

**Baffinland Iron Mines 2021 Annual Report to the
Nunavut Impact Review Board**

**Baffinland ᐅᐱᑦᓂᐱᑦ 2021 ᐱᑦᑭᑭᑦᑕᑦ ᐅᓂᑲᑦ
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Project Certificate No. 005
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March 31, 2022 | ᑭᑦᑭᑦ 31, 2022



2021 NIRB ANNUAL REPORT

Popular Summary

MARY RIVER PROJECT

Monitoring Programs

Gain insight into all the Marine, Terrestrial, Freshwater, and Air Quality Monitoring Programs at Baffinland.
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2021 Compliance Performance

Learn more about Baffinland's self-assessment status of compliance with PC conditions for 2021.
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Planning Ahead

Baffinland continues operations under the Early Revenue Phase and awaiting a decision on Phase 2.
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THE MARY RIVER PROJECT

The Mary River iron ore deposits on North Baffin Island are considered to be one of the largest and highest quality iron ore open pit deposits in the world. With such high grade iron ore, there are no concentrators, tailings, or tailings ponds associated with production activities. The Project is operated by Baffinland Iron Mines Corporation (Baffinland) and is jointly owned by The Energy and Minerals Group and ArcelorMittal. The mine is located on Baffin Island, approximately 160 km south-southwest of the nearest community of Pond Inlet (Mittimatalik), in the Qikiqtani region of Nunavut, Canada, and 1,000 km north-northwest of the territorial capital of Iqaluit. Baffinland's head office is located in Oakville, Ontario and its northern headquarters is located in Iqaluit, Nunavut. Baffinland also has offices in five North Baffin communities including Arctic Bay, Clyde River, Sanirajak, Igloolik and Pond Inlet.

The current approved Project is limited to mining out of Deposit No. 1, however, Baffinland administers an extensive exploration program designed to increase the known reserves in Deposit No. 1, as well as in other deposits in close proximity to the Project Area. The Project represents a potential multi-generational opportunity for resource-driven socio-economic development in the North Baffin region.

The Project currently consists of three main operating centres: the Mary River Mine Site (the Mine Site), the 100-km long Milne Inlet Tote Road (Tote Road), and the Milne Port facility (Milne Port). There are also two approved, but yet to be built components of the Project: the Southern Railway and Steensby Port. The operation includes open pit mining, crushing and transportation of ore overland 12 months of the year along the Tote Road from the Mine Site to the Milne Port. The ore is shipped to markets in Europe and Asia between July and October. The Project is currently operating in the Early Revenue Phase, augmented by the temporary Production Increase Proposal (2018 to 2021), that allows for the hauling and shipping of up to 6 million tonnes per annum (Mtpa) of iron ore under the Project Certificate.

During 2021, mining operations continued at Deposit No. 1 and a total of 5.53 Mt of ore was transported by ore haul trucks along the Tote Road from the Mine Site and stockpiled at the Milne Port. During the 2021 shipping season a total of 5.6 Mt of ore was shipped from the Project's Milne Port to international markets. In 2021, marine ore shipments involved 73 individual ore carrier vessel voyages. The shipping season was delayed in 2021 due to the implementation of a provisional Narwhal Adaptive Management Response Plan, which delayed the start of the shipping season and ultimately limited the volume of ore that could be shipped.



Pond Inlet Youth Forum, October 2021

CONSULTATIONS & ENGAGEMENTS

With some easing of travel restrictions in 2021, Baffinland implemented a hybrid approach to community engagement activities in the 5 North Baffin communities and Iqaluit, with some events and meetings being held in-person and others relying on video and telephone conference. Baffinland also continued to maintain a presence on social media and local radio as a means to ensure that information about the Project is accessible to a wide audience. Although Baffinland acknowledges that in-person engagement is preferred, the hybrid model has proven effective in ensuring that effective lines of communication remained in place between community representatives and other stakeholders and Baffinland throughout the pandemic.

As travel restrictions and public health orders continually evolved, Baffinland frequently evaluated what methods of engagement were most effective, while still maintaining individual and community health and safety as the top priority. This adaptive approach to engagement is predicted to continue as the COVID-19 pandemic and associated public health orders evolve throughout 2022.

Consultation with both Inuit community members and other parties, including the Qikiqtani Inuit Association (QIA) and regulators had a significant focus on Baffinland's Phase 2 Proposal in 2021. Although Baffinland continued to provide relevant operational updates to the communities and regulators, a large portion of interest from both these groups was specific to Phase 2. Wherever possible, Baffinland has taken feedback received throughout the Phase 2 review process, and applied it to existing operations. For example, through Phase 2 technical review submissions, issues related to ballast water and narwhal entrapment events were raised. Despite not having approval on the Phase 2 Proposal, in 2021 Baffinland implemented commitments for additional ballast water mitigations (i.e. requiring vessels to conduct both exchange and treatment) and has been running narwhal entrapment clearance aerial surveys since 2019. These examples highlight that where synergies between the current operation and the Phase 2 Proposal were identified, Baffinland proactively integrated forward-looking commitments, to ensure that information received through Phase 2 consultation events were captured and addressed throughout 2021 to the extent possible.

RESPONSE TO COVID-19

At Baffinland, the safety and wellbeing of our employees, contractors and the North Baffin communities remains our highest priority, while ensuring the continuity of our business during these evolving and challenging times. Baffinland has robust Emergency and Crisis Management Plans, which include an infectious disease component. Our response to COVID-19 not only includes industry leading health and safety measures, but also additional community support to help relieve some of the strain arising from this global pandemic. Together with its employees, Baffinland has taken strides to support North Baffin communities throughout the pandemic.

At the start of 2021, Baffinland's Nunavummiut employees continued to remain in their home communities with compensation to help protect themselves and their communities. This arrangement was first implemented in April 2020 when employees were put on standby pay rates with full group benefits. Throughout 2021, Baffinland continued to work with the Government of Nunavut and Nunavut Public Health on risk based initiatives, which led to Nunavummiut employees beginning their return to work in July of 2021. The timing of this allowed for Inuit researchers from local communities to participate in several of the summer environmental monitoring programs, when possible. Unfortunately, in December 2021, it was determined that due to the highly contagious Omicron variant, Nunavummiut employees would return home with paid-leave. Baffinland is pleased to report that as of March 2022, our Nunavummiut-based employees are re-transitioning back to site.

For more information on Baffinland's COVID-19 response, please visit www.baffinland.com/sustainability/health-and-safety/

EDUCATION & TRAINING

The Qikiqtani Skills and Training for Employment Partnership has proven to be the most successful employment and training program currently offered at Baffinland. The Q-STEP Charter from Employment and Service Development Canada was scheduled to end on March 31st, 2021. Due to COVID-19, access to the remaining funding of the program was extended until March 31st, 2022. The Q-STEP teams at Baffinland and QIA have also secured additional funding from Kakivak Association for a portion of the Q-STEP program including:

1. Community based work readiness training
2. On-site work readiness training
3. Heavy Equipment Operators Training
4. Adult Basic Education and Pathway to Adult Secondary School programs

The Q-STEP team continues to seek additional third party funding to support the continuation of apprenticeship training at Baffinland.

In 2021, Inuit training hours totalled 32,974 hours which is 27.2% of the total training provided by Baffinland. Baffinland is also working to develop new training programs that would be offered both in community and at the Mine Site. Baffinland is also working with contractors to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as the operation advances, employment increases, and feedback from Inuit employees is implemented.



Quluq High School Graduates, Clyde River 2021

2021 COMPLIANCE PERFORMANCE

The Annual Report is a requirement of the Project Certificate No. 005 issued by the Nunavut Impact Review Board to Baffinland Iron Mines Corporation outlining the terms and conditions for operation of the Mary River Project. The Report provides information on how Baffinland is meeting the terms and conditions of the Project Certificate and its performance against them.

The Annual Report also presents an opportunity to discuss the Project activities over the preceding calendar year and highlights what is coming ahead for the following year. The complete Report can be found on the NIRB Public Registry and the Baffinland Document Portal.

Overall, in 2021 Baffinland remained ‘In Compliance’ with the required Terms and Conditions for the Project. Of the 170 Project Certificate conditions that were applicable to the Project in 2021, Baffinland is 96% ‘In Compliance’ with these Terms and Conditions, consistent with its performance in 2020. In areas where improvement is still required, Baffinland will continue to improve and refine existing mitigations and monitoring programs, make operational changes, implement adaptive management, and work with regulators and the communities to ensure the Project remains ‘In Compliance’ continues to achieve high rates of compliance with Project Certificate No. 005.

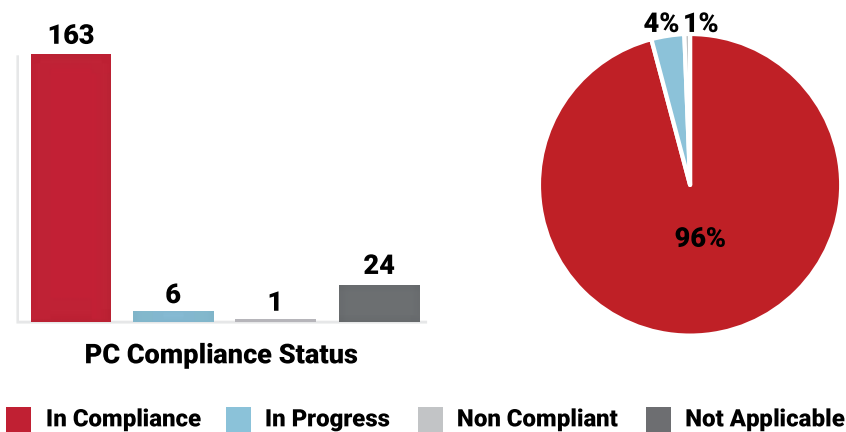
Baffinland will continue to complete its self-assessment using the approach described below until such time that guidance is issued by the NIRB on its expectations for completing self-assessments and/or its methodology for assessing PC compliance is disclosed to proponents.

Self Assessment Methodology

Baffinland has taken a conservative approach for self-assessing the status of compliance with Project Certificate (PC) conditions for 2021. When determining a status of compliance for each of the PC conditions, the following process was implemented by Baffinland and its technical experts:

1. A review of the specific requirements outlined in each PC condition is conducted.
2. A review of all relevant work completed by Baffinland in the reporting year and/or previous reporting years (if applicable) relevant to the PC condition is conducted.
3. A consideration of previous status assignments by NIRB and associated interpretation.
4. A gap analysis is completed to assess whether or not there is a delta between the requirements of the PC condition and the work completed by Baffinland to meet these requirements.
5. Inuit and stakeholder comments as relevant to the PC condition are considered.
6. A status of compliance based on the results of Baffinland’s self-assessment is assigned.

Summary of Baffinland’s 2021 Overall Performance Against Project Certificate No. 005 Terms and Conditions



Status of Compliance	
In Compliance	Condition requirements have been met or exceeded. <i>*Rationale for meeting compliance requirements is provided.</i>
In Progress	Condition requirements have been partially met. <i>*Demonstrable efforts towards meeting compliance requirements is evidenced.</i>
Non Compliant	Condition requirements have not been met. <i>*Rationale for being unable to meet compliance requirements is</i>
Not Applicable	The PC Term and Condition is not applicable to the current phase of the Project for the relevant monitoring period.

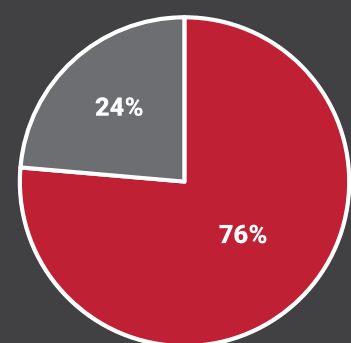
AIR QUALITY MONITORING PROGRAMS



In 2021, the following data collection and monitoring was undertaken in relation to the atmospheric environment monitoring program:

- Meteorological Monitoring
- Ambient Air Quality Monitoring
- Dustfall Monitoring
- Climate Change

**Air Quality 2021
Performance Against PC
No.005 Terms and Conditions**



- In Compliance
- Non Compliant
- In Progress
- Not Applicable

Weather conditions in 2021 were summarized and compared to average conditions from previous years. Mean monthly air temperatures at the Mine Site and Milne Port in 2021 were fairly consistent, both in terms of timing and average temperature, with baseline and post-baseline periods. Wind speed and direction at the Mine Site were also consistent with past years (generally a southeast wind). Milne Port generally experienced north-northeast winds off of Milne Inlet, and southeast winds.

Ambient monitoring for sulphur dioxide and nitrogen oxides continued to be carried out at the Mine Site and Milne Port. Results from the continuous monitoring indicate that concentrations were below the Nunavut Air Quality Standards for NO₂ and SO₂, and were below the 2021 Canada Ambient Air Quality Standards. Ambient air concentrations were generally greater in winter and lower in summer, consistent with previous years. In 2020, Baffinland retained expert support to evaluate the implementation of continuous particulate monitoring stations, a commitment made to Environment and Climate Change Canada through the Production Increase Proposal technical review. The stations were installed at both the Mine and Port site in 2021 and are currently collecting and analyzing ambient air quality data and will be reported for the 2022 period..

In 2021, further expansions were made to Baffinland's passive dustfall monitoring program. 14 new dustfall monitoring stations were installed: four additional monitors at Milne Port; four new monitors along the section of the proposed Phase 2 railway that departs the Tote Road to define baseline conditions; and, in response to requests from community members and the TEWG, six dustfall monitors were installed to collect dust at 0.5 m as a pilot study to investigate the variability between dustfall sampling at the standardized height of 2.0 m and that closer to ground level. Results show there is very little difference between dustfall levels at 0.5 and 2.0m.

Baffinland also expanded the dustfall satellite imagery analysis to include undeveloped areas of the Project at Steensby, which facilitate an enhanced comparative analysis to a 'reference' site. Additionally, in 2021, Baffinland commissioned a third-party Dust Audit, which includes the establishment of a Dust Audit Committee comprised of representatives from the five North Baffin communities. As part of this work, the Audit Committee undertook an on-site investigation in October 2021, and additional engagement activities are planned for 2022. The results of the audit will be captured in a Final Report, which will be shared with NIRB and other Parties, before the end of 2022. Baffinland will seek to integrate the recommendations of the Committee following the release of the Final Report.

From 2015 through 2021, there was no consistent correlation between increases in production and dustfall. Results of 2021 monitoring support that additional dust mitigations employed in 2021 along the Tote Road and at the Milne Port stockpiles are functioning as intended.

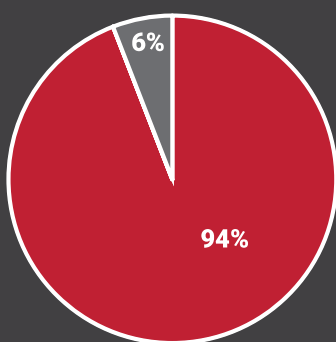
Baffinland also continued to advance the development of updates to its 2019 Climate Change Strategy throughout 2021. Efforts including substantial engagement with both internal and external parties to seek feedback on initial plans and to seek input on community-driven priorities and potential solutions.

MARINE MONITORING PROGRAMS

In 2021, Baffinland implemented the following marine environment monitoring programs;

- Ringed Seal Aerial Survey Program
- Marine Mammal Aerial Survey Program
- Bruce Head Shore-based Monitoring Program
- Underwater Passive Acoustic Monitoring Program
- Marine Environmental Effects Monitoring Program (MEEMP) and Non-Indigenous Species /Aquatic Invasive Species (NIS/AIS) Monitoring Program
- Freight Dock Habitat Offset Monitoring Program

Marine 2021
Performance Against PC
No.005 Terms and Conditions



■ In Compliance ■ Non Compliant
■ In Progress ■ Not Applicable

2021 was the first year the Ringed Seal aerial survey has been conducted by Baffinland since 2014, however, surveys were completed by Fisheries and Oceans Canada (DFO) in 2016 and 2017. The results of the 2021 survey demonstrate that ringed seal density and distribution remain similar to previous years, including 2014, before ore shipments for the Project began in 2015, and 2016/17, before shoulder season icebreaking activities commenced in 2018. These results support impact predictions that no significant effects to ringed seal distribution and density would occur as a result of Project activities.

Results from the open water narwhal aerial survey indicate that narwhal abundance in Eclipse Sound was statistically lower in 2021 than previous years (i.e. 2013, 2016, 2019 and 2020), while the combined narwhal abundance in Eclipse Sound and Admiralty Inlet was statistically higher in 2021 to that observed in previous years (2013, 2019 and 2020). The Bruce Head Shore-based Monitoring Program also detected fewer narwhal than previous years, a finding that aligns with the 2021 aerial survey results. Additionally, the proportion of immature narwhal (i.e., calves and yearlings) in the observed population at Bruce Head was lower than all previous survey years, although not significantly lower than the baseline condition (2014/2015). This decrease is possibly attributed to the low sample size and high variability in the 2021 Bruce Head monitoring data, as also indicated by the aerial survey results, rather than being reflective of a true change in the population structure. Additional investigations will be undertaken in 2022 using aerial survey imagery to reassess whether this change is real or rather an artefact of the low sample size in 2021. Although the total number of narwhal near Bruce Head was lower in 2021, observed behavioural responses of narwhal to shipping appear generally consistent with previous years, meaning that narwhal continue to demonstrate temporary and localized responses to shipping activities, with animals returning to their pre-response behaviour shortly following initial exposure. Underwater sounds from Project shipping activities (near Bruce Head and Ragged Island) and non-Project activities near Pond Inlet were also successfully obtained in 2021. Sound exposure levels from shipping never exceeded thresholds for acoustic injury (temporary or permanent hearing loss) at any recording location, and on average, underwater noise above rarely exceeded the 120 dB disturbance threshold at any location (i.e. less than one hour per day, which is significantly lower than predictions derived through acoustic modelling).

