement Plan supplemental to 2014 Annual Report to the NIRB (March 2015)

and Noise Abatement Management Plan,[3] and compared to site observation in 2015, dust generation in 2016 was noticeably reduced.

Picture 44: Dust plumes along Tote Road

Picture 43: Salt application along Tote Road

2.2.1 Air Quality –Incineration

Condition 11

"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)."

Condition 12

"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."

The Monitoring Officer noted that the incinerators in use at the Mine site and Milne Port were appropriately contained within housing units, and appeared reasonably well maintained except for minor pooling of drainage water within the Mine site incinerator facility (Pictures 45 and 46). As observed during previous site visits, the Monitoring Officer noted that Baffinland's high temperature incinerators are monitored during operations to prevent the discharge of pollutants into the wider environment, and that once incineration is complete, Baffinland conducts chemical analyses of ash residues to ensure that hazardous constituents are not above concentration levels for safe disposal.

[3] Section 3.2.1 of Appendix J1-Air Quality and Noise Abatement Management Plan

Picture 46: Incinerator at Mine Site

Picture 45: Water pooling at Incinerator

2.2.2 Hydrology and Hydrogeology-Effluent Management

Condition 17

"The Proponent shall develop and implement effective measures to ensure that effluent from project-related facilities and/or activities….satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment."

Condition 19

"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."

Condition 24

"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."

Condition 46

"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."

Baffinland has implemented different measures to monitor effluents generated from the site. The Monitoring Officer noted during the 2016 site visit that membrane bioreactors (MBR) continue to be used at various locations around the Mary River site and Milne Inlet to ensure that effluent

and sewage discharge criteria are met (Picture 47). At the time of the 2016 site visit, untreated runoff was flowing from the piles of potentially acid generating waste rock/overburden into the adjacent tundra. The Monitoring Officer observed that no drainage system was in place to properly channel surface water runoff into a sedimentation pond where monitoring could be completed prior to its release to the environment, pursuant to Part D, Item 16 of Baffinland's Type "A" Water Licence. As a result, Baffinland is not in full compliance with conditions 17, 24, and 46 of the Project Certificate.

Picture 47: Waste pond at Mary River site

2.2.3 Sediment and Erosion Management Plan

Condition 22

> *"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."*

Condition 26

> *"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."*

Condition 43

> *"Prior to the start of construction, the Proponent must submit a Site Drainage and Silt Control Plan to the appropriate regulatory authorities for approval."*

Prior to the 2016 site visit, Baffinland submitted its Surface Water and Aquatic Ecosystem Management Plan to the NIRB,[4] which addressed requirements for site drainage, silt control, and sediment and erosion management. During the 2016 site visit, Mr. Millard described the efforts

[4] Appendix J20-Surface Water Management Plan supplemental to 2015 Annual Report to the NIRB (March 2016)

undertaken by Baffinland to manage sediment and erosion and identified locations where rip rap, armoring, silt fences, and check dams were used to prevent sediment loading into surface water, destabilization and erosion. Silt fences were made of geotextile or fabric materials, supported by wooden stakes, and was placed at different monitoring locations along the Tote Road and within the Mine site to protect adjacent streams, lakes, and rivers from silt, sediment, and construction debris contamination. The Monitoring Officer did not observe any damage to silt fences at the locations visited. Additionally, the Monitoring Officer did not receive any indication as to whether or not silt fences or check dams were routinely inspected, particularly after runoff events, in order to ensure that they were not damaged by water overflow or debris (Pictures 48 and 49).

Picture 48: Embankment protection

Picture 49: Check dam along the road to Deposit No. 1

2.2.4 Landforms, Geology and Geomorphology, Soils, and Permafrost

Condition 25

"The Proponent shall undertake the additional geotechnical investigations to identify sensitive landforms, modify engineering design for Project infrastructure, develop and

implement preventative and/or mitigation and monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms."

Condition 28

"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."