A holistic review of the data from the 2021 shipping season does not conclude that the relatively lower numbers of narwhal observed in Eclipse



Sound in 2021 is Project-related. Elimination of early season ice-breaking in 2021 further reduced residual uncertainty in that Project shipping is the primary driver of the observed change in narwhal abundance in Eclipse Sound.

A review of available Inuit knowledge and scientific monitoring data supports that the Admiralty Inlet and Eclipse Sound narwhal stocks may actually represent a single stock with natural exchange of animals between the two putative summering areas. Another factor could be that narwhal migratory routes and summering areas have been influenced by environmental factors, such as changing ice conditions and/or prey/predator dynamics. This is further supported by recorded harvest levels in the spring at the Pond Inlet floe edge, which suggest that few narwhal were present at the floe edge at this time waiting to migrate into Eclipse Sound in the months before Project shipping began. However, it is noted that Pond Inlet harvesters were able to fulfill their entire summer quota by the fall.

Based on 2021 monitoring and the need to initiate planning for the 2022 shipping season, it is Baffinland's intention to resume icebreaking in 2022 concurrent with additional monitoring in the form of a spring narwhal tagging program, which will fill gaps on narwhal behavioural responses to icebreaking. Baffinland will carry out focused consultations with key parties on 2022 shipping activities and monitoring plans, all of which will be summarized to the NIRB in the 2022 Marine Shipping and Vessel Management Report. Baffinland will also engage DFO to understand what, if any, regional studies could be planned in the near future that may provide greater insights into narwhal migratory behaviour, environmental conditions affecting regional narwhal abundance distribution, and/or to re-examine the classification of Eclipse Sound and Admiralty Inlet narwhal as distinct stocks. To be clear, such regional studies would be complemented by Baffinland's Project effects monitoring.

In 2021, Baffinland also continued to undertake its MEEMP and NIS/AIS Monitoring Program at Milne Port. This included monitoring of water quality, sediment quality, habitat availability, health and diversity of species, fish diversity, presence and health, and the presence of non-indigenous species and/or aquatic invasive species. Consistent with previous years, the results of this program indicate that effects of the Project on the marine environment are within predictions. There is no indication that the Project is negatively affecting fish health or resulting in changes to the local fish communities to-date. Marine water and sediment quality at Milne Port remains below the applicable scientific guidelines or remains consistent with pre-Project operation levels for metals such as iron.

In 2021, Baffinland implemented Year 2 of habitat offset monitoring required under the Fisheries Act Authorization for the Freight Dock. Field surveys were conducted on both Freight Dock offset habitat as well as a suitable Reference Area outside the area of Project influence. Monitoring results indicate that the Freight Dock offset habitat appears to be providing a suitable and stable substrate for colonization and growth of marine organisms, as evidenced by the presence of macroalgae, motile invertebrate, and fish taxa. However, there are a few small and localized areas where the crushed rockfill foundation has become exposed; these exposed areas are vulnerable to erosion. A stability assessment in Year 5 of the program will provide additional information on the physical stability of these areas and whether remedial work may be considered.



Underwater Acoustic Monitoring Program



Marine Effects Monitoring

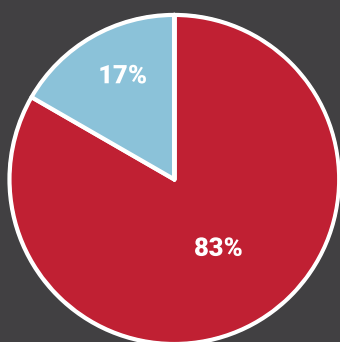
FRESHWATER MONITORING PROGRAMS



Monitoring activities undertaken in relation to the freshwater environment in 2021 included:

- Aquatic Effects Monitoring Program (AEMP)
 - Core Receiving Environment Monitoring Program
 - Lake Sedimentation Monitoring Program
 - Hydrometric Monitoring Program
- Environmental Effects Monitoring Program
- Milne Inlet Freshwater Health Study (Completed in collaboration with MHTO)
- Tote Road Fish Habitat Monitoring
- Surveillance Network Program
- Tote Road Monitoring Program
- Groundwater Monitoring Program

Freshwater 2021
Performance Against PC
No.005 Terms and Conditions



■ In Compliance ■ In Progress
■ Non Compliant ■ Not Applicable

The Aquatic Effects Monitoring Program focuses on the key potential impacts to freshwater environment valued ecosystems components (VECs). The freshwater VECs include water quantity and quality, sediment quality, and freshwater biota and fish habitat. The results of the 2021 Core Receiving Environment Monitoring Program, which assesses mine site lakes and streams, indicate that no ecologically significant, adverse, mine-related effects to biota were identified at any of the receiving waterbodies based on comparisons to applicable reference and/or baseline conditions. Lake Sedimentation monitoring at the Mine Site indicate that sedimentation rates are generally consistent with baseline except in the shallow stations, but accumulation rates at these sites remain well below the proposed low response threshold of 0.15 mm.

The fish habitat monitoring associated with the Tote Road Fisheries Act Authorization identified that the fish use of the rustic fishway installed at BG-30 continued to be successful. In 2021, there was no in-stream construction works at crossings classified as Harmful Alteration, Disruption or Destruction (of Fish Habitat) (HADD), compensation, and Letters of Advice (LOA) crossings. 2021 surveys noted recurring perches and sedimentation issues at several crossings. Appropriate remedial measures are being identified in a short term and long term plan, which will be discussed with DFO and implemented to address these issues. The necessary permits will be obtained prior to executing remedial works in 2022.

Results of the 2021 Surveillance Network Program, which monitors all effluent discharge and runoff from project areas, indicate that exceedances of applicable discharge criteria in 2021 involved primarily surface water runoff and effluents with elevated total suspended solids levels. In each case, appropriate control measures were implemented to restore TSS levels below applicable discharge criteria. Baffinland continues to assess and implement the appropriate corrective and mitigation measures to address ongoing sedimentation concerns at the Project. As part of the Long Term Water Management Plan Baffinland also constructed the KM 105 dam to control sediment loading in the receiving environment.



Fish Monitoring at Tote Road Culvert BG-01



Mine Site Hydrology Program

Groundwater consultants specialized in Arctic environments were retained in 2021 to execute the current groundwater monitoring program at the Mine Site landfill and hazardous waste berms. As additional data is collected, Baffinland will be able to further characterize natural groundwater chemistry at the Project and further identify any trends, including potential impacts from Project activities or infrastructure.

The 2021 Milne Inlet Freshwater Fish Health Assessment program was initiated following discussions with the MHTO about the potential effects of the Milne Port facility operations on anadromous Arctic char and to fulfill requirements of Term and Condition No. 48a. The design for the study was developed following consultation and direction from the MHTO on sampling locations, timing, and techniques for the study. The 2021 field fish health assessment program ran from August 12 to 19 with a member from the MHTO at the Tugaat and Qurluktuk River systems. Continuation of this program is planned for August 2022 to focus on Ikaluit river systems as field teams were unable to access this area due to weather in 2021.

Mine Site AEMP Winter Lake Sampling



Routine Tote Road Water Quality Monitoring



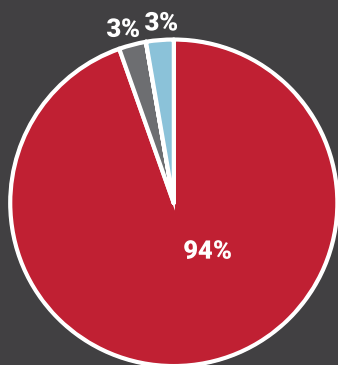
TERRESTRIAL MONITORING PROGRAMS



In 2021, the following data collection and monitoring was undertaken in relation to the terrestrial environment monitoring program:

- Vegetation Monitoring
- Height of Land Caribou Surveys
- Remote Camera Wildlife Monitoring Program
- Snow Track Surveys
- Snowbank Height Monitoring
- Helicopter Flight Height Analysis
- Migratory Bird Nest Surveys

Terrestrial 2021
Performance Against PC
No.005 Terms and Conditions



■ In Compliance ■ Non Compliant
■ In Progress ■ Not Applicable

Vegetation monitoring in 2021 included vegetation and soils base metals monitoring. Soil-metal concentrations and lichen-metal concentrations at the Project mainly indicated no significant increases compared with baseline values, and all samples remained within guidelines. No significant risk to human or ecological health was identified.

In 2021, after incorporating pilot rationale, overall helicopter cruising altitude compliance in all areas in all months was 92.2%. This represents a decrease from 2020 compliance rates and although noise monitoring data indicate that helicopter noise is likely too infrequent in all Project areas to cause any significant disturbance to wildlife, Baffinland aims to continuously improve in this area.

Wildlife monitoring included snow track surveys, height of land caribou surveys, and migratory bird nest surveys. No caribou were observed during the height of land surveys in 2021, and no caribou tracks were identified during the snow track surveys. These results are consistent with previous years, and with low regional abundance estimates provided by the Government of Nunavut. Remote wildlife cameras were also installed in 2021 to address questions from the Terrestrial Working Group on whether caribou were near the Project site when height-of-land surveys were not being run. As no caribou were spotted in the over 42,000 photos captured from the 12 cameras, Baffinland remains confident that the results of the height-of-land surveys are a by-product of the low regional abundance numbers in caribou, and not due to a methodological issue with the program.

Bird nest surveys were completed before any land disturbance, with two nests being identified in a potential work area in 2021. Construction was postponed and only proceeded once the chicks had left the nest.

SOCIO-ECONOMIC BENEFIT SUMMARY



2021 marks nine years since construction first began, and seven full years of operations at the Mary River Project. Baffinland has continued its phased development of the Mary River Project.

A total of 493,131 hours were worked by Inuit and 3,652,195 by Non-Inuit in 2021. These hours include both Baffinland and Contractor employees. In total, Inuit employment hours were 12% of the total hours worked. Baffinland's Inuit employee payroll totaled \$15,292,407. These amounts include all Inuit employees who lived in and outside of Nunavut. Contractor's Inuit employee payroll totaled \$6,303,205. These amounts include all Inuit employees who lived in and outside of Nunavut.

Total contract expenditures to Inuit firms exceeded \$220 million in 2021. This includes twenty-five contracts with Inuit-owned businesses and joint ventures, all of which were based in either North Baffin communities or Iqaluit.

In addition to the direct impacts of the Project discussed above there are direct community-benefit programs financed via the Inuit Impact Benefit Agreement, such as the Harvesters Enabling Program that provide substantial benefits to Inuit in the North Baffin communities. In addition, revenues from the Project flows to other Parties, which are expected to have positive spin-off effects for Inuit and other Nunavummiut. For example, in 2021, Baffinland paid a total of approximately \$15 million in taxes to the Government of Nunavut: \$10.3 million in employee payroll tax and \$4.7 million in fuel tax. Additionally, in 2021 Baffinland paid a total of \$9,206,970 in royalties to QIA in 2021 as well as \$3,463,126 in Commercial Rent. Throughout 2021, Baffinland also heard Inuit communities express a desire to receive direct financial benefits from the Project. One such initiative includes payment to the Tasiuqtiit Working Group, which is jointly managed by the Hamlet of Pond Inlet and the Mittimatalik Hunter and Trappers Organization (MHTO). This Working Group has an agreement with Baffinland that requires Baffinland to provide payment of \$10,000.00 for every ore carrier required to ship over 4.2 MT of ore. For the years between 2018 to 2021, this amounts to a total of \$730,000 for the Tasiuqtiit Working Group as a result of this agreement.

As of 2021, the Project has:

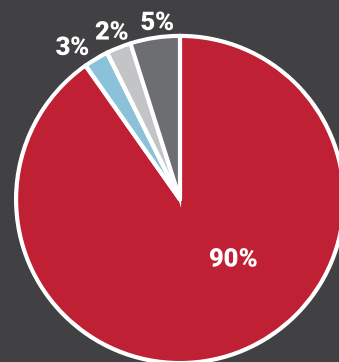
\$100m

Provided over \$ 100 million in wages to Inuit Project Employees and Contractors

\$1.5b

\$1.5 billion in contracts signed and awarded to Inuit Firms

Socio-Economic 2021 Performance Against PC No.005 Terms and Conditions



■ In Compliance ■ Non Compliant
■ In Progress ■ Not Applicable



Continued Development of Deposit No. 1 (Nuluujaak Pit)

PLANNING AHEAD

In 2022, Baffinland will work towards continuing operations, and, depending on the outcome of the responsible authorities' decision on the Phase 2 Proposal, will proceed with the preparations for the expansion of the Project, where possible. Specific activities to support the current operations that are proposed to be undertaken in 2022 include: the mining, crushing, hauling, stockpiling, shiploading and shipping of iron ore, as well as the construction and maintenance of supporting infrastructure required at Milne Port, along the Tote Road, and the Mine Site. Additionally, Baffinland will pursue on-going exploration activities as required to maintain mineral tenure in good standing and position the Company for future exploration programs.

The Project's Phase 2 Expansion Proposal continues to advance through a joint assessment administered by the NIRB and NWB. As of January 2022, NIRB has closed the Public Record for the Phase 2 Proposal and the NIRB Panel's "Reconsideration Report and Recommendations" will be conveyed to the Responsible Ministers on or before May 13, 2022.

No activities are planned to be undertaken along the south railway or at Steensby Port in 2022, with the exception of select environmental studies to support the post environmental assessment permitting for the future development of the southern transportation corridor and Steensby Port, should that be possible. Project environmental monitoring programs prescribed by the Project Certificate, water licences, authorizations, management plans and environmental effects monitoring plans will continue through 2022.



Fully Loaded Ore Haul Truck Travelling Along the Tote Road To Milne Port



Baffinland's 2021 Shipping Monitor Team, Pond Inlet

QUESTIONS? HERE IS HOW YOU CAN REACH US

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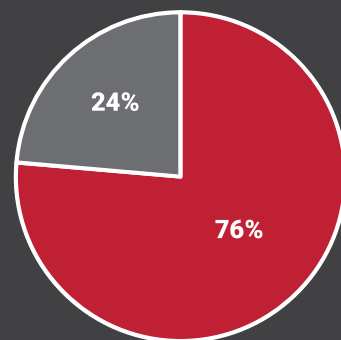
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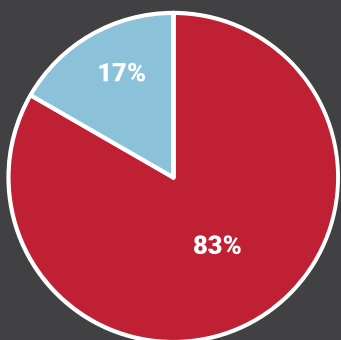
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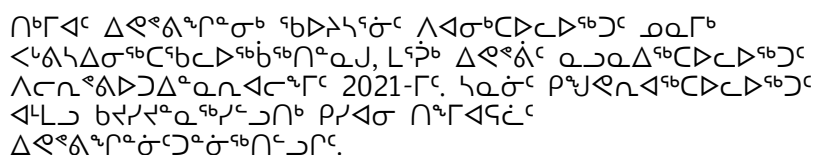
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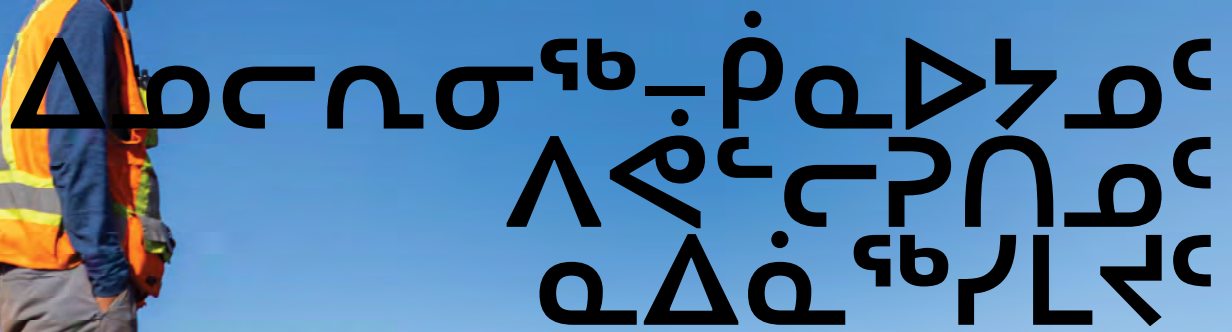
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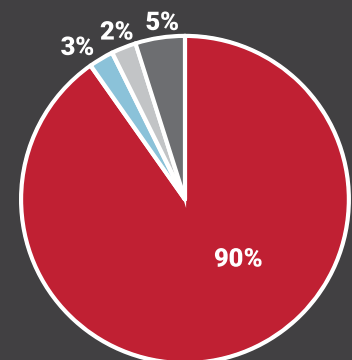
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Baffinland Iron Mines Corporation

Mary River Project

2021 ANNUAL REPORT TO THE NUNAVUT IMPACT REVIEW BOARD





2022-03-31	0		
		L. Kamermans	M. Lord-Hoyle
Date	Rev.	Reviewed By	Approved By

TABLE 0: REPORT SUBMISSION SUMMARY

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ABBREVIATIONS

AANDC	Aboriginal Affairs and Northern Development Canada
AAQS	Ambient Air Quality Standards
ADCP	Acoustic Doppler Current Profilers
AED	Automatic External Defibrillator
AEMP	Aquatic Effects Monitoring Plan
AIS	Aquatic Invasive Species
AiS	Automatic Identification System
AMBNS	Active Migratory Bird Nest Surveys
APRF	Annual Project Review Forum
ARD	Acid Rock Drainage
ARU	Autonomous Recording Units
As	Arsenic
ASR	Annual Security Review
Baffinland	Baffinland Iron Mines Corporation
BC MOE	British Columbia Ministry of Environment
BCLO	Baffinland Community Liaison Officer
BDO	BDO Canada LLP
BHL	Baffinland Hematite Lump
BSA	Behavioural Study Area
BWM	Ballast Water Management
BWMP	Ballast Water Management Plan
CAAQS	Canadian Ambient Air Quality Standards
CC	Contracting Committee
CCCS	Canadian Centre for Climate Services
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
Cd	Cadmium
CDA	Canadian Dam Association
CEDO	Community Economic Development Officer
CF	Crusher Facility
CGVD	Canadian Geodetic Vertical Datum
CHS	Canadian Hydrographic Service
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ eq	Carbon Dioxide Equivalent
CoPC	Contaminant of Potential Concern
CORI	Coastal and Ocean Resources Inc.
CPA	Closest Point of Approach
CPIT	Contracting and Procurement Information Tour

CPR.....	Cardiopulmonary Resuscitation
CPUE	Catch-Per-Unit-Effort
CRD	Collaborative Research and Development
CRDG.....	Collaborative Research and Development Grant
CREMP	Core Receiving Environment Monitoring Program
CTD	Conductivity, Temperature, and Depth
Cu	Copper
CwS	Canada-Wide Standards
CWS	Canadian Wildlife Service
dB.....	Decibels
dBA	A-weighted Decibels
DAF	Dissolved Air Flotation
DFO	Department of Fisheries and Oceans
DL.....	Detection Limit
DOE.....	Department of Environment
DPA	Development Partnership Agreement
DSD	Department of Sustainable Development
DSP.....	Direct Shipping Pellets
dw	Dry Weight
EC.....	Environment Canada
ECo.....	Employment Committee
ECCC.....	Environment and Climate Change Canada
ECSAS.....	Eastern Canada Seabirds at Sea
EDC	Endocrine Disruption Chemicals
EDI.....	Environmental Dynamics Inc.
EEZ	Exclusive Economic Zone
EEM.....	Environmental Effects Monitoring
EFAP.....	Employee Family Assistance Program
EIS	Environmental Impact Statement
EPP.....	Environmental Protection Plan
ERP.....	Early Revenue Phase
ERp.....	Emergency Response Plan
ES	Eclipse Sound
ETIS	Employment and Training Information Sessions
EWI	Early Warning Indicators
FA.....	Fishing Area
FAA.....	Fisheries Act Authorization
FEIS	Final Environmental Impact Statement
FIGQ.....	Federal Interim Groundwater Quality
FLIR	Forward-Looking Infrared
FNBC	First Nations Bank of Canada
FWSSWMP	Fresh Water Supply, Sewage and Wastewater Management Plan

FTE	Full-Time Equivalents
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GN	Government of Nunavut
Golder	Golder Associates Ltd.
GPS.....	Global Positioning System
GSI.....	Gonadal Somatic Index
GT.....	Gross Tonnage
ha	hectares
HADD	Harmful Alteration, Disruption or Destruction (of Fish Habitat)
Hatch	Hatch Ltd.
HEO	Heavy Equipment Operator
HOL	Height of Land
HSE.....	Health, Safety and Environment
HTA	Hunter and Trapper Association
HTO	Hunter and Trapper Organization
ICA.....	Inuit Certainty Agreement
ICRP	Interim Closure and Reclamation Plan
IEG.....	Inuit Employment Goals
IFC	Issued-for-Construction
IFO.....	Intermediate Fuel Oil
IHRS.....	Inuit Human Resources Strategy
IHTA	Ikajutit Hunters and Trappers Association (Arctic Bay)
IHTO	Ikajutit Hunters and Trappers Organization
IIBA	Inuit Impact and Benefit Agreement
IFO.....	Intermediate Fuel Oil
ILBA	Inuit Labour Force Barriers Analysis
IMO	International Maritime Organization
INPK	Ilagiiktunut Nunalinnullu Pivalliajutisait Kiinaujat
IOL.....	Inuit Owned Land
IOPP	International Oil Pollution Prevention
IOPPC	International Oil Pollution Prevention Certificate
IPCC.....	Intergovernmental Panel on Climate Change
IQ	Inuit Qaujimajatuqangit
JEC.....	Joint Executive Committee (Baffinland and the QIA)
JPCSL	Jason Prno Consulting Services Ltd.
KPI.....	Key Performance Indicators
kPa	Kilopascal
L	Litres
Landfill Facility	Mine Site Non-Hazardous Waste Landfill Facility
LMA.....	Labour Market Analysis
LMS	Learning Management System

LOA.....	Letters of Advice
LOTO	Lockout Tag-Out
LRR	Listening Range Reduction
LSA	Local Study Area
LSI	Liver Somatic Index
LTWMP	Long-Term Water Management Plan
MAC	Mining Association of Canada
magl	Meters Above Ground Level
MDMER.....	Metal & Diamond Mining Effluent Regulations
MEEMP	Marine Environmental Effects Monitoring Program
MEWG.....	Marine Environment Working Group
MHTO.....	Mittimatalik Hunters and Trappers Organization
MI.....	Milne Inlet
MIEG	Minimum Inuit Employment Goal
MIHR	Mining Industry Human Resources Council
Milne Port	Milne Port Facility
Mine Site.....	Mary River Mine Site
mL	Millilitre
ML.....	Metal Leaching
Mg/L	Milligrams per Liter
MMASP	Marine Mammal Aerial Survey Program
MMON	Marine Mammal Observation Network
MoU	Memorandum of Understanding
MRSEWG.....	Mary River Socio-Economic Working Group
m/s ²	Meter per Second Squared
MSC.....	Mine Site Complex
MSV	Multipurpose Supply Vessel
Mt	Million Tonnes
Mtpa	Million Tonnes Per Annum
MWO	Marine Wildlife Observer
NAAQS	National Ambient Air Quality Standards
NB	Navy Board Inlet
NCP	Northern Contaminants Program
NHC.....	Nunavut Housing Corporation
NIRB	Nunavut Impact Review Board
NIS.....	Non-Indigenous Species
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxide
NPC	Nunavut Planning Commission
NPRI	National Pollutant Release Inventory
NRCan	Natural Resources Canada
NSERC	Natural Sciences and Engineering Research Council of Canada

NTI	Nunavut Tunngavik Incorporated
NT-NU	Northwest Territories-Nunavut
NuPPAA.....	Nunavut Planning and Project Assessment Act
NWB.....	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
NWPA.....	Navigable Waters Protection Act
NWT	Northwest Territories
OBPS	Output-Based Pricing System
OETIO	Operating Engineers Training Institute of Ontario
OHS	Occupational Health & Safety
ON.....	Oceans North
OPEP	Oil Pollution Emergency Plan
OPPP	Oil Pollution Prevention Plan
OSRL.....	Oil Spill Response Ltd.
OWTS	Oily Water Treatment System
PAC	Project Advisory Committee
PAI.....	Potential Acidic Input
PAH	Polycyclic Aromatic Hydrocarbon
PAM	Passive Acoustic Monitoring
Pb.....	Lead
PC.....	Project Certificate
PCa.....	Parks Canada
PDA	Project Development Area
PEFA.....	Peregrine Falcon
PIP	Production Increase Proposal
Plan	Dust Mitigation Action Plan
PM.....	Particulate Matter
PSC	Port Site Complex
psi	Pounds per Square Inch
PSU.....	Practical Salinity Unit
PWSP	Polishing and Waste Stabilization Pond
Q-STEP	Qikiqtani Skills and Training for Employment Partnership
QA/QC.....	Quality Assurance / Quality Control
QEC	Qulliq Energy Corporation
QIA	Qikiqtani Inuit Association
QLMA	Qikiqtani Labour Market Analysis
QSEMC	Qikiqtaaluk Socio-Economic Monitoring Committee
RAD	Relative Abundance and Distribution
RBR	RBRconcerto
RCMP	Royal Canadian Mounted Police
RLHA	Rough-Legged Hawk
RMA	Raptor Monitoring Area

ROM.....	Run of Mine
ROV	Remotely Operated Vehicle
ROW.....	Right-of-way
RPD	Relative Percent Difference
RSA.....	Regional Study Area
RSASP	Ringed Seal Aerial Survey Program
RTK.....	Real Time Kinematic
SAR.....	Search and Rescue
SBO	Ship-Based Observer
SCA.....	Skills and Capacities Assessment
SCH.....	Small Craft Harbour
SCUBA	Self Contained Breathing Apparatus
Se	Selenium
SEAT	Skills Equivalency Assessment Template
SEL.....	Sound Exposure Levels
SEMWG	Socio-Economic Environment Working Group
SEMR.....	Socio-Economic Monitoring Report
SMWMP	Shipping and Marine Wildlife Management Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SITM.....	Standing Instructions to Masters
SM4.....	SongMeter4
SNP.....	Surveillance Network Program
SO ₂	Sulphur Dioxide
SOLAS.....	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SPL	Sound Pressure Level
SSA	Stratified Study Area
SSRP	Spill at Sea Response Plan
STP	Sewage Treatment Plants
SUSF	Super Sinter Fines
SWAEMP	Surface Water and Aquatic Ecosystem Management Plan
TAH	Total Allowable Harvest
TC.....	Transport Canada
TDG	Transportation of Dangerous Goods
TDS.....	Total Dissolved Solids
TEMMP	Terrestrial Environment Mitigation and Monitoring Plan
TEAMR	Terrestrial Environment Annual Monitoring Report
TEWG	Terrestrial Environment Working Group
the Communities	North Baffin Communities
the Project	Mary River Project
the Strategy	Climate Change Strategy
Tote Road	Milne Inlet Tote Road

ToR.....	Terms of Reference
TREEP	Tote Road Earthworks Execution Plan
TRMP	Tote Road Management Plan
TS	Tremblay Sound
TSD.....	Technical Supporting Document
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
UAV.....	Unmanned Aerial Vehicle
VHF	Very High Frequency
VSEC.....	Valued Socio-Economic Components
WHMIS.....	Workplace Hazardous Materials Information System
WQG	Water Quality Guidelines
WRF	Waste Rock Facility
WSCC	Workers' Safety and Compensation Commission
WTP	Water Treatment Plant
WWF	World Wildlife Fund
wwt.....	Wet Weight
YOY	Young-of-Year
Zn	Zinc

1 INTRODUCTION

This 2021 Annual Report (the Report) to the Nunavut Impact Review Board (NIRB) is a requirement of Baffinland Iron Mines Corporation's (Baffinland's) Project Certificate (PC) No. 005 for the Mary River Project (the Project). The Annual Report summarizes:

- Project activities undertaken during the reporting year (January 1, 2021 to December 31, 2021);
- Baffinland's performance against the requirements of the Terms and Conditions in PC No. 005;
- An evaluation of the Project's effects in relation to those predicted in the Final Environmental Impact Statement (FEIS; Baffinland, 2012); the Addendum to the FEIS (FEIS Addendum; Baffinland, 2013a) for the Early Revenue Phase (ERP) which included a temporary approval for production increase up to 6 million tonnes per annum (Mtpa), the Production Increase Proposal (PIP) exclusive to years 2018 to 2021 (NIRB, 2018a, 2020); and
- Planned Project work for the next reporting year (January 1, 2022 to December 31, 2022).

1.1 COMPANY DESCRIPTION

The Mary River iron ore deposits on North Baffin Island are considered to be one of the largest and highest quality iron ore open pit deposits in the world. With such high grade iron ore, there are no concentrators, tailings, or tailings ponds associated with production activities. Baffinland produces three iron ore products that are shipped during the shipping season to international markets; Direct Shipping Pellets (DSP), Super Sinter Fines (SUSF) and Baffinland Hematite Lump (BHL). The Project is operated by Baffinland and is jointly owned by The Energy and Minerals Group and ArcelorMittal.

The mine is located on Baffin Island, approximately 160 Km south-southwest of the nearest community of Pond Inlet (Mittimatalik), in the Qikiqtani region of Nunavut, and 1,000 Km north-northwest of the territorial capital of Iqaluit. Baffinland's head office is located in Oakville, Ontario and its northern headquarters is located in Iqaluit, Nunavut. Baffinland also has offices in five (5) North Baffin communities including Arctic Bay, Clyde River, Sanirajak, Igloolik and Pond Inlet (Figure 1.1).

Baffinland's Mission, Vision and Values were developed with the Government of Nunavut's (GN) eight (8) Inuit Societal Values in mind, and include:

Mission: To become the lowest-cost producer of high grade iron ore in the world

Vision: To safely and efficiently identify and develop resources within Baffin Island, unlocking their wealth-generating potential

Values:

Health and Safety – Safety as a Value: When safety is a personal value, people naturally choose to make the safe choice. They even use hearing protection and safety glasses at home. Employers who have safety as a value make their workplace safe because they want to, not because of government regulation. Employees work safely because they want to, not because it is a company rule. In this environment, companies go above and beyond regulations to protect their people.



Integrity: Do What is Right, Not What is Easy: Integrity is often defined as doing the right thing even when no one else is around. It is the ability to act with honesty, be consistent, and ethical in whatever it is we are doing. It's about being accountable, transparent and building trust through communications.

Engage and Develop our People: An organization where good work is recognized and rewarded. All employees are seen and treated as valued partners. Baffinland will invest in employee's success and growth through providing tools, training and support needed to unleash their potential. Baffinland will endeavour to become the employer of choice for Inuit in Nunavut.

Respect for All: We will respect and abide by Inuit Societal Values in the workplace and as a manner of doing business. We will strive to provide a healthy and safe workplace, free from physical or psychological bullying, harassment and violence. Violations of respect will be investigated and if substantiated will be dealt with expeditiously. Multiculturalism will be viewed as a strength and promoted. Consideration for people will be first and foremost in all interactions.

Environmental Stewardship: Respect the air, land, water and wildlife as we thoughtfully put to good use the earth's resources. Always remember that we are guests on this land and treat it respectfully. We will develop it responsibly and be good stewards of the land in concert with Inuit.

Pursue Performance Excellence: We are relentless in challenging ourselves and others to achieve high performance and create lasting socio-economic impacts in all that we do. We focus on improving every day and delivering on commitments. Innovation is seen as a key mechanism to achieve this outcome. Rigor in planning and thoughtful execution is a key strength. Teamwork is necessary for desired outcomes.

1.2 MARY RIVER PROJECT HISTORY

Baffinland is currently mining high-grade iron ore from the area referred to as Deposit No. 1, which was first discovered in 1962. The current approved mine operation is expected to last for more than 20 years, however through ongoing exploration activities and the development of additional deposits the Mary River Mine has the potential to operate for significantly longer. The Project represents a potential multi-generational opportunity for resource-driven socio-economic development in the North Baffin region.

The Project has gone through a number of important milestones prior to operating at the 2021 approved production rate of 6 Mtpa. Baffinland's initial proposal consisted of mining iron ore from the reserve at Deposit No. 1 at a production rate of 18 Mtpa (with operational flexibility) and using a port south of the mine in Steensby Inlet, serviced by an approximately 160 km southern railway to transport the ore to market (i.e., Southern Transportation Corridor; Figure 1.1). The NIRB issued Project Certificate No. 005 for this proposal on December 28, 2012 (additional information specific to the Project Certificate is provided in Section 1.4.1).

From 2013 to 2014, in response to changing iron ore market price conditions, Baffinland prepared an alternative development approach, the ERP, supported by an addendum to the FEIS for the Mary River Mine. The Project Certificate was subsequently amended to include the mining of an additional 4.2 Mtpa of ore to be hauled on the existing Milne Inlet Tote Road (Tote Road) north to a port at Milne Inlet (Milne Port). In 2018 (NIRB, 2018a) and 2020 (NIRB, 2020a), the Project Certificate (PC) was amended again following approval of the PIP and PIP Extension Request, allowing for up to 6 Mtpa to be transported and shipped through Milne Port until the end of 2021.

In parallel to the operation of the mine, Baffinland also developed the Phase 2 Proposal, which has been in the regulatory review process since 2015. While there have been revisions to the Phase 2 Proposal since its inception,

the current Phase 2 proposal outlines an increase in output from Milne Port Facility (Milne Port), from the originally approved 4.2 Mtpa to 12 Mtpa supported by the construction of a new railway running largely parallel to the existing Tote Road within the Northern Transportation Corridor. Should this be approved, the total mine production approved would include up to 30 Mtpa, with 12 Mtpa being transported via the North Railway to Milne Port and 18 Mtpa via the South Railway to Steensby Port.

1.3 EXISTING PROJECT OVERVIEW

The Project currently consists of three (3) main locations (Figure 1.2): The Mary River Mine Site (Mine Site), the Tote Road and Milne Port. Operational activities include:

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

During 2021 (the seventh (7) shipping season), mining operations at Deposit No.1 resulted in a total of 5.3 million tonnes (Mt) of ore crushed, which was a decrease from the 6.0 Mt crushed in 2020. A total of 5.3 Mt of ore was transported by ore haul trucks along the Tote Road and stockpiled at Milne Port. Between July 24 to October 31, a total of 5.6 Mt of ore was shipped from Milne Port to international markets. The shipments included ore mined, transported and stockpiled after the 2020 shipping season ended. In 2021, marine ore shipments involved 73 individual ore carrier vessel round trip voyages during the shipping season. An additional vessel was called to Milne Port, but not loaded due to timing constraints at the end of the shipping season.