While the effects of the Project on permafrost could not be fully verified at the time of the site visit, the Monitoring Officer noted extensive permafrost degradation and noted the vulnerability of slope areas along the Milne Inlet Tote Road and around the sewage outfall area to slumping and embankment failures (Pictures 20, 21, 22, and 23). During previous visits, the Monitoring Officer had consistently observed several slope areas where ice-rich permafrost had degraded causing widespread thaw and potential terrain instability of roads and other associated structures. Mr. Millard had specifically outlined during previous visits that backfilling of the degraded areas was one (1) option considered by Baffinland to address permafrost degradation in the affected areas. During the 2016 site visit, silt fences were in use along several affected areas, but no indication was given as to when the areas would be backfilled (Pictures 50 and 51).

Picture 50: Embankment failures along Tote Road

Picture 51: Use of silt fences at embankment failure areas

2.2.5 **Aesthetic Quality**

General site aesthetic quality observations were presented in previous sections of this report. Further observations within this section are discussed within the context, and the requirements, of Condition 27 of the Project Certificate, which stipulate that:

> *"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."*

Based on the aesthetic condition observed while onsite, the Monitoring Officer discussed with Mr. Millard the need to develop a consistent clean-up plan for the Project areas. The clean-up plan, as discussed, should focus on areas with unused materials, steel pipes, salt bags, tires, and wooden scraps particularly around contractor laydown areas, locations near the incinerator, the ore stockpile area, and the landfarm (Pictures 52 and 53). The aesthetic quality of the area around the Mine site incinerator facility requires particular improvement due to the abundance of used tires at various locations. The Monitoring Officer further identified that the Milne Inlet requires clean-up for scrap metals, tires, seacans, steel pipes, metals, and salt bags.

Picture 52: Salt bags at Milne Inlet

Picture 53: Tire disposal area at Mine site

2.2.6 Freshwater Aquatic Environment-Drainage and Watercourses

Condition 47

"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."

The Monitoring Officer observed bridge crossings, as well as installations of culverts at various watercourses along the Tote Road (Picture 54). During previous visits, a seacan bridge was observed beside a newly constructed bridge along the Tote Road; however, during the 2016 site visit, the Monitoring Officer observed that the seacan bridge had been decommissioned and was unable to verify whether or not, or to what extent, the crossing limited the movement of water or fish species.

Picture 54: Bridge crossing along Tote Road

2.2.7 Terrestrial Wildlife and Habitat

Caribou

Condition 53

"The Proponent shall demonstrate consideration for the following:

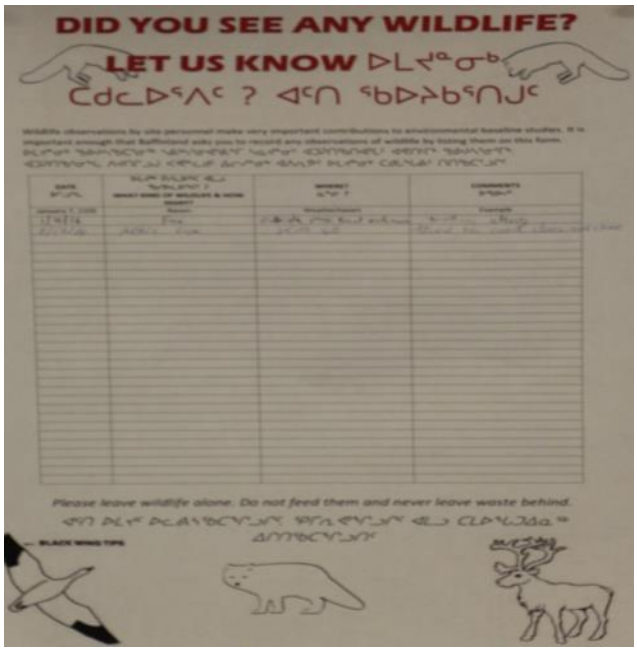
a. *Steps taken to prevent caribou mortality and injury as a result of train and vehicular traffic, including operational measures meant to maximize the potential for safe traffic relative to operations on the railway, Milne Inlet tote road and associated access roads.*
b. *Monitoring and mitigation measures at points where the railway, roads, trails and flight paths pass through caribou calving areas, particularly during caribou calving times…."*

Condition 61

"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."