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

- A 150 Km South Railway from the Mine Site to a new port facility at Steensby Inlet (Figure 1.2);
- Steensby Port, which will operate year-round; and
- Year-round shipping along the Southern Shipping Route (Foxe Basin - Hudson Strait).

A summary of the Project is provided in Table 1.1.

1.4 REGULATORY CONTEXT

1.4.1 Project Certificate

On December 28, 2012, the NIRB issued PC No. 005 for the Project to Baffinland (NIRB, 2012a) pursuant to Section 12.5.12 of Article 12 of the Nunavut Agreement (CIRNAC and Nunavut Tunngavik Inc., 2010). The basis for the PC is Baffinland's FEIS (Baffinland, 2012), which presented an assessment of potential environmental and socio-economic effects associated with mining the reserves of Deposit No. 1 at a nominal rate of 18 Mtpa.

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

Table 1.1: Mary River Project Description Summary

Information Type	Description
Location	North Baffin Island, Nunavut; 160 Km south/southwest from the closest Inuit community, Pond Inlet (Mittimatalik) (Figure 1.1)
Facility Name	Mary River Mine and Milne Port connected via the Milne Inlet Tote Road. Steensby Port and southern railway are approved but not active
Type of Mine	Open pit (Deposit No. 1; Photo 1 in Appendix D)
Summary of Current Mine Operations (from blasting to shipping)	<ol style="list-style-type: none"> 1 Iron ore is blasted and extracted from Deposit No. 1 and loaded onto trucks (Photos 1 and 2 in Appendix D) 2 Blasted iron ore is crushed at Mine Site 3 Crushed ore is transported from Mine Site to Milne Port (Photo 3 Appendix D) 4 Ore is stockpiled at Milne Port until the shipping season is opened (Photo 4 in Appendix D) 5 Ore is loaded onto ships at Milne Port (Photo 5 in Appendix D) 6 Ore is shipped to customers worldwide.
Key Dates – Mary River and Milne Port	<ul style="list-style-type: none"> • Construction at Mary River and Milne Port initiated in 2013; • Bulk sample shipped from Milne Port in 2014; • Operations began in 2015; and • First ore carrier loaded and shipped out of Milne Port in 2015.
Environmental Impact Statement Submissions to the Nunavut Impact Review Board and Amendments	<p>FEIS: Submitted in February 2012; approval in December 2012 (18 Mtpa production via rail to Steensby Port)</p> <p>Amendment No. 1: Submitted in June 2013; approval in 2014 (4.2 Mtpa via Northern Transportation Corridor)</p> <p>Amendment No. 2: Submitted in April 2018; approval in 2018 (increase to 6 Mtpa)</p> <p>Amendment No. 3: Extension request submitted in January 2020, approval in June 2020 (increase to 6 Mtpa until end of 2021)</p> <p>Phase 2 Proposal: Submitted in 2018, currently under review</p>
Products	Direct Shipping Pellets (DSP), Super Sinter Fines (SUSF) and Baffinland Hematite Lump (BHL);
Expected Life	20+ years, with potential for expansion
Access	Remote fly-in/fly-out access via charter flights to and from Mary River Mine from various hubs including Montreal, Iqaluit, and five (5) North Baffin communities. Charter flights to Nunavut communities were suspended in 2020 in response to the COVID-19 Pandemic. These flights were restarted in July 2021, but were further suspended in December 2021. There are also two land based connections between the Mine Site and tidewater, the first being the Milne Inlet Tote Road to Milne Port, which existed prior to Baffinland developing the Project. The other is the 160 Km railway to Steensby Port, which has not yet been developed.

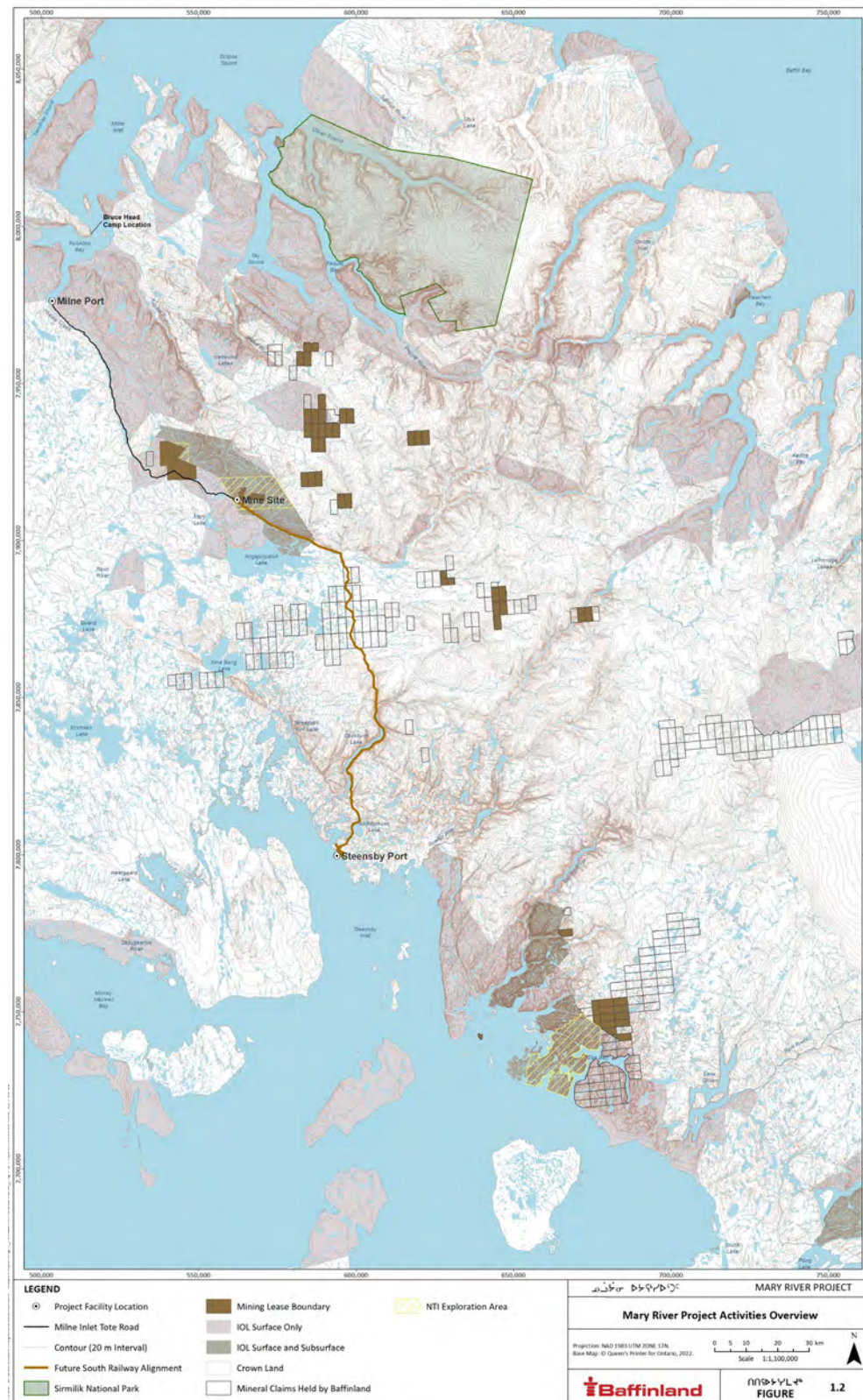


Figure 1.2: Project Activities Overview

Three (3) amendments to the PC have been issued to Baffinland, in 2013, 2018 and 2020. Additionally, the Company is currently seeking a further reconsideration for its Phase 2 Proposal which, if granted, will result in a fourth amendment to the PC. This history is described below.

Amendment No. 001 of Project Certificate No. 005 for the Early Revenue Phase

Following the issuance of the PC, Baffinland requested an amendment to the PC to undertake the 4.2 Mtpa ERP, and an Addendum to the FEIS was submitted to the NIRB in June 2013 (Baffinland, 2013a). The Minister of Aboriginal Affairs and Northern Development Canada (AANDC; now Crown Indigenous Relations and Northern Affairs Canada - CIRNAC) approved the ERP on April 28, 2014 (Minister of Aboriginal Affairs and Northern Development, 2014), and NIRB subsequently issued an amended Project Certificate in May 2014 (NIRB, 2014).

Amendment No. 002 of Project Certificate No. 005 for the Production Increase Project Proposal and Extension Request

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

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

On June 11, 2018 the NIRB determined that the modifications proposed in the PIP required assessment through a formal reconsideration of the PC Terms and Conditions. On June 20, 2018 Baffinland filed additional information in support of the FEIS Addendum and on June 27, 2018, the NIRB issued correspondence formally accepting the FEIS Addendum, and inviting comment on the proposal from interested parties to be received on or before July 26, 2018. The NIRB held a public information session in Pond Inlet on July 12, 2018.

A public hearing was not held in support of the review and the NIRB issued its Reconsideration Report and Recommendations on August 31, 2018 that recommended partial approval of the application. Specifically, NIRB recommended Baffinland be approved to move forward with the construction of its 380-person camp and additional 15 millilitre (mL) fuel tank at Milne Port, but not be approved to increase its annual limits for trucking and shipping ore to market (NIRB, 2018b). On September 30, 2018, following an appeal by the Qikiqtani Inuit Association (QIA) to the Minister responsible for final approval – the Minister of Intergovernmental Affairs, Northern Affairs and Internal Trade - Baffinland received an approval to increase its trucking and shipping limits for 2018 and 2019 (Minister of Intergovernmental and Northern Affairs and Internal Trade, 2018). Subsequently, on October 30, 2018, the NIRB issued PC Amendment No. 2 (NIRB, 2018a).

Amendment No. 003 of Project Certificate No. 005 for the Production Increase Project Proposal and Extension Request

In early December 2019, Baffinland sent a notification of its intention to NIRB to request an additional extension to the production increase limits (i.e., extending the 6 Mtpa limit beyond 2019) and thereby consider further modifications of PC Conditions No. 179(a) and 179(b). On January 6, 2020, Baffinland submitted a formal Extension Request Package. Baffinland's intention to continue shipping 6 Mtpa in 2020 was widely supported by the five North Baffin region hamlets and regulators, with letters of support submitted to the NIRB. On March 4, 2020 the NIRB issued its "Reconsideration Report and Recommendations" indicating that they recommended the extension of the

6 Mtpa production increase until December 31, 2021. The Responsible Ministers approved the temporary expansion request on May 19, 2020. NIRB subsequently issued an amended Project Certificate in 18 June, 2020 (NIRB, 2020a) with varied terms and conditions, notably Conditions No. 179(c) and 183.

1.4.2 Permits

Baffinland operates the ERP in accordance with the permits, licences, approvals, authorizations and agreements identified in Table 1.2. In addition, Baffinland's contractors and consultants undertake various activities on the Project under additional permits in the areas of scientific research, archaeology, and explosives manufacture, storage and use.

Table 1.2: Permit Registry

Approval	Project Activity and Update	Expiry
Nunavut Impact Review Board (NIRB) Nunavut Agreement, and the Nunavut Planning and Project Assessment Act		
Project Certificate No. 005 (Amendment No. 001)	Required under Article 12 of the <i>Nunavut Agreement</i> to obtain the requisite permits and approvals to proceed with the Project.	No Expiry
Project Certificate No. 005 (Amendment No. 003)	Required under Article 12 of the <i>Nunavut Agreement</i> to obtain the requisite permits and approvals to proceed with the Project	December 31, 2021
Nunavut Agreement (Article 12) Qikiqtani Inuit Association (QIA) Agreements issued under Articles 6, 20 and 26 of the Nunavut Agreement		
Inuit Owned Land (IOL) Commercial Lease Q13C301	Mine development activities on IOL; Compliance with the lease is outlined in the <i>2021 QIA and NWB Annual Report for Operations</i> and the <i>2021 QIA and NWB Annual Report for Exploration and Geotechnical Drilling</i> , submitted March 31, 2022.	December 31, 2043
Inuit Impact and Benefit Agreement (IIBA)	Required under Article 26 of the <i>Nunavut Agreement</i> to proceed with Project - concluded first in September, 2013, subsequently amended in October, 2018 to account for the temporary 6 Mtpa production increase proposal; Compliance with the agreement is outlined in the Annual Inuit Impact and Benefit Agreement (IIBA) Implementation Report submitted by March 31 st of each year.	No Expiry
Wildlife Compensation Agreement	Wildlife Compensation required under Article 6 of the <i>Nunavut Agreement</i> , with the regime set out in IIBA.	No Expiry
Quarry Concession Agreement	Required to extract specified substances (quarried rock and borrow sand and gravel) on Inuit Owned Land under the Commercial Lease	Not Applicable
Water Compensation Agreement	Required under Article 20 of the <i>Nunavut Agreement</i> to provide compensation to Inuit for water use by the project or impact to water use.	June 10, 2025
Nunavut Water Board (NWB) Water Licences issued under the Nunavut Agreement (Article 13), the Nunavut Waters and Nunavut Surface Rights Tribunal Act, and the Northwest Territories Water Regulations		
Type 'A' Water Licence 2AM-MRY1325 Amendment No. 1	Water use and waste disposal associated with the mine; In good standing; no amendments were issued by the NWB in 2021. Compliance with the Licence is outlined in the <i>2021 QIA and NWB Annual Report for Operations</i> , submitted March 31, 2022.	June 10, 2025

Approval	Project Activity and Update	Expiry
Type 'B' Water Licence 2BE-MRY2131	Regional exploration activities, including exploration drilling; In good standing; a licence renewal application was approved in 2021. Compliance with the Licence is outlined in the <i>2021 QIA and NWB Annual Report for Exploration and Geotechnical Drilling</i> , submitted March 31, 2022.	April 16, 2031
Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) Mineral Leases and Land Leases, Land Use Permits, and Quarry Permits on Crown Land, issued under the Territorial Lands Act and associated Canadian Mining Regulations and Territorial Land Use Regulations		
Foreshore Lease 47H/16-1-2 Lease Amendment 47H/16-1-5	Supersedes historical Class A Land Use Permit N2014X0012; Use of foreshore area for current Milne Port Ore Dock; In good standing.	June 30, 2035
Tote Road and Borrow Area Land Use Permit N2019Q0011	Land use permit for the section of Milne Inlet Tote Road on Crown Land, associated quarries and infrastructure.	June 29, 2024
Land Use Permit Bruce Head: N2019J0010	Land use permit for the summer marine monitoring camp at Bruce Head, in Milne Inlet	June 29, 2024
Land Use Permit Steensby: N2019C0009	Land use permit for the Infrastructure and activities on Crown Land at Steensby Port.	June 29, 2024
Mineral Leases #2483, #2484 and #2485	Rights to extract minerals; Lease #2484 covers Deposit No.1.	August 27, 2034
Department of Fisheries and Oceans (DFO) Authorizations and Letters of Advice issued under the <i>Fisheries Act</i>		
Letters of Advice (various)	Prior to 2021, DFO issued Baffinland various letters of advice in regard to Project crossings along the Tote Road, at quarries, culvert extensions and replacements, and for stockpile expansion work at Milne Port.	No Expiry
Fisheries Authorization 06-HCAA-CA7-0084	Authorization to construct water crossings in fish habitat along the Tote Road; The authorization remains valid and has been amended over the years. A monitoring report for the water crossings was submitted to DFO on December 31, 2021.	Not applicable; monitoring ongoing
Fisheries Authorization 14-HCAA-00525	Authorization to construct the Milne Port Ore Dock in fish habitat; DFO reviewed final monitoring report and closed file on May 31, 2021	Not applicable
Fisheries Authorization 18-HCAA-00160	Authorization to construct the Freight Dock in fish habitat; The Year 2 monitoring report for the Milne Port Freight Dock was submitted to DFO on March 18, 2022, in accordance with regulated timelines. A revised amendment application for the Freight Dock was also submitted by Baffinland on December 20, 2021.	Not applicable; Request for extension TBD

Approval	Project Activity and Update	Expiry
Transport Canada (TC) Approvals of in-water works under the <i>Navigable Waters Protection Act</i> (NWPAA; now the <i>Canadian Navigable Waters Act</i>); and Marine Facility Approval under the Marine Transportation Security Act and Regulations		
Approvals: 8200-07-10273, 8200-07-10267, 8200-07-10269, 8200-07-10268, 8200-07-10274, 8200-07-10272, 8200-07-10266, 8200-07-10271	Approvals to interfere with navigation within navigable waters along the Tote Road at crossings: CV-040, BG-50, CV-128, CV-223, CV-072, BG-17, CV-217, and CV-099; In good standing, no changes from previous year.	No Expiry; Until complete
Statement of Compliance of a Marine Facility # 1000000660	Approval for the Milne Inlet Marine Facility to conduct iron ore operations	May 27, 2025
National Resources of Canada Licensing of Explosives Manufacture and Storage Facilities under the <i>Explosives Act</i>		
Division 1 Factory Licence #F76068/E	Issued to Baffinland's explosives contractor to manufacture explosives for the mine	-

1.4.3 Permitting of the Phase 2 Expansion Project Proposal

The NIRB public technical review of the Phase 2 Proposal that was initiated in 2018 continued throughout 2021. Following the adjournment of the Phase 2 Proposal hearing in November 2019, NIRB issued procedural direction for next steps in the Phase 2 Proposal review process. A third technical meeting followed by a community roundtable and Pre-Hearing Conference were subsequently scheduled for March 2020.

In response to the COVID-19 Pandemic, on March 13, 2020 the NIRB provided notice that the planned third technical meetings would not be held in-person, and would instead be replaced by a combination of teleconference sessions and written submissions. Then, on March 17, 2020 the NIRB revised their communications, and provided notification they would not be issuing a revised schedule for formal technical teleconferences until circumstances change or organizations have had sufficient time to adjust their operations to current conditions. On April 13, 2020, Baffinland issued correspondence to the NIRB requesting technical meetings be facilitated via teleconference in the weeks following to ensure the regulatory review process could continue to advance in a manner that respects public safety. In response, NIRB proposed a teleconference-based Technical Meeting option for April 28 to May 7, 2020 but this was later cancelled due to logistics-related complications associated with COVID-19. Technical Meeting No. 3 was later rescheduled and held via teleconference between September 14 to 18, 2020, and followed up with an in-person Community Roundtable and Pre-Hearing Conference on September 28 to October 1, 2020 in Pond Inlet with video and audio linkages to meeting hubs in Iqaluit, Winnipeg and Ottawa.

Subsequently, a 12-day reconvened Public Hearing Conference was held in-person between January 25 and February 6, 2021 in Pond Inlet with video and audio linkages with a hub in Iqaluit and for participants unable to travel into Nunavut via video or audio links. Due to delays in completing the various agenda items, an extension of the in-person Public Hearing (the Extended Public Hearing) and Community Roundtable was later scheduled for

April 12 to 21, 2021 in Iqaluit with video and audio linkages available for remote participants in Iqaluit with video and audio linkages available for remote participants and an organized hub in Pond Inlet.

On April 14, 2021, in response to the identification of a COVID-19 outbreak in Iqaluit, NIRB suspended the Phase 2 extended Public Hearing. On July 30, 2021, NIRB provided notification that the extended Public Hearing would resume November 1 through November 6, 2021 in Iqaluit with video and audio linkages available for remote participants and an organized hub in Pond Inlet. The extended Public Hearing was successfully completed between November 1 and November 6, 2021, and included a one (1) day technical session and five (5) day community roundtable.

NIRB provided additional time following the completion of the extended Public Hearing for intervenors and Baffinland to file written comments on correspondence and attachments from the Government of Canada related to an assessment conducted by Denmark under the international *Espoo Convention* (the Espoo Materials), and subsequently for intervenors and Baffinland to file Final Closing Statements. The deadlines for intervenors and Baffinland to file written comments on the Espoo Materials were December 10, 2021 and December 17, 2021, respectively. The initial deadlines set before the reconvened Public Hearing for intervenors and Baffinland to file Final Closing Statements were November 22, 2021 and December 6, 2021, respectively, but an extensions was ultimately granted, moving the deadlines to Final Closing Statements to January 10, 2022 and January 24, 2022 for intervenors and Baffinland, respectively.

On January 28, 2022, NIRB issued correspondence that the Public Hearing Record for the Phase 2 Proposal was closed, and that the matter was remitted to NIRB's decision making Panel who will issue the Board's "Reconsideration and Recommendation Report". On February 4, 2022, NIRB issued a letter to the Minister of Northern Affairs indicating that they would be unable to meet the 45-day timeline prescribed in the Nunavut Planning and Project Assessment Act to produce their report, and would require an additional 60 days' time. The Panel's "Reconsideration and Recommendation Report" will be conveyed to the Responsible Ministers on or before May 13, 2022.

The Nunavut Water Board (NWB) review process for the amendment to Baffinland's Type 'A' Water License required for the Phase 2 Proposal was paused through 2020 following its submission to amend the Type 'A' Water Licence on August 16, 2018, in parallel with the NIRB review process. Since this time, Baffinland submitted on May 5, 2019 updated documentation to the NWB for the Phase 2 Proposal, including updated monitoring and management plans, as well as issued for construction drawings. Further updated documentation was submitted to the NWB for the Phase 2 Proposal on September 17, 2021, and an in-person Technical Meeting was held in Iqaluit on November 12, 2021.

Baffinland looks forward to completion of the regulatory review process for Phase 2 and the Type 'A' Water Licence amendment through 2022 with the aim of continuing to stabilize the Mary River Project and to deliver associated benefits.

1.5 REPORT STRUCTURE

1.5.1 Report Content

This report is structured as follows:

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

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

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

Section 3: Describes the Project's operational context in 2021 including COVID-19 Pandemic-related considerations, and operational successes and challenges Baffinland associated with implementation of the PC Terms and Conditions.

Section 4: Includes tailored 'summary sheets' for each term and condition, which provide an overview of the work completed towards meeting the requirements of the PC Conditions as well as Baffinland's self-assessment of compliance. This section also describes stakeholder feedback on relevant components and effects of the Project, observed trends, a comparison of the Project's effects in comparison with predictions made in the FEIS and FEIS Addendum and plans for future works relative to the implementation of the PC Condition, where relevant.

Section 5: Outlines the correspondence Baffinland has had with NIRB during 2021 and comments provided by interested Parties on Baffinland's 2020 Annual Report to NIRB.

Section 6: Lists all updates made to environmental management plans as a result of monitoring programs and engagement activities throughout 2021.

1.5.2 Supporting Documents and Appendices

Where PC Conditions specify that Baffinland provide supporting documentation to NIRB as part of the submission of this Report, these documents have been appended and are identified in the Table of Contents. Other appendices, such as reports or documentation that are likely to be of specific interest to NIRB as part of their review of this Report, and those that provide a pertinent context to the discussions are also included in this Report. Reports that have yet to be issued as final and are awaiting review and feedback from the Terrestrial and Marine Environment Working Groups have not been included as attachments to this report, however, they have been released to the Working Groups for review and comment, to which the NIRB is an observing member.

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

2 ENGAGEMENT ACTIVITIES

2.1 ENGAGEMENT APPROACH

Meaningful and substantive Inuit, community, and Stakeholder engagement is valued by Baffinland as a means of building and maintaining community relationships and maximizing benefits from the Project. Baffinland's approach to engagement emphasizes the importance of informing Inuit, affected communities, and other stakeholders, as well as establishing effective dialogue, and collecting feedback and resolving issues and concerns (Figure 2.1). Baffinland understands that Inuit engagement and consultation must occur in a manner that is appropriate to the Nunavut and Qikiqtani regional context. Engagement and consultation methods and approaches appropriate for Southern groups, other Northern jurisdictions or an academic setting, are not necessarily transferable. Baffinland has made every effort to provide Inuit employees, individuals, communities, and Inuit organization groups with practical opportunities to engage in meaningful dialogue in the format of their choosing, and in a way that would meet their objectives and values.

With some easing of travel restrictions in 2021, Baffinland implemented a hybrid approach to community engagement activities in the five (5) North Baffin communities and Iqaluit, with some events and meetings being held in-person and others relying on video and telephone conference. Baffinland also continued to maintain a presence on social media and local radio as a means to ensure that information about the Project is accessible to a wide audience. Although Baffinland acknowledges that in-person engagement is preferred, the hybrid model has proven effective in ensuring that effective lines of communication remained in place between community representatives and other stakeholders and Baffinland throughout the Pandemic.

As travel restrictions and public health orders continually evolved, Baffinland frequently evaluated what methods of engagement were most effective, while still maintaining individual and community health and safety as the top priority. This adaptive approach to engagement is predicted to continue as the COVID-19 Pandemic and associated public health orders evolve throughout 2022.

Consultation with both Inuit community members and other parties, including the Qikiqtani Inuit Association (QIA) and regulators had a significant focus on Baffinland's Phase 2 Proposal in 2021. Although Baffinland continued to provide relevant operational updates to the communities and regulators, a large portion of interest from both these groups was specific to Phase 2. Wherever possible, Baffinland has taken feedback received throughout the Phase 2 review process, and applied it to existing operations. For example, through Phase 2 technical review submissions, issues related to ballast water and narwhal entrapment events were raised. Despite not having approval on the Phase 2 Proposal, in 2021 Baffinland implemented commitments for additional ballast water mitigations (i.e. requiring vessels to conduct both exchange and treatment) and has been running narwhal entrapment clearance aerial surveys since 2019. These examples highlight that where synergies between the current operation and the Phase 2 Proposal were identified, Baffinland proactively integrated forward-looking commitments, to ensure that information received through Phase 2 consultation events were captured and addressed throughout 2021 to the extent possible.



Figure 2.1: Baffinland's Approach to Stakeholder Engagement

2.2 ENGAGEMENT OBJECTIVES

Baffinland is committed to meaningful engagement with stakeholders potentially affected by the Project, including the five (5) North Baffin Communities (Arctic Bay, Clyde River, Sanirajak, Igloolik and Pond Inlet), the QIA, applicable regulatory agencies and the general public.

The objectives of Baffinland's engagement efforts are to:

- Provide Inuit, communities and other stakeholders with relevant Project information in a timely, accessible and culturally appropriate manner in order to identify issues and concerns and provide input into the development of appropriate mitigation measures and issues resolution;
- Ensure that Inuit, communities and other stakeholders have the opportunity to understand and meaningfully engage in the processes initiated by the Project;
- Consider Inuit traditional knowledge as well as scientific expertise and community feedback in decision-making processes;
- Build constructive and positive relationships with communities most likely to be affected by the Project; and
- Focus priorities so that potential adverse effects are mitigated, and Project benefits are enhanced.

2.3 ENGAGEMENT ACTIVITIES

In support of Baffinland's focus on continuous improvement and the engagement objectives defined for the Project (Section 2.2), Baffinland implements a variety of engagement mechanisms that are intended to ensure a broad and comprehensive approach to the identification of stakeholders and relevant interested parties, and that the creation of enhanced opportunities for dialogue and input are executed. As noted in Section 3.2.2, Baffinland continued to

be flexible in its engagement approach in 2021 due to various restrictions related to the ongoing COVID-19 Pandemic and in respect of Public Health Orders and guidelines in Nunavut. The most notable changes included limiting of public meetings and moving to non-in-person formats for meetings with community groups, governments and elected officials, until travel restrictions were lifted for fully vaccinated individuals. Notwithstanding these challenges, Baffinland successfully completed a number of public engagement activities in 2021, which included:

- Providing regular and ongoing opportunities for the dissemination of Project-related information and receipt of stakeholder input through Baffinland Community Liaison Officers (BCLOs) stationed in each of the five (5) North Baffin communities;
- Providing regular and ongoing opportunities for the dissemination of Project-related shipping activities and receipt of Inuit input through the Baffinland Shipping Monitor roles stationed in Pond Inlet (in-person visits, posters throughout the community, radio shows, ongoing marine VHF radio communications about ongoing vessel traffic, dedicated 'Baffinland Shipping' Facebook posts);
- Hosting public meetings, with enhanced use of public radio shows in response to in-person gathering restrictions;
- Conducting employee surveys;
- Holding employee town halls;
- Participation in multi-stakeholder forums (e.g. Working Groups, Baffinland-led youth forum);
- Holding meetings with community groups and Hamlet Councils;
- Distributing Project-related information through the corporate website, social media sites including Facebook, LinkedIn and Twitter, newsletters, advertisements, radio shows, and other means; and
- Holding one-on-one teleconference discussions with Mayors from Pond Inlet, Sanirajak, Igloolik, and Iqaluit to provide updates on Mary River's existing operations, proposed Phase 2 expansion, and to listen to community updates and issues of importance.

A summary of engagement events including details on public meetings and community group meetings held in 2021 are presented in Appendix B.

Baffinland's approach to receiving and addressing concerns/feedback is dynamic and evolves based on the circumstances and channels through which feedback has been received. Baffinland uses a variety of methods for receiving and responding to community comments. In addition to Baffinland's Northern Headquarters, critical points of contact for employees, members of the public, elected officials, and other interested bodies in the five communities are the BCLOs. These team members receive feedback, often informally, and ensure follow-up is conducted and that responses to feedback are provided when required. Updates about Baffinland activities are also regularly provided by BCLOs on local radio as well as in-person during daily office hours (unless there are office closures). Inuit feedback and comments in some instances are gathered through informal phone or in-person interactions. Information gathered in this way is passed along to the relevant subject matter expert(s) at Baffinland and subsequently may be used to influence future engagement efforts, monitoring program design, or adaptive management considerations. A summary of Inuit feedback related to environmental effects of the Project, captured through these engagement efforts, is provided in Section 4 when relevant to specific ecosystemic and socio-economic and detailed in Appendix B.

Baffinland has also created additional community-based positions in Pond Inlet in direct response to community feedback. For example, since 2019, Shipping Monitors have been hired annually during the shipping season to

provide an in-community point of contact between Pond Inlet residents and their elected representatives, the Mittimatalik Hunters and Trappers Organization (MHTO) and Baffinland in order to expand local communications about shipping-related matters such as daily vessel activity. Concerns and comments can be submitted by community residents through a variety of methods (e.g., Baffinland Shipping Facebook Messenger account, in-person interactions, email). This feedback is actively tracked by Shipping Monitors and responded to on an as-needed basis. Shipping monitors recorded 25 questions or concerns during the 2021 shipping season. Some concerns (e.g., anchor wash and drifting at Ragged Island, reports of seaweed) required specific follow-up discussions/clarifications by Baffinland employees to the individuals who expressed these concerns. Comments requiring further discussions with particular community groups (e.g., Mittimatalik Hunters and Trappers Organization) are also included as part of the annual shipping season-specific meeting agendas.

An individual was also hired to fill the newly-created Community Environmental Coordinator position in Pond Inlet at the end of 2021. This role provides a local point-of-contact throughout the year for residents and organizations (e.g., MHTO) to obtain information about Baffinland's environmental monitoring programs and provides an opportunity for residents to voice concerns/comments they may have on Baffinland's activities and potential effects these may have on the environment. Other than shipping, a common topic of concern includes dust, which are then relayed to the community representatives sitting on the third-party Dust Audit Committee.

Baffinland uses StakeTracker software system to input meeting records (includes concerns and feedback) from more formal engagements like public meetings and working groups. Additionally, community- and activity- focused emails have been created, which are monitored by staff across relevant departments. In 2021, only one comment was submitted by a community member in relation to the Mary River Inuit Impact and Benefit Agreement. The comment was sent via the company email address: 'communityquestions@baffinland.com'.

Baffinland will continue to implement a proactive approach to engagement with Inuit and other various stakeholders through informal and formal methods that include meetings, workshops, surveys and dissemination of information and reports. This broad range of engagement methods are designed to ensure that the communities, QIA, regulators and the public are informed in a timely and culturally relevant manner of the Project's progress and the potential environmental and social impacts of the Project. Moving forward, Baffinland will continue to ensure that any engagement activities planned will respect rapidly changing public health advice and any applicable COVID-19 guidelines.

2.3.1 Public Meetings & Events

In 2021, Baffinland held various public meetings and/or radio shows within the five (5) North Baffin communities. These meetings provided an important opportunity for Baffinland to share information with the Communities related to current operations and avenues for Inuit to become more involved in the Project and/or a way to access the benefits of the Project. A list of more formal public meetings and events held in the communities is provided in Table 2.1.

A summary of engagement events including details on public meetings and community group meetings held in 2021 are presented in Appendix B.

Table 2.1: Public Meetings & Events in 2021

Date	Meeting Type	Sample of Topics Discussed
Pond Inlet		
June 2 June 14 September 23 November 29 December 13	Public Radio Shows	<ul style="list-style-type: none"> 2020 Shipping Season Wrap Up and 2021 Pre Shipping Season Meeting Employment and Training Information Session with Baffinland and QIA Acoustic Monitoring Program and Devices General history of the Nunavut Agreement, the Mary River Project and proposed Phase 2; Q&A Session
July 4	Public Meeting	<ul style="list-style-type: none"> Public Town Hall with residents of Pond Inlet
July 4, 12 October 28	Employee Meeting	<ul style="list-style-type: none"> Pond Inlet Employee Town Hall
August 30	Public Recruitment Tour	<ul style="list-style-type: none"> Recruitment opportunities with residents
September 23	Community Donations Tour	<ul style="list-style-type: none"> Donation to local community initiative
October 24	Youth Forum	<ul style="list-style-type: none"> Towards a Bright Future for Youth in North Baffin
November 30	High School	<ul style="list-style-type: none"> General History of the Nunavut Agreement, the Mary River Project and proposed Phase 2
Igloolik		
January 6 June 14, 25	Public Radio Shows	<ul style="list-style-type: none"> Mary River Project Update Employment and Training Information Session with Baffinland and QIA
July 15	Employee Meeting	<ul style="list-style-type: none"> Pond Inlet Employee Town Hall
March 25	Public Meeting	<ul style="list-style-type: none"> Public Town Hall with residents of Igloolik
Clyde River		
January 5 June 7, 9, 11, 23 September 9	Public Radio Shows	<ul style="list-style-type: none"> Update on Phase 2 Review Process and Project Benefits to Hamlet of Clyde River; Public Q&A Mary River Project Update Employment and Training Information Session with Baffinland and QIA Update on Phase 2, Inuit Certainty Agreement (ICA), and NIRB review process
March 29	Public Meeting - Residents of Clyde River	<ul style="list-style-type: none"> Public Town Hall with residents of Clyde River
March 29 July 16	Employee Meeting	<ul style="list-style-type: none"> Clyde River Employee Town Hall
August 22	Public Recruitment Tour	<ul style="list-style-type: none"> Recruitment opportunities with residents

Date	Meeting Type	Sample of Topics Discussed
September 10	Community Donations Tour	<ul style="list-style-type: none"> Donation to local community initiative
Sanirajak		
June 8 June 28 July 19	Public Radio Shows	<ul style="list-style-type: none"> Mary River Project Update Employment and Training Information Session with Baffinland and QIA
March 22	Public Meeting	<ul style="list-style-type: none"> Public Town Hall with residents of Sanirajak
March 22 July 14	Employee Meeting	<ul style="list-style-type: none"> Sanirajak Employee Town Hall
July 24	Q&A - Residents of Sanirajak	<ul style="list-style-type: none"> Public Question and Answer Session at Co-Op Store
August 25	Public Recruitment Tour	<ul style="list-style-type: none"> Recruitment opportunities with residents
Arctic Bay		
June 17	Public Radio Show	<ul style="list-style-type: none"> Employment and Training Information Session with Baffinland and QIA
March 31 July 13	Employee Meeting	<ul style="list-style-type: none"> Arctic Bay Employee Town Hall
September 22	Community Donations Tour	<ul style="list-style-type: none"> Donation to local community initiatives

Note: Engagements related to Ege Bay are excluded from this table but listed in Appendix B.