At the time of the 2016 site visit, the Monitoring Officer did not observe any caribou or wildlife at any Project locations; however, while at the Steensby Inlet caribou tracks were observed near the existing camp. Mr. Millard stated during previous visits that caribou are not frequently sighted around the PDA by Project staff and that in the event caribou or other wildlife are encountered on site, a right of way policy is in place which requires vehicles to stop to allow wildlife pass safely. The Monitoring Officer noted that wildlife logs were posted at the main camp building for staff to report on wildlife encounters or observations around Mary River, Milne Port and along the Tote Road (Picture 55).



Picture 55: Wildlife log at Mary River site

2.2.8 Environmental Protection Plan

Condition 64

"The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures:

a. *Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and*
b. *Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting)."*

During the 2016 site visit, the Monitoring Officer did not observe any installation of an incinerator beside the kitchen, and did not note any concerns with respect to food wastes, odours or the storage of garbage that may serve as attractants to wildlife. Pursuant to Condition 64 (b), the Monitoring Officer confirmed that solid carnivore-proof skirting was fully installed around the accommodation building in Mary River and Milne Inlet. The Monitoring Officer observed the landfill site due to past concerns raised by the NIRB, as well as other authorizing agencies, regarding the the deteriorating condition of the litter fences, as well as the potential for offsite dispersion of litter or debris by wind to the adjacent tundra. In 2014 and 2015, the Board recommended that Baffinland address the deteriorating condition of the mesh fence used at the landfill and requested that Baffinland outline measures it would implement to prevent wastes from being dispersed or accessed by wildlife. At the time of the 2016 site visit, solid wastes were contained within the landfill and were fully covered with soils; however, the litter fences around the site were observed to be completely removed from the supporting poles and appeared to be damaged and in a state of disrepair similar to previous observations (Pictures 56 and 57).

Picture 56: Deteriorated landfill fencing

Picture 57: Damaged landfill fencing poles

The Monitoring Officer observed that, in general, the condition of the landfill fencing has not improved since the 2014 and 2015 site visits given the current condition of the protective mesh and litter fences. The Monitoring Officer concluded that there is potential for dispersal of waste materials offsite as some sections of the landfill do not have appropriate fencing (Picture 58).

Picture 58: Deteriorated landfill fencing

There are no specific terms and conditions within the current Project Certificate regarding the operation of the landfarm (Picture 59). However, the Board has noted concerns regarding the co-disposal of synthetic liners with contaminated snow and soil. In 2014 and 2015, the Board requested that Baffinland provide a rationale for the co-disposal of synthetic liners within the landfarm, describe how the landfarm is designed to address the treatment of synthetic liners, and discuss its plan for long term disposal of these materials. Baffinland responded that during the bladder farm decommissioning in the summer of 2014 some liner material became entrained in the soils and ended up in the landfarm for temporary storage, and further indicated that site personnel would ensure that the materials were stable and not transported by the wind to the adjacent tundra.

Picture 59: Landfarm with liners

Baffinland had further noted that the landfarm represented a low risk of windblown material, and that plans were underway in the Spring/Summer of 2015 to remove the liner from the facility and transport them off site to a certified disposal facility in southern Canada.

In 2015, the Monitoring Officer noted that additional contaminated soil and snow were still entrenched in the synthetic liners, and that new bags were presently used for storage of contaminated soils at the landfarm. Small pieces of synthetic liner, from the landfarm, were observed on the adjacent tundra. However, during the 2016 site visit, the Monitoring Officer noted no improvement with respect to the removal of synthetic liners and windblown debris from the site. In addition, used tires were observed near the landfarm area (Pictures 60 and 61). The previous Board recommendations to Baffinland to address the state of the landfarm as the facility in similar poor condition as previously reported over the past three (3) years.