2.3.2 Community Group Meetings

As part of its engagement efforts, Baffinland also meets directly with various community groups on a regular basis to discuss aspects of the Project and ongoing issues, concerns or recommendations community representatives may have. Accordingly, Baffinland also engaged with several community groups in 2021 including local Hunter and Trapper Organisations/ Hunter and Trapper Associations (HTOs/HTAs), Hamlet Mayors and Council, using in-person or virtual/teleconference methods. Key events are listed in Table 2.2. Specific details are provided in in Appendix B.

Table 2.2: Community Group Meetings in 2021

Date	Community Group	Sample of Topics Discussed
Pond Inlet		
March 4, 9, 30 April 7 June 30 July 7, 28, 29 August 11 September 9, 23 October 21 November 30 December 2	Hamlet of Pond Inlet and/or Mayor of Pond Inlet	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Community Engagement Planning Phase 2 Updates and new Phase 2 Commitments Update on 2021 Shipping Season, Shipping Season Mitigations, Phase 2, Community Engagement Planning Discussion of existing Bylot Island repeater issues (channel 26) and new Bruce Head repeater station installation Phase 2 Review Process

Date	Community Group	Sample of Topics Discussed
May 28 July 4	MHTO and Hamlet of Pond Inlet	<ul style="list-style-type: none"> 2020 Shipping Season Wrap Up and 2021 Pre Shipping Season Meeting General Mary River Updates
Feb 18 July 29 September 21	MHTO	<ul style="list-style-type: none"> Milne Inlet Freshwater Fish Monitoring Program Tasiuqtiit Working Group, IIBA Harvesters Enabling Program, Future engagement opportunities Phase 2 Updates, Tote Road Use, Future Engagement Planning
July 29	MLA Tununiq	<ul style="list-style-type: none"> Engagement Planning, Human Resources Concerns, Inuit Hiring, Monitoring Programs
October 28	Mayor of Pond Inlet	<ul style="list-style-type: none"> Baffinland employees discussed Phase 2
September 23	Search and Rescue (SAR)	<ul style="list-style-type: none"> SAR Coordination
September 23	Qikiqtani Inuit Association Community Director	<ul style="list-style-type: none"> Phase 2 Updates and new Phase 2 Commitments
Igloolik		
January 7 March 25 November 26 December 8	Igloolik Working Group	<ul style="list-style-type: none"> Update on Phase 2 Review Process Benefits to Hamlet of Igloolik
June 1	Mary River Socio-Economic Monitoring Working Group Meeting (MRSEMWG)	<ul style="list-style-type: none"> Annual MRSEWG Meeting
March 25 July 6 October 19 October 29 November 25	Hamlet of Igloolik and/or Mayor of Igloolik	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Mary River Dust Audit Update
Clyde River		
September 9 October 6, 21	Hamlet of Clyde River and/or Mayor of Clyde River	<ul style="list-style-type: none"> Engagement - Baffinland's latest draft of the Climate Change Strategy Update on Phase 2 Review Process
January 5	Hamlet of Clyde River and Clyde River Hunters and Trappers Organization (HTO)	<ul style="list-style-type: none"> Update on Phase 2 Review Process and Project Benefits to Hamlet of Clyde River
Sanirajak		
March 22 July 23, 24, 26	Hamlet of Sanirajak (Council or	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Updates on Repeater Tower Project, Phase 2, and COVID-19 at the Mary River Project

Date	Community Group	Sample of Topics Discussed
	Administration Officer)	<ul style="list-style-type: none"> Return to work plan, Repeater Tower Project, Community Sponsorships, Phase 2, Community Engagement Planning
May 20 July 23 October 2	Hall Beach Hunters and Trappers Association	<ul style="list-style-type: none"> Discussion regarding VHF radio repeaters Discussion regarding VHF radio repeaters including updates on land use applications, Nunavut Planning Commission screening Engagement - Baffinland's latest draft of the Climate Change Strategy
Arctic Bay		
March 31 22 September October 6	Hamlet of Arctic Bay and/or Mayor of Arctic Bay and/or Economic Development Officer	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Introductory meeting with new Hamlet Chief Administrative Officer Closure plans for the Mary River Project
March 31 October 8	Ikajutit Hunters and Trappers Association (IHTA)	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Engagement - Baffinland's latest draft of the Climate Change Strategy
22 September	Hamlet of Arctic Bay and Ikajutit Hunters and Trapper Association (IHTA)	<ul style="list-style-type: none"> Phase 2 Update
North Baffin Communities and/or Other Organizations		
April 6 October 6	Hamlet of Grise Fiord and/or Mayor of Grise Fiord	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process Grise Fiord Hamlet and Recruitment Phase 2 Update, Recruitment, Employment and Training Information
April 6 June 4	Hamlet of Grise Fiord and HTO	<ul style="list-style-type: none"> Phase 2 Project Proposal, Phase 2 Review Process
October 4, 5	Hamlet of Resolute Bay	<ul style="list-style-type: none"> Phase 2 Update, Recruitment, Employment and Training Information

Note: Engagements related to Ege Bay are excluded from this table but are included in Appendix B and are summarized in the Ege Bay Project Annual Report to the NIRB (Baffinland, 2022a).

2.3.3 Community Donations and Sponsorships

In keeping with its values, Baffinland understands the importance of supporting various social, recreational and cultural activities in communities. In addition to IIBA-dedicated staff, which oversee the implementation of social support programs outlined in the IIBA, Baffinland has a Donations and Sponsorship Committee that evaluates proposals requesting support, in addition to being mandated to proactively identify opportunities to support North Baffin communities. Baffinland also delivers annual support for Inuit who are advancing their education (i.e., high school graduation laptop program, annual scholarships, etc.). The following lists some of the community donations, sponsorships and IIBA commitments provided in 2021:

- 61 laptops to high school graduates in the North Baffin communities, as well as 8 laptops to the Quluqaq science lab;
- \$25,000 to five (5) recipients as part of the 2021 annual scholarship fund;
- \$300,000 made available as part of the North Baffin Local Study Area (LSA) School Lunch Program outlined in the IIBA;
- \$100,000 in funding towards the installation of marine VHF repeater stations in Pond Inlet and Sanirajak to support safe travel in areas lacking communication methods for land users and hunters;
- Financial contribution of \$72,000 towards the purchase of cleaning supplies in North Baffin communities in response to ongoing COVID-19 Pandemic; and
- Numerous donations to food banks and other food-related initiatives in LSA communities organized by hamlets, as well as logistical or monetary support for specific events/infrastructure including, though not exclusively, community Christmas events and games, mental health initiatives, youth forum (Pond Inlet), shipment of winter clothing for students (Igloodik), fishing derby (Sanirajak), community clean-up (Pond Inlet), hockey jerseys (Pond Inlet), Arctic Comedy Festival (Iqaluit), Get Happy Camp Program including purchase of bicycles (Pond Inlet), sewing machines through Sew & Sew (Pond Inlet), all-terrain vehicle (Angunasuqtitt Program, Clyde River), generator (Clyde River) and ice resurfacing machine (Arctic Bay).

In summary, in 2021 Baffinland, its business partners and staff provided over \$700,000 towards various social, recreational, educational and cultural initiatives throughout North Baffin communities and Iqaluit, further enforcing the Company's commitment for creating a positive benefit to Nunavummiut communities.

2.4 ENGAGEMENT WITH THE QIA

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

2.4.1 Engagement on IIBA Implementation

Implementation of the IIBA is managed by a Joint Executive Committee (JEC), Employment Committee (ECo) and Contracting Committee (CC). These committees consist of an equal number of representatives from Baffinland and QIA, and meet on a regular basis by phone or in-person.

During 2021, the Employment and Contracting Committees focused their efforts on supporting Inuit through employment, training, education and contracting. The committees met regularly to discuss and plan initiatives that could be executed in 2021 during the COVID-19 Pandemic.

Baffinland and QIA held teleconferences with the JEC, EC and CC on several occasions throughout 2021, as presented in Table 2.3.

Due to COVID-19 Baffinland was unable to hold the Annual Project Review Forum (APRF) Employment and Training Information Sessions (ETIS) and the Contracting and Procurement Information Tour (CPIT) in 2021. These in-person sessions will be planned and rolled out in 2022 pending COVID-19 restrictions. Modified ETIS Radio shows were conducted in all five of the impacted communities in July 2021. These were conducted with Baffinland and QIA participation. A full update on Baffinland Operations, and Education and Training opportunities was provided. Community residents had the opportunity to call in and ask questions, which were answered live on the air. A prize draw was held in each community as a way of increasing participation with the Radio Shows. In October 2021, a

modified ETIS tour was conducted within the impacted communities where one on one interviews were conducted. Discussions about employment opportunities as well as education and training opportunities was undertaken. All participant's information was shared with either Baffinland recruitment team, or Contractors directly. This was directly tied to efforts to recruit in excess of 60 Inuit.

Table 2.3: Meetings with QIA (IIBA)

Date	Location	Description
Employment Committee (EC)		
9-Mar-21	Teleconference	Employment Committee Meeting
28-Apr-21	Teleconference	Employment Committee Meeting
26-May-21	Teleconference	Employment Committee Meeting
28-Jul-21	Teleconference	Employment Committee Meeting
12-Aug-21	Zoom Video Meeting	EC Meeting - Annual Work Plan
19-Aug-21	Teleconference	Employment Committee Meeting
9-Sep-21	Zoom Video Meeting	EC Meeting - Annual Work Plan
21-Sep-21	Ottawa	EC Workshop - Management and Advanced Skills Training Opportunities
21-Sep-21	Ottawa	EC Workshop - Skill Classification Training Opportunities
21-Sep-21	Ottawa	EC Workshop - Management and Advanced Skills Training Opportunities & Skill Classification Training Opportunities
23-Sep-21	Ottawa	EC Workshop - Career Development Template Mock Trial
23-Sep-21	Ottawa	Employment Committee Meeting
23-Sep-21	Ottawa	EC Workshop - Career Development Template Mock Trial & September EC Meeting
25-Oct-21	Teleconference	Employment Committee Meeting
10-Nov-21	Teleconference	Employment Committee Meeting
10-Dec-21	Teleconference	Employment Committee Meeting
Contracting Committee (CC)		
02-Feb-21	Teleconference	Contracting Committee Meeting
12-Mar-21	Teleconference	Contracting Committee Meeting
23-April-21	Teleconference	Contracting Committee Meeting
10-June-21	Teleconference	Contracting Committee Meeting
16-Sept-21	Teleconference	Contracting Committee Meeting
09-Nov-21	Teleconference	Contracting Committee Meeting
Joint Executive Committee (JEC)		
23-Feb-21	Teleconference	Joint Executive Committee Meeting
31-March-21	Teleconference	Joint Executive Committee Meeting
10-Nov-21	Teleconference	Joint Executive Committee Meeting

2.4.2 Engagement on the Commercial Lease and Associated Agreements

In addition to implementation of the IIBA, Baffinland and QIA also engage on a regular basis with respect to the Commercial Lease, associated Agreements and a range of management plans. Meetings in 2021 were primarily focused on discussing the Annual Work Plan, Annual Securities Review, the Water Compensation Agreement, and the Interim Closure and Reclamation Plan. Regular engagement with QIA on the commercial lease and associated agreements has been ongoing. In 2021, Baffinland continued to discuss with QIA at the beginning of the year to set a schedule of activities for the year based on jointly agreed upon priorities, ensuring that the objectives of both the QIA and Baffinland could be achieved in reasonable and actionable timelines.

2.5 ENGAGEMENT WITH WORKING GROUPS

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

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

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

The meetings are structured to enable participants to have the opportunity to provide input on monitoring program design and implementation, and follow-up at the conclusion of the field programs prior to finalization of the annual monitoring reports. The TEWG and MEWG receive presentations on the implementation of field programs and subsequent results in order to prioritize monitoring plans. Working group members are also able to provide input on measures for mitigation where required. The Working Groups provide a platform for the discussion of collaborative research opportunities between parties and to identify monitoring programs suited for community-based monitoring and Inuit participation. The TEWG and MEWG include member-status and observer-status participant organizations.

A SEMWG meeting is typically held following the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) annual meeting. The SEMWG is delivered a short presentation and overview of monitoring activities scheduled for the year. Project and monitoring program updates are also provided. A general discussion and comment period is then held with all working group members. In 2021, a QSEMC meeting did not occur; however, two (2) SEMWG meetings were held via teleconference.

Updates on 2021 activities specific to each working group are provided below. A record of meeting minutes for all Working Group meetings held in 2021 are provided in Appendix C.

2.5.1 Terrestrial and Marine Environment Working Groups

Project Certificate Conditions No. 49 and 77 mandated the establishment of working groups related to the terrestrial and marine environments. Members for each group include the Government of Nunavut, the QIA, Environment and Climate Change Canada (ECCC), Mittimatalik Hunters and Trappers Organization and Baffinland. Fisheries and Oceans Canada (DFO), Parks Canada and Makivik Corporation are also members of the MEWG. World Wildlife

Foundation (WWF) - Canada participates as an observer on both groups, and Oceans North participates as an observer to the MEWG.

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

- Baffinland to provide a Project update to the members (e.g., includes mining and shipping-related activities such as ore production, and vehicular and vessel traffic);
- Discussion of monitoring program planning including sampling approach (e.g., sampling variables, sites, and data collection methods) in advance of field programs to obtain feedback from MEWG and TEWG members;
- Discussion of results of monitoring programs to obtain feedback by MEWG and TEWG members; and
- Various research presentations (given by Baffinland, Baffinland technical consultants, and other working group members).

The working groups typically schedules two (2) yearly in-person meetings, in addition to hosting two (2) interim teleconferences per year. In 2021, engagement with the Working Groups were reduced to avoid consultation fatigue and overlap with scheduled engagements associated with the Phase 2 Proposal. However, as mentioned in Section 2.1, wherever possible, Baffinland has taken feedback received throughout the Phase 2 review process, and applied it to existing operations. For example, through Phase 2 technical review submissions, issues related to ballast water and narwhal entrapment events were raised by members of the Working Group (i.e. DFO and QIA). Despite not having approval on the Phase 2 Proposal, in 2021 Baffinland implemented commitments for additional ballast water mitigations (i.e. requiring vessels to conduct both exchange and treatment) and has been running narwhal entrapment clearance aerial surveys since 2019. These examples highlight that where synergies between the current operation and the Phase 2 Proposal were identified, Baffinland proactively integrated forward-looking commitments, to ensure that information received through Phase 2 consultation events were captured and addressed throughout 2021 to the extent possible.

As described in the Summary for PC Condition No. 49 and 77, draft technical annual reports and other documentation are provided to the TEWG in advance of meetings to the extent possible and on an on-going basis to allow for review, comment and advice to be provided by all members. Baffinland reviews all comments received on draft reports, makes effort to provide meaningful responses to each comment, and in so doing, takes into consideration the suggestions for improvement of the report and advice provided by TEWG. This mechanism allows TEWG members to provide constructive feedback on annual reporting efforts.

A list of the meetings and topics discussed with the TEWG and MEWG in 2021 is provided in Table 2.4.

In addition to the annual operational activities of the Working Group outlined above, since 2019, Baffinland has been engaging with the Working Group to update to the Working Group Terms of Reference (ToR). Following a comment period on previous iterations of the ToR, an updated version was provided by Baffinland to the Working Group in October 2020 alongside a concordance table to demonstrate how feedback provided was integrated into the ToR by Baffinland. Baffinland then organized a meeting with the Working Group in November 2020 to discuss the latest draft. In its most recent draft Terms of Reference (ToR) for the Working Groups Baffinland presented a reasonable path forward that would result in meaningful changes to the Groups current structure, operational schedule, and ability to influence the Project. It is expected that this should improve Members' expectations, communication within the Group and outcomes. Included within the most recent ToR, Baffinland has also suggested strengthening the Working Groups consensus based recommendation development process. If there were a recommendation that is agreed amongst all voting members of the working group except for Baffinland, the Working Group would follow

the processes described at Section 7 of the Draft ToR, ultimately seeking direction from NIRB if a resolution cannot be found amongst members.

Table 2.4: Terrestrial Environment and Marine Environment Working Group Meetings in 2021

Date	Location	Topics Discussed
TEWG		
June 30, 2021	Teleconference	2021 Terrestrial Environment Monitoring Overview <ul style="list-style-type: none"> • Climate • Vegetation Green-up • Disturbance <ul style="list-style-type: none"> ○ Tote Road Traffic ○ Dustfall ○ Helicopter Overflight • Effects Monitoring <ul style="list-style-type: none"> ○ Snow Track and Snowbank Surveys ○ Height of Land ○ Trace Metals ○ Caribou Tissue ○ Fall Aerial Survey
MEWG		
May 13, 2021	Teleconference	Baffinland Update 2020 Preliminary Marine Monitoring Results Technical Memo <ul style="list-style-type: none"> • 2020 Marine Mammal Aerial Survey Results • Ice Conditions • Icebreaking Activities • Narwhal Locations and 2020 Start of Shipping • Killer Whales • 2020 Small Craft Harbour Construction – Pond Inlet <ul style="list-style-type: none"> ○ Effects of Pile Driving ○ Icebreaking and Pile Driving Video ○ 2020 Small Craft Harbour – 13 July, 2020 • Passive Acoustic Monitoring – Predicted vs. Measured • Areas of Uncertainty • 2021 Monitoring programs • Narwhal Adaptive Management Response Plan Alternatives <ul style="list-style-type: none"> ○ Baffinland Mitigation Commitment ○ Small Craft Harbour Construction – 2021 schedule • 2021 Ringed Seal Aerial Survey Program • Methodology • Survey Area • Difference from DFO Survey
June 29, 2021	Teleconference	Baffinland Update

Date	Location	Topics Discussed
		<ul style="list-style-type: none"> • 2021 Shipping Season Overview • Vessel Management – Protocols and Mitigation • Shipping Communications • Steensby Data Collection Overview <ul style="list-style-type: none"> ○ 2021 Field Studies – Marine and Freshwater Environments ○ Purpose for Marine Studies - Support Regulatory Permit Applications ○ Marine Program Objectives - Collect and Update Baseline Information ○ Freshwater Program Overview <p>2021 Marine Monitoring Programs Overview</p> <ul style="list-style-type: none"> • MEEMP Program • Aquatic Invasive Species Program • Marine Fish Habitat Offset Monitoring Program • Physical Oceanography Data Collection Program • Ringed Seal Aerial Survey Program • Marine Mammal Aerial Survey Program • Bruce Head Shore-based Monitoring Program <ul style="list-style-type: none"> ○ Proposed UAV Surveys ○ Early Warning Indicator – Proportion of Immatures • Passive Acoustic Monitoring Program

Also included in Attachment 1 of Baffinland’s March 2021 Written Responses (NIRB Registry No. 336778; Baffinland, 2021a) was a model showing how the Inuit Committee and the Working Groups could complement one another should Phase 2 be approved. This proposed integrated relationship would allow for an improved flow of information with Inuit and technical experts, which Baffinland hopes will reduce the sometimes conflicting advice Baffinland has been presented with. For example, while Working Group members have consistently recommended Baffinland undertake additional underwater acoustic monitoring and aerial surveys, Inuit community representatives have expressed hesitations with these programs running on an annual basis. Although Baffinland has attempted to bridge this gap between Working Group recommendations and community preferences, the model proposed by Baffinland will facilitate direct engagement between these Parties, which is expected to better resolve these discrepancies. Most importantly, under this revised model, the Working Groups and the Inuit Committee would practically function as an advisory body to the NIRB, not just Baffinland. NIRB would at all times continue to maintain its monitoring oversight role for the Project, and that role under the Nunavut Agreement should continue to be respected and not be delegated to any third party. Baffinland acknowledges the ToR are still draft and we appreciate the feedback we have received to date. It is challenging and unfortunate that there has not been better engagement from participants on this initiative to date, however, Baffinland is confident they can be agreed to and finalized within a reasonable time frame and will report back to the NIRB once a consensus with the Working Groups have been reached.

Some Intervenor have suggested that going forward, the working groups should shift from acting in an advisory capacity to become an “oversight” function, and that decisions at the working group should be made by “consensus”.

In the manner proposed by the Working Groups, “by consensus”, means Baffinland should be required to adopt any measure that all members of the working group agree on, irrespective of the rationale for not moving it forward that may be provided by Baffinland. Baffinland has several concerns with this approach.

Baffinland suggests NIRB should give close consideration to the experience and composition of the members of the Working Group who are seeking a greater oversight role. Some Working Group members have expertise conducting research on the marine or terrestrial environments or have intimate knowledge of the area, while others do not have that expertise. Some participate solely in their capacity as a government regulator or as an interested Party. However, to Baffinland’s knowledge none of the participants, other than Baffinland and its technical experts, have significant experience operating industrial projects, particularly in the complex and challenging Arctic. While recommendations brought forward within these Working Groups must be subject to appropriate consideration and discussions taking into consideration Inuit Qaujimajatuqangit (IQ) and western science, they must also be weighed against the practical operationalization of the recommendation along with a fulsome cost benefit analysis, which no other party is suited to do outside of Baffinland. To be clear, Baffinland accepts that some Working Group members wish to see a process inserted into the Terms of Reference to generate and record consensus-based recommendations and this has been reflected in the most recent drafts, however, Baffinland must stress the need to retain ultimate authority to reject recommendations that don’t meet reasonable criteria for implementation. Baffinland also notes that many of the members that participate in the Working Groups also represent regulatory bodies that have the ability to issue directions to Baffinland in accordance with their jurisdiction, mandate or issued permits. As has always been the intention of the Working Groups, they should not duplicate or fetter regulatory obligations, and rather remain focused on the enhancement of Baffinland’s monitoring programs and providing advice on best practices or new research they are aware of to inform the ongoing development and implementation of Baffinland’s comprehensive environmental management system.

Baffinland notes that as part of its 2020 to 2021 Board Recommendations Report, the NIRB issued three recommendations related to the Working Groups, specifically relating to the functionality of these bodies, the development of a clear operational schedule for the Working Groups and an update from Baffinland on a path forward to finalizing the ToR. Baffinland has provided responses to each of these recommendations in Appendix E.

2.5.2 Mary River Socio-Economic Monitoring Working Group

Baffinland coordinates the Mary River SEMWG in fulfillment of Project Certificate Condition No. 129. The SEMWG is a sub-group of the Regional QSEMC, which meets annually. Baffinland also acts as a participant in the QSEMC. The SEMWG includes members from the Government of Nunavut, the QIA, CIRNAC, and Baffinland.

SEMWG meetings were held on June 1, 2021 and October 13, 2021 via teleconference. Inform. Topics discussed during these meetings are outlined in Table 2.5. A QSEMC meeting was scheduled to be held October 27 to 28, 2021. Out of an abundance of caution regarding the status of COVID-19 in Iqaluit, the Government of Nunavut – the meeting organizer – postponed the meeting indefinitely.

Additional information on the meetings held and information shared can be found in the 2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022).

Table 2.5: Socio-Economic Monitoring Working Group Meetings in 2021

Date	Location	Topics Discussed
SEMWG		
June 1, 2021	Teleconference	<ul style="list-style-type: none"> • Baffinland Project Update • 2020 Socio-Economic Monitoring Report Overview • MRSEMWG Terms of Reference Review • Updated Closure Planning
October 13, 2021	Teleconference	<ul style="list-style-type: none"> • Project Update <ul style="list-style-type: none"> ○ COVID-19 ○ Phase 2 Update ○ Care and Maintenance Preparation • 2020 Annual Report Review • 2021 Inuit Employee Survey • Update on Temporary Closure Planning

2.6 LOOKING AHEAD

In 2022, Baffinland will work towards continuing operations under the approved Project, and where permitted, will prepare for the anticipated expansion of the Project, pending approval of Phase 2 by the end of year. Specific activities to support the Project that are proposed to be undertaken in 2022 include: continued development and construction of infrastructure required at Milne Port, Mary River Mine Site (Mary River) and along the Tote Road including improvements to the Tote Road to address safety concerns, freshet runoff issue and progressive reclamation of historic borrow sources; and site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues around current infrastructure (specific details are provided in Section 3.3). Project environmental monitoring programs prescribed by the Project Certificate in consideration of the applicable Project Phase(s), water licences, authorizations, management plans and environmental effects monitoring plans will also continue through 2022.

Baffinland will continue to implement a proactive approach to engagement with Inuit and other stakeholders through meetings, workshops, surveys and dissemination of information using various oral (e.g., public radio, one-on-one in-person meetings, town halls) and written (e.g., brochures, reports) communication modes recognizing that travel into communities and in-person gatherings may continue to be limited. This will serve to ensure that the communities, QIA, regulators and the public are informed in a timely manner of the Project's progress and the potential environmental and social impacts of ongoing operations. Baffinland will continue to follow all public health advice and will adapt its engagements with communities, governments, and members of the public accordingly.

3 OPERATIONS OVERVIEW

3.1 SITE ACTIVITIES COMPLETED IN 2021

Baffinland continued to focus on mine production from Deposit No. 1 in 2021. Key activities undertaken in 2021 occurred at the active Project component areas including Milne Port, the Milne Inlet Tote Road, and the Mine Site. No Project activities were undertaken related to the development of the South Railway or at Steensby Port in 2021, with the exception of studies to update baseline information on fish and fish habitat along the South Railway and at Steensby Port.

Mining and hauling activities from the Mine Site to Milne Port continued throughout 2021, with 5.3 Mt of iron ore hauled using the Tote Road and stockpiled at Milne Port. This year also marked the seventh shipping season with a total of 5.6 Mt of iron ore shipped between July 24 to October 31. Following consultation with QIA, the Hamlet of Pond Inlet, MHTO, DFO, and MEWG, Baffinland developed and implemented the '2021 Narwhal Adaptive Management Response Plan'. This resulted in a decision to delay the start of the shipping season until ice-breaking activities could be avoided. However, Baffinland did bring in an ice breaking vessel (the MSV Botnica), which was retained as a safety measure for the start of the shipping season, and used to escort ore carriers at the end of the shipping season to facilitate safe passage through prevailing ice conditions. Seventy-three (73) voyages were executed, with vessels carrying an average of approximately 77,000 tonnes of iron ore each. An additional vessel was called to Milne Port, but not loaded due to timing constraints at the end of the shipping season.

Operational activities in 2021 included:

- Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore;
- The continued development and construction of infrastructure required at Milne Port and the Mine Site, and along the Tote Road;
- Continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction activities, which included the use of water and deposition of waste as authorized under existing permits;
- Ongoing operation of permitted quarry and borrow sources;
- Arrival of vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port during shipping season (approximately between end of July and end of October 2021). Transportation of material, fuel and supplies required for operational and construction activities to the Mine Site year-round via the Tote Road;
- Ongoing environmental effects studies and baseline data collection to support the construction and operation of the Project as well as for future engineering requirements;
- Environmental monitoring in accordance with the approved PC, licences, authorizations, management plans and environmental effects monitoring plans;
- Ongoing exploration activities including drilling, mapping, prospecting, sampling and geophysics;
- Tote Road improvements to address fish passage, drainage and sedimentation and erosion concerns;
- Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues;
- Remediation of historic borrow pits along the Tote Road;
- Construction of new water management infrastructure at Km 105.

Representative photographs showing major 2021 site activities are included in the Photo Essay (Appendix D).

3.2 2021 HIGHLIGHTS AND CHALLENGES

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

2021 presented a number of challenges for the Baffinland operation. The COVID-19 Pandemic continued to present challenges with safely operating a mine along with temporary shut-downs that occurred throughout the year resulting in the amount of ore mined, crushed and transported by ore haul trucks along the Tote Road and stockpiled at Milne Port being lower in 2021 (5.3 Mt) than in 2020 (6.0 Mt). Baffinland also pro-actively made the decision to delay the start of the shipping season in response to lower narwhal numbers observed in 2020 and the continuation of construction of important community infrastructure in the marine environment. 2021 also saw the continuation of the Phase 2 expansion project review which was challenged by cancellations in key events due to the on-going Pandemic. Despite these challenges, Baffinland was able to ship 5.6 Mt of ore to its customers and notably Baffinland employees continued to create a safe workplace resulting in the lowest total recordable injury frequency throughout our operations to date.

3.2.1 Project Economics

As stated in previous years reports to the NIRB, throughout 2021, Baffinland continued to communicate with Inuit and other Project stakeholders that the economics of the current Project was not considered financially viable in the long-term. Subsequently, on April 30, 2021, Baffinland notified its employees and the QIA that placing the Project into care and maintenance in 2022 may be necessary due to the unanticipated delays associated with the Phase 2 Proposal and unfavourable iron ore price forecasts for 2023 and beyond coupled with the mine's current production rates.

After this notification was released, Baffinland worked throughout 2021 to consult with relevant Parties on the development of Temporary Closure Plans, which were submitted to the NIRB on January 20, 2022 (Jason Prno Consulting Services Ltd. [JPCSL], 2022). A copy of the Temporary Socio-Economic Closure Analysis from Baffinland Regarding the Mary River Project has been included with this Report as Appendix G.21. Within this submission it was highlighted to the Board that the circumstances that could lead to temporary closure in 2022 or 2023, could have longer term negative consequences than the period of temporary closure itself.

Advancing the Phase 2 Proposal will allow Baffinland to increase production from 4.2 Mtpa (and temporary expansion increase of 6 Mtpa) to 12 Mtpa from Milne Port, and utilize a more environmentally efficient and cost effective mode of land based transportation by rail. These improvements in production and transportation will both serve to insulate the Project against fluctuating global iron ore prices by reducing unit costs to produce and transport our iron ore. Over time these efficiencies should also support the longer-term goal of reaching a production rate of 30 Mtpa. Continued pursuit of this phased approach will safeguard the Project from vulnerability to market fluctuations, which will subsequently help prevent temporary or early closure of the Project.

3.2.2 COVID-19 Pandemic

Tremendous efforts carried over from 2020 into 2021 to ensure that the health and safety of Baffinland's employees, its contractors, and the neighbouring communities remained the foremost priority as operations continued through the COVID-19 Pandemic. Comprehensive safety plans and protocols to minimize the risk of COVID-19 exposure were implemented at the Project. To protect communities in Nunavut from COVID-19, Baffinland requested that all Nunavummiut remain home on paid leave in the first half of 2021. When easing of public health restrictions allowed, Nunavummiut returned to work in late summer 2021, but were sent home again in December due to the presence of the Omicron variant. Additionally, specific protocols were also established to minimize the risk of COVID-19 transmission to hunters and visitors traveling through Project areas. With these extensive precautions and protocols in place by Baffinland, the risk of COVID-19 exposure to Nunavut communities was minimized while the operation continued. Baffinland's Northern and Oakville offices have also been impacted with the Northern offices following local protocols in their respective communities, while the Oakville headquarters has remained closed with employees working from home since the start of the COVID-19 Pandemic.

To minimize risk of exposure to employees and contractors traveling to Mary River, pre flight COVID-19 testing and screening for symptoms was implemented for all inbound personnel as a prerequisite for site access. Baffinland protocols, established in consultation with federal and territorial public health experts included: preventive measures such as physical distancing, proper hand washing, frequent sanitizing, and mask use during travel and on site at Mary River. Baffinland and its consultants implemented comprehensive safety plans and protocols to minimize the risk of COVID-19 exposure to their employees and local communities.

Baffinland was one of the first companies to implement on-site COVID-19 testing facilities at its remote mining site to test all employees and contractors coming to Mary River as well as throughout each rotation. Additionally, all staff undergo daily health screenings to monitor for any symptoms of COVID-19; if any symptoms are experienced, these staff members immediately self isolate. If testing yields positive results or if symptoms develop while on-site, Nunavut Public Health is contacted and the employee are quarantined until medically cleared.

With the extensive precautions and protocols in place by Baffinland, the risk of COVID-19 exposure to Nunavut communities was minimized, and operations continued with minimal risks and remained viable. Table 3.1 provides an overview of the challenges and outcomes faced in 2021 as a result of the COVID-19 Pandemic, as it relates to the implementation of the Project and adherence to the Project Certificate.

Table 3.1: Summary of COVID-19 Challenges and Outcomes in 2021

Challenge	Relevant Term(s) and Condition(s)	Description and Outcome
Health and Safety		
Ensuring health and safety of employees and contractors during the global COVID-19 Pandemic	General application of any term and condition relevant to on-site activities	<ul style="list-style-type: none"> Existing robust Emergency and Crisis Management Plans in place that included an infectious disease component, rapid responses based on risk assessments were rolled out; Continued operation of full scale COVID-19 testing lab at Mine Site; Implemented pre departure flight testing at LUX terminal for inbound personnel. Full scale Covid-19 testing lab at LUX terminal installed for this purpose; Nunavummiut workforce were requested to remain home and remain on standby pay; Baffinland's other high risk (most-vulnerable) employees sent home during certain periods; Introduced stringent preventative controls and increased H&S protocols. For example: <ul style="list-style-type: none"> Quarantine and isolation protocols in place at site; Increased sanitation cleaning of site and equipment; Increased employee hygiene practices; Enhanced communications with employees; and Strict travel policies. Baffinland continues to successfully manage the risks of potential COVID-19 transmission at its Project sites.
Monitoring Program Implementation		
Field Work Logistical Considerations	General and applicable to all site-based monitoring programs	Numerous health and safety protocols were implemented to ensure the safety of employees and contractors, including during travel to and from Mary River. Work rotations were extended from 2 to 3 weeks, due to limited flights schedules into and out of Mary River.
Vessel Boarding Restrictions	101c, 106, 123	The Ship-based Observer (SBO) Program as typically run in 2018 and 2019 could not be implemented due to boarding restrictions on the MSV Botnica. As an alternative, Baffinland continued its partnership with the Marine Mammal Observation Network (MMON) an incidental marine mammal sighting program with a select fleet of vessels contracted by Baffinland including MSV Botnica, Nordic Ore Carriers, and newly participating Oldendorff.