Picture 60: Used tires near landfarm

Picture 61: Waste materials near landfarm

2.2.9 Birds – Project Infrastructure

Condition 68

> *"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."*

During previous site visits, the Monitoring Officer observed a communication tower at km 68 (Picture 62). Past issues raised by Baffinland regarding the installation of communication towers onsite were concerns that lights were shown to be an attractant to birds, and that in the study area birds are active during the 24-hour daylight season. At the time of the 2016 site visit, no flashing lights were observed on the communicator tower.

Picture 62: Communication tower

2.3 Marine Wildlife and Marine Habitat

Condition 101

> *"The Proponent shall incorporate into the appropriate monitoring plans the following items:*
> *101(c) Monitoring protocols that are responsive to Inuit concerns;*
> *101(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);*
> *101h(iii) Monitoring strategy focused on assessing and mitigating interaction between humans and wildlife at the port site(s)."*

Condition 109

> *"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."*

Prior to the site visit, Baffinland submitted its Shipping and Marine Wildlife Management Plan,[5] as well as its Shore-Based Marine Mammal Monitoring Report,[6] which specifically addressed some items under Condition 101. However, during the 2016 site visit, a helicopter was utilized

[5] Appendix J10-Shipping and Marine Wildlife Management Plan of the 2015 Annual Report to the NIRB (March 2016).
[6] Appendix N7-Shore-based Marine Mammal Monitoring Report of the 2015 Annual Report to the NIRB (March 2016).

for observing Bruce Head, an area where Baffinland conducts shore-based monitoring of narwhals and vessels (Picture 63). During the 2016 site visit the Monitoring Officer did not observe any vessels or narwhals around Milne Inlet. While the camp area near Bruce Head was unoccupied at the time of the aerial view, Mr. Millard mentioned that shore-based monitoring of narwhals at Bruce Head would only begin when vessels travel through Milne Inlet.

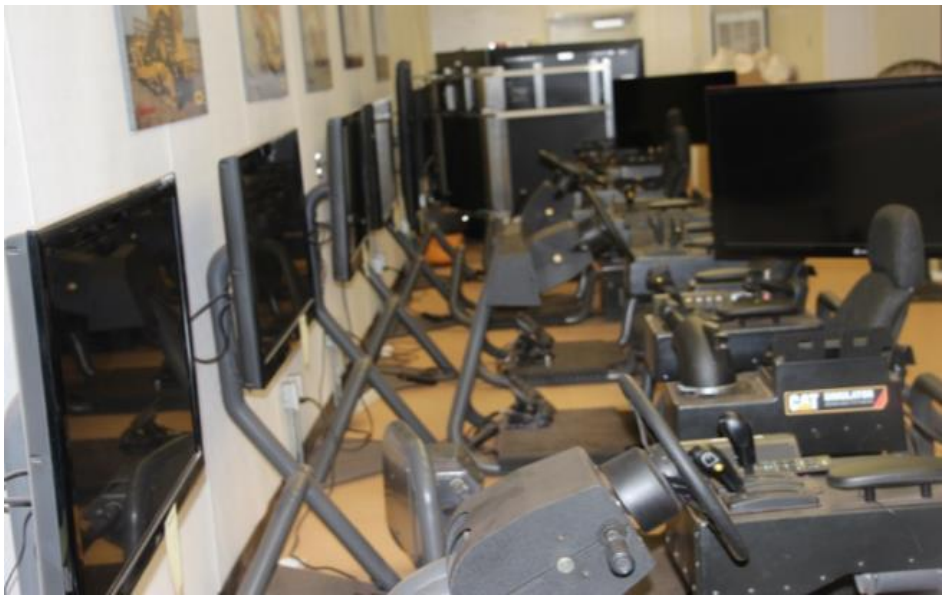
Picture 63: Bruce Head marine mammal observation area

2.4 Education and Training

Condition 137

> *"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."*

During the tour of the main accomodation building at the Mine site, the Monitoring Officer observed a driving simulator room, however, no employees were using it at the time of the site visit (Picture 64).



Picture 64: Driving simulator training room

2.5 Livelihood and Employment - Employee Family Contact

Condition 142

"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."

Condition 143

"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."

The Monitoring Officer did not observe any separation of any employee because of language or other cultural barriers. Baffinland is providing telephones so that Project employees are able to keep in contact with family or friends and ward off feelings of homesickness while working on site pursuant to Condition 143.

Condition 145

"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."

Condition 146

"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."

The Monitoring Officer observed English and Inuktitut informational advertisements at the main accommodations facility encouraging Inuit women to explore employment at the Mary River Project in the following positions: heavy equipment operators, haul truck drivers, skilled trades, mechanic, administrators, human resources, and various training opportunities (Picture 65). The Monitoring Officer did not observe any information regarding childcare availability or initiatives to offset or subsidize childcare for Project employees.

Picture 65: Human Resource information board

2.6 Human Health and Wellbeing

Condition 153

> *"The Proponent is encouraged to employ a mental health professional to provide counseling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being."*

At the time of the site visit, the NIRB Monitoring Officer did not observe any medical personnel at the health centre or professional mental health counselling services for employees onsite.

2.7 Culture, Resources and Land Use

Condition 165

> *"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…."

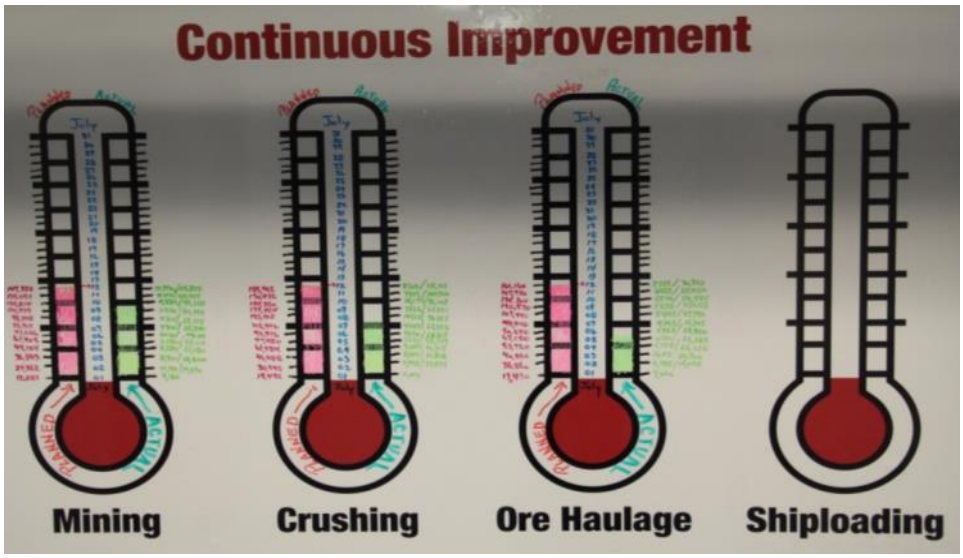
The Monitoring Officer observed two (2) emergency shelters along the Tote Road, at km 33 and 69 respectively. The Monitoring Officer was informed during previous visits that these emergency shelters were for use by Project personnel only.

2.8 Operational Variability and/or Flexibility

Condition 179 (a)

"In any given calendar year, the total volume of ore shipped via Milne Inlet, shall not exceed 4.2 million tonnes."

Although no shipping vessels were observed at Milne Port during the site visit, the Monitoring Officer noted the movement of several heavy trucks hauling ore via the Tote Road to Milne Inlet for stockpiling (Pictures 66 and 67).



Picture 66: Board showing planned and actual ore stockpiling targets

Picture 67: Ore stockpiles in Milne Port

3 FINDINGS AND SUMMARY

Due to the ongoing development of the Mary River Project, it was noted that many terms and conditions as contained within Project Certificate No. 005 may not be applicable for this monitoring period and/or have not yet been thoroughly implemented at this time by Baffinland. During the site visit, the Monitoring Officer observed that facilities in operation at the Mine site, Milne Inlet, and Steensby Camp were generally well maintained. In order to meet the requirements of the Project Certificate terms and conditions, and to ensure that potential adverse impacts to the environment are adequately mitigated, the Monitoring Officer has identified several issues that require follow-up and corrective action:

3.1 Used Tires

As noted in sections 2.1.1, 2.1.2, and 2.2.5, used tires appear to be a significant waste stream across the Project sites, particularly around the Mine site and Mile Port. While the Project Certificate does not have any specific terms and conditions for this particular waste stream; the management measures proposed by Baffinland in both the Final Environmental Impact Statement and the Environmental Protection Plan (EPP) commit to managing used tires through stockpiling for shipment offsite (e.g., re-treading, reuse, or disposal). Alternatively, in 2011 as part of the design of the Mine Site Landfill/Landfarm Site Layout Plan submitted to the Nunavut Water Board the tires would be disposed of on-site in a segregated area at the landfill facility.[7] During the 2016 site visit, a designated used tire storage area was not found within the landfill and used tires were found to inconsistently disposed of at different locations across the Project locations visited. However, on October 7, 2016, Baffinland provided an update to the NIRB noting that it is currently reviewing options for tire storage, and will develop a preliminary plan in time for submission with the 2016 NIRB Annual Report.

3.2 Waste Landfill

Although there are no specific terms and conditions in the NIRB Project Certificate regarding the regular operation of the landfill, general waste management practices at the Project site are expected to be consistent with best practices. The current version of the EPP, as submitted by Baffinland to the NIRB as part of the 2015 Annual Monitoring Report, incorporates provisions for landfill facility operations, monitoring, inspection and maintenance. During the NIRB's 2016 site visit, the Monitoring Officer observed that waste materials contained within the landfill were appropriately covered with soils, although it was noted that the use of soil covers increased the height of the landfill as compared to previous observations.

Further, continued deterioration of the protective mesh and incomplete fencing of the landfill footprint appeared to be a persisting issue, raising concerns with respect to the potential dispersal of waste materials offsite. No significant dispersal of waste materials offsite was noted at the time of the visit. The NIRB's 2014 Recommendation 11 required a follow-up from Baffinland due to the deteriorating state of the protective mesh around the landfill. Baffinland responded that due to the expanding footprint of the landfill, and the high winds often observed, the fence required periodic relocation, maintenance, and repair which was undertaken on a regular basis.

[7] http://www.nwb-oen.ca/public/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MRY1325%20BIMC/1%20APPLICATION/2008%20New/120215%202AM-MRY----%20Waste%20Mgmt%20Plan%20for%20Construc%20Operation%20and%20Closure%20Part%206-IMLE.pdf

Baffinland further indicated to the Board that overall, the effectiveness of the current fence type and configuration was deemed to be acceptable while it examined potential alternative fence types and designs based on its operational experience.

The NIRB's 2015 Recommendation 17 required Baffinland to provide description of how it incorporated the recommendation from Aboriginal Affairs and Northern Development Canada (AANDC, now Indigenous and Northern Affairs Canada) to replace the landfill fences with new fencing that would have greater long-term durability. As well, AANDC requested a discussion of how Baffinland would ensure that wastes disposed of at the landfill were properly contained, and would not become dispersed offsite due to wind or runoff. Baffinland responded that at the time of AANDC's site visit on June 3, 2015 a small quantity of windblown material was observed outside the litter fence area due to the damage of the fencing over the course of the winter. Baffinland stated that the fence was repaired shortly after the time of the inspection and any litter observed adjacent to the landfill site was cleaned up.

At the time of the 2016 site visit, most of the protective mesh around the landfill area was completely removed from the supporting poles similar to previous site visit observations in 2014 and 2015. The Monitoring Officer further noted that the condition of the fencing around the landfill was not significantly improved compared to previous years, and Baffinland has yet to install a more durable fencing material consistent with best practices and as recommended by INAC. However, on October 7, 2016, Baffinland provided an update to the NIRB regarding the status of the landfill, noting that a plastic mesh and an eight feet high new litter fence was constructed of wooden pallets and installed in August, 2016 around the active area of the landfill facility.

3.3 Uncontrolled Seepage from Waste Rock Pile

Conditions 17 and 46 require the Proponent to develop and implement effective measures to ensure that runoff, including effluent from project-related facilities and/or activities, satisfies all discharge criteria prior to release into the receiving environment. Baffinland reported within its Waste Rock Runoff Management Plan that the first phase of runoff management for years one (1) through four (4) for the waste rock stockpile area would consist of channels formed by berms around the stockpile perimeter produced by two (2) roads, one (1) on each of side of the waste stockpile. These would then channel runoff downstream of the waste rock stockpile to the sedimentation pond.

Baffinland predicted within its Waste Rock Management Plan that snow would accumulate in the waste rock stockpile during the winter and during the summer the melted snow, along with any rainfall, would seep through the active zone, and then runoff to the sides of the dump and/or drain from the base of the perimeter of the dump. Additionally, Baffinland predicted the water quality from the stockpile would meet discharge limits. However, as the runoff management committed to in the Final Environmental Impact Statement and Early Revue Phase of the Mary River Project (i.e., bermed channels) were not in place at the time of the site visit the NIRB cannot assess compliance of Conditions 17 and 46.

3.4 Landfarm - Contaminated Snow, Soil, and Synthetic Liners

The landfarm management and monitoring protocol outlined within Baffinland's Surface Water and Aquatic Ecosystem Management Plan stated that the 2016 Work Plan includes the ongoing management of hydrocarbon impact soils within the existing landfarm facility. As noted in the previous site observations and current site visit, the protocol related to proper management of disposed synthetic liners entrenched in contaminated soils does not appear to have been addressed pursuant to the Board's 2014 and 2015 recommendation. On September 28, 2016, Baffinland provided new updates to the NIRB regarding the condition of the landfarm, noting that the large piles of liners were removed in early September and placed in open seacans for disposal off site. In addition, Baffinland indicated that other debris that included the quatrex bags containing soil, and other refuse including small quantities of wood, garbage, and plastics were sorted and removed for proper disposal.

3.5 Aesthetic Quality

Condition 27 requires Baffinland to submit a public consultation report regarding affected communities thoughts on the changes that Project activities have had on the topography and landscape in the Project area and how this has impacted or changed their perceived aesthetic or visual value of that area. During the 2016 site visit the Monitoring Officer observed the ongoing significant changes of some project areas, noting the need for general cleanup of areas with unused materials, steel pipes, tires, metals, salt bags, wooden materials, synthetic materials, and drums particularly around contractor laydown areas, incinerators, and other locations.

3.6 Terrain Stability and Maintenance

Conditions 25 and 26 require that Baffinland 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. As noted within the Proponent's 2015 Annual Report to the NIRB, Baffinland had included the requirements of this plan into its Surface Water and Aquatic Ecosystems Management Plan. Baffinland had reported that in September 2014 the Tote Road and borrow sources were subject to a geotechnical inspections to assess the condition of the road and roadside borrow pits initially excavated in 2007 and 2008 as part of the bulk sample program. Baffinland outlines that several of the borrow pits were excavated into thaw-sensitive or ice-rich soils, for a total of 101 locations along the road surveyed, and 7% of those sites ranked as requiring a higher priority for stabilization. As noted during the 2016 site visit, several locations, particularly along Milne Inlet Tote Road and the sewage outfall area, showed signs of terrain instability and could pose a fall hazard to workers unfamiliar with the site. Due to the prevalence of deteriorating soil and permafrost conditions and extensive erosion issues noted in several areas across the Project sites, the expectations of Conditions 25 and 26 are not being met and the mitigation measures in the applicable plans should be reconsidered.

3.7 Dust Suppression Measures

Condition 10 requires the implementation of a dust management and monitoring plan at site to prevent impacts to air quality from dust dispersion. At the time of the 2016 site visit, trucks were observed applying water and salt (calcium chloride) to the Tote Road; however, some areas of

the road, especially the areas close to the Mine site, did not appear to have adequate dust suppression as dust was observed behind moving vehicles. In comparison with the site observations from 2015, dust plumes were significantly reduced, however, efforts are still required to ensure consistency in applying dust suppression measures along the Tote Road and other locations.

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