Challenge	Relevant Term(s) and Condition(s)	Description and Outcome
	89	As part of the ship-shore personnel interface risk evaluation, only the Port Captain was given permission to board ore carriers to test for ballast water salinity and temperature, rather than having the program run by a dedicated Ballast Water Monitor reporting to the Environment Department.
Reduced Inuit Participation	101c, 126	As Nunavummiut were welcomed back to site at the end of July, some Inuit participation in the environmental monitoring programs was once again feasible. Inuit researchers from local communities participated in the Bruce Head, Aerial survey, Marine Environmental Effects Monitoring Program / Aquatic Invasive Species (MEEMP/AIS), Milne Inlet Freshwater Fish Health Study and Steensby baseline data collections programs. Non-Nunavut based Inuit employees also continued working on environmental programs throughout 2021.
In-person Engagement Efforts		
Pre-shipping and End of Season Shipping Meeting	Not applicable	Baffinland organized an End of 2020 Shipping Season/2021 Pre-shipping season teleconference meeting on May 28, 2021 due to ongoing travel restrictions limiting travel to communities.
Monitoring Program Engagement (Terrestrial, Marine and Freshwater)	Not applicable	Baffinland developed an information package for the Mittimatalik Hunters and Trappers Organization (MHTO) to provide details about the 2021 Monitoring Programs and was shared via email. Follow-up communications via email and phone provided details on anticipated program details, in addition to working group meetings held in June 2021.
Procurement and Contracting/Employment Tours	Not applicable	Due to COVID-19 Baffinland was unable to hold the Annual Project Review Forum (APRF) Employment and Training Information Sessions (ETIS) and the Contracting and Procurement Information Tour (CPIT) in 2021. These in-person sessions will be planned and rolled out in 2022 pending COVID-19 restrictions. Modified ETIS Radio shows were conducted in all five of the impacted communities in July 2021.
Community Tours - Operations	Not applicable	Baffinland had to implement changes to its Engagement Approach in 2021 due to the COVID-19 Pandemic and in respect of Public Health Orders and guidelines in Nunavut. The most important changes were the limiting of public meetings and moving to non-in-person formats (i.e., teleconference).
Regulatory Agency Site Visits		
In-person Summer 2020 Site Visit by NIRB was not possible due to travel restrictions	Not applicable	NIRB provided a list of Project activities and locations of photos to be taken by Baffinland as an alternative to an in-person visit.

Challenge	Relevant Term(s) and Condition(s)	Description and Outcome
Working Groups		
Travel restrictions prevented the organization and participation of in-person meetings	Not applicable	Shift from in-person to teleconference meeting format.
Hiring and Training of Inuit Employees		
No to limited in-person training	135, 136, 138, 140, 141, 142, 156	Baffinland adapted its training to provide opportunities for Inuit to participate remotely in training while keeping health and safety as the number one priority. This led to the development of online delivery methods of training, and an enhanced focus on in-community training.
Employee/Contractor and Family Wellness		
Individual and family health (physical and mental health)	Not applicable	Employees and contractors were faced with unprecedented challenges related to implementation of extended and often variable lockdown measures, working from home scenarios and the need to care for sick family members including elderly, and/or the need to isolate/quarantine because of personal sickness and/or sick family members, and/or exposure to COVID-19 positive individuals identified through contact tracing. In response, focus has been placed on ensuring the wellness of individuals and their families.
Office/School/daycare closures (working from home and work-life balance)	Not applicable	Employees and contractors have been faced with unpredictable challenges related to lockdown measures including office closures to reduce transmission risk, exposure to positive COVID-19 individuals, sickness, etc. resulting in most non-Site-based employee's individuals working from home since March 2020. School and daycare closures due to lockdown measures and/or institutional outbreaks have resulted in challenging work-life scenarios for over a year. Adaptation has been key.
Shift from 2-week to 3-week rotations over field season	Not applicable	Based on risk management, flight schedules were modified in order to best manage the risk of COVID-19 transmission at remote mining sites. This has included a number of measures including reduced flights into and out of Mary River. These longer shifts have been challenging given the extended length of shifts over which employees and contractors have worked. Fatigue management and positive mental health are considered priority areas.

3.2.3 IIBA Implementation Highlights

Implementation of the IIBA contributed to many new and notable highlights for the year 2021. These include, but are not limited to, the following:

- The Mary River Inuit Training budget (Article 8.6) at Baffinland was \$2.25 million dollars between 2018 until 2021, and then \$1.5 million dollars for the years of 2021 through 2031. Baffinland and QIA through the Annual Work Plan highlight what training will be conducted in each year. A large focus has been placed on increasing Community based training which was successfully conducted in each of the five impacted communities in 2021.
- Successful implementation of the Harvesters Enabling Program (Article 17.7) in Pond Inlet which supplies each Inuk residing in Pond Inlet, who on January 1st of that year is not less than twelve years old, with three hundred liters of gas to support harvesting activities that occur during that year.
- In 2021 Baffinland awarded five scholarships (Article 8.8.2) to North Baffin residents, totaling \$25,000. Since 2014, Baffinland has awarded \$219,000 to 44 well-deserving students in pursuit of continuing education. Inuit students are welcome to apply each year that they further their education.
- Baffinland continued to provide opportunities for Inuit to participate in training while keeping health and safety as the number one priority. Training was provided in both online, and in-person formats throughout 2021.
- Baffinland and QIA conducted Employment and Training Radio Shows (Article 7.8) in each of the five impacted communities due to the restrictions on travel created by COVID-19. These radio shows provided community members information on employment and training with an opportunity for a question and answer period during the show. These radio shows were held during June, 2021.
- While not a direct requirement of the IIBA, since 2007 Baffinland has provided laptops to high school graduates in the North Baffin communities as an incentive to motivate local youth to complete their high school education and pursue post-secondary education. Baffinland provided 61 laptops to grade 12 Inuit graduates in 2021.
- Baffinland also purchased 25 iPad devices (five (5) in each LSA) to aid in the delivery of virtual training, and meetings given the inability of holding in-person events due to COVID-19 restrictions. Due to this, Baffinland was successful in the delivery of virtual work-ready programming in the LSA communities in both 2020, and 2021.

3.2.4 Inuit Employment and Contracting

In 2021, a total of 493,131 hours were worked by Inuit and 3,652,196 by Non-Inuit. These hours include those worked by both Baffinland and Contractor employees. In total, Inuit employment hours were 12% of the total hours worked. Baffinland's Inuit employee payroll totaled \$15,292,407. These amounts include all Inuit employees who lived in and outside of Nunavut. Contractor's Inuit employee payroll totaled \$6,303,205. These amounts include all Inuit employees who lived in and outside of Nunavut. For 2020 and 2021, Inuit employment hours and wages paid should be interpreted with some level of caution. Given that Inuit employees were at home on standby rates, and that subsequently Baffinland could not hire new, or re-mobilize Nunavut-based employees, these roles had to be supplemented by contractors from the south to meet operational requirements. Ultimately, this resulted in lower wages/hours for Inuit, as the standby wages are 8 hours a day/40 hours a week vs. 12 hours a day/seven days per week for on-site rotation. When considering this, the number of Inuit employment hours for 2020/2021 does not accurately represent the contribution of Inuit to the total workforce (i.e. greater than 12%), which would exist under normal operating conditions.

Throughout 2021, Baffinland continued to hire Shipping Monitors in Pond Inlet to provide a direct liaison between the community of Pond Inlet, the Mittimatalik Hunters and Trappers Organization and Baffinland. A total of ten (10)

Shipping Monitors were hired in 2021 in order to provide local community oversight on Baffinland shipping operations over the entire length of the season, including daily tracking of vessel locations and speeds. Hires consisted of three (3) returning Shipping Monitors from 2020 and seven (7) new workers/summer students joined the shipping monitoring team between July and October 2021.

Since 2014, Baffinland (not inclusive of contractors) has provided \$91.1 million in payroll to Inuit. Wages paid to Inuit is an important measure of the Projects significant positive socio-economic impact on Nunavummiut. Through the provision of wages, Baffinland is providing Inuit with the opportunity to purchase goods and services in their communities creating positive benefits for local business, including Inuit owned firms.

Article 6 of the IIBA refers to procurement and contracting to ensure that all economic activity associated with the Project will be available to Inuit firms. Baffinland utilizes the registry of Inuit Firms maintained by Nunavut Tunngavik Incorporated (NTI) to identify Inuit Firms which may be eligible/qualified for various contracting opportunities.

Procurement with Inuit-owned businesses and joint ventures in 2021 totaled approximately \$220.2 million. This includes twenty-five (25) contracts with Inuit-owned businesses and joint ventures, all of which were based in either the North Baffin communities or Iqaluit. Since Project development, a total of approximately \$1.5 billion worth of contracts have been awarded to Inuit-owned businesses and joint ventures.

Throughout 2021, Baffinland continued to take steps to ensure that maximum benefits of the Project, represented by employment and contracting opportunities, were accessible to Inuit.

3.2.5 Training Initiatives

Baffinland and the Qikiqtani Inuit Association (QIA) as well as the government of Nunavut, Kakivak Association and the Government of Canada have partnered in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program, the objective of which is to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Training under the Q-STEP program includes work readiness programs as well as targeted training programs directed at apprenticeships, skills development, and formal certification in heavy equipment operation.

The Qikiqtani Skills and Training for Employment Partnership has proven to be the most successful employment and training program currently offered at Baffinland. The Q-STEP Charter from Employment and Service Development Canada was scheduled to end on March 31st, 2021. However, due to COVID-19, access to the remaining funding of the program was extended until March 31st, 2022. The Q-STEP teams at Baffinland and QIA have also secured additional funding from Kakivak Association for a portion of the Q-STEP program including:

1. Community based work readiness training
2. On-site work readiness training
3. Heavy Equipment Operators Training
4. Adult Basic Education and Pathway to Adult Secondary School programs

The Q-STEP team continues to seek additional third party funding to support the continuation of apprenticeship training at Baffinland.

In 2021, Inuit training hours totalled 32,974.25 hours, equivalent to 27.2% of the total training provided by Baffinland. Baffinland is also working to develop new training programs that would be offered both in local

communities and at the Mine Site. Baffinland is also working with contractors to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as the operation advances, employment increases, and feedback from Inuit employees is implemented.

3.2.6 Support for Local Businesses

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

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

3.3 LOOKING AHEAD

The 2022 Work Plan was submitted to the NWB, QIA and CIRNAC on November 1, 2021 (Baffinland, 2021b). This submission is a requirement under Part J, Item 3 of Amendment No. 1 of Type 'A' Water Licence 2AM-MRY1325 and under Section 6.1 of Commercial Lease No. Q13C301 agreed between Baffinland and the QIA.

A summary of the planned 2022 activities are as follows:

- Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore;
- The continued development and construction of infrastructure required at Milne Port and the Mine Site and along the Tote Road for the Mary River Project;
- Continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction activities which will include the use of water and deposition of waste as authorized under existing permits;
- Ongoing operation and expansion of permitted quarry and borrow sources;
- At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive during open water. Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year round via the Tote Road;
- Ongoing environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements;
- Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans;
- On-going exploration activities including drilling, mapping, prospecting, sampling, and geophysics. Planning of the details of the summer drilling and/or trenching program is not yet finalized;
- Tote Road improvements to address safety concerns, freshet runoff issues and progressive reclamation of the historic borrow sources;
- Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues around current infrastructure; and
- Erection of additional maintenance facilities to safely service equipment.

The Project's Phase 2 Expansion Proposal continues to proceed through the review and approvals process facilitated by the NIRB and NWB. NIRB has closed the Public Record for the Phase 2 Proposal and the NIRB Panel's

“Reconsideration Report and Recommendations” will be conveyed to the Responsible Ministers on or before May 13, 2022. Should the NIRB’s Report be favourable, Baffinland will move forward with further environmental permitting, as well as Inuit Certainty Agreement implementation.

No activities are planned to be undertaken along the south railway or at Steensby Port in 2022, with the exception of select baseline studies to support the future development of the southern transportation corridor and Steensby Port, should that be possible. Project environmental monitoring programs prescribed by the Project Certificate, water licences, authorizations, management plans and environmental effects monitoring plans will continue through 2022.

4 PERFORMANCE ON PC CONDITIONS

The following sections provide a discussion of Baffinland's self-assessed status of compliance and performance related to each of Project Certificate (PC) Conditions for the Project in 2021.

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

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

4.1 METHODOLOGY AND CRITERIA

Table 4.1 outlines the status of compliance levels and describes the criteria related to each of these options. Each PC Condition has been assigned a status of compliance. Where a PC Condition is designated as being only 'In Progress' or 'Non Compliant', a rationale explaining why 'In Compliance' was not achieved in 2021 and, where applicable, a strategy for moving towards full compliance in a future reporting year has been provided.

Table 4.1: Status of Self-Assessment Compliance Terminology and Criteria

Status	Criteria
Status of Project Condition	
Active	The PC term and Condition is active during the current phase of the Project for the relevant monitoring period.
Not Active	The PC term and Condition is not active for the relevant monitoring period, and/or is tied to a project component that was not yet applicable during the reporting year.
Status of Compliance	
In Compliance	Obligations described under the Term and Condition have been met or exceeded, as intended in the PC for the relevant monitoring period. *Rationale for meeting compliance requirements is provided.
In Progress	Obligations described under the Term and Condition have been partially fulfilled, as intended in the PC for the relevant monitoring period. *Demonstrable efforts towards meeting compliance requirements is evidenced.
Non Compliant	Obligations described under the Term and Condition have not been met as intended in the PC for the relevant monitoring period. *Rationale for being unable to meet compliance requirements is provided.
Not Applicable	The PC term and Condition is not applicable to the current phase of the Project for the relevant monitoring period.

Baffinland has taken a conservative approach for self-assessing the status of compliance with PC Conditions for 2021. When determining a status of compliance for each of the PC Conditions, the following process was implemented by Baffinland and its technical experts:

1. A review of the specific requirements outlined in each PC Condition is conducted.

2. A review of all relevant work completed by Baffinland in the reporting year and/or previous reporting years (if applicable) relevant to the PC Condition is conducted.
3. A consideration of previous status assignments by NIRB and associated interpretation.
4. A gap analysis is completed to assess whether or not there is a delta between the requirements of the PC Condition and the work completed by Baffinland to meet these requirements.
5. Inuit and stakeholder comments as relevant to the PC Condition are considered. Baffinland maintains a list of meeting records (formal and informal) that were held with Inuit or other stakeholders and integrates any relative feedback heard according to topics covered through the various ecosystemic and socio-economic terms and Conditions.
6. A status of compliance based on the results of Baffinland's self-assessment is assigned.

Baffinland will continue to complete its self-assessment using this approach in the absence of specific guidance from the NIRB on expectations on Proponents for the preparation of Annual Reports and a description of the NIRBs compliance assessment evaluation process.

4.2 APPROACH TO REPORTING ON PERFORMANCE

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

Table 4.2: Layout of PC Condition Summary Sheets

Item	Summary of Content
Category	<ul style="list-style-type: none"> Category as defined in PC No. 005.
Responsible Parties	<ul style="list-style-type: none"> Responsible party as defined in PC No. 005.
Project Phase(s)	<ul style="list-style-type: none"> Phase(s) of the Project the PC Condition is applicable to: <ul style="list-style-type: none"> Construction Operations Temporary Closure / Care and Maintenance Closure Post-Closure Monitoring (as outlined in PC No. 005)
Objective	<ul style="list-style-type: none"> The objective as outlined in PC No. 005
Term or Condition	<ul style="list-style-type: none"> The term or Condition as written in PC No. 005
Relevant Project Commitment	<ul style="list-style-type: none"> List of all corresponding Baffinland commitments outlined in the Final Hearing Report (NIRB, 2012b).
Reporting Requirement	<ul style="list-style-type: none"> The reporting requirement as outlined in PC No. 005.
Status of Project Condition	<ul style="list-style-type: none"> A self-assessed status of compliance for the PC Condition: <ul style="list-style-type: none"> Active Not Active

Item	Summary of Content
Status of Compliance	<ul style="list-style-type: none"> A self-assessed status of compliance for the PC Condition: <ul style="list-style-type: none"> In Compliance In Progress Non Compliant Not Applicable
Inuit and Stakeholder Review	<ul style="list-style-type: none"> Inuit, stakeholders and other interested parties that participate in discussions and reviews related to aspects and implementation of regulatory submission of actions or documents relevant to the PC Condition.
Reference	<ul style="list-style-type: none"> Description / title of relevant documents where supporting information related to PC Condition status of compliance is available for review. URL to web-portal where referenced documentation can be accessed, and/or Appendix where documentation can be found appended to the report.
Methods	<ul style="list-style-type: none"> The methods employed to complete work required to meet compliance to the PC Condition. Summary of any adaptive management measures employed that year in support of achieving compliance to the PC Condition. If relevant, challenges associated with the COVID-19 Pandemic are provided, including whether specific program components were or could not be completed in 2021.
Results	<ul style="list-style-type: none"> Summary of analytical results, quantitative/qualitative data or work that were completed in support of achieving PC condition compliance in 2021.
Trends	<ul style="list-style-type: none"> Summary of notable trends from previous years, if identified, and relevant discussion on whether these are stemming from Project-related effects or due to natural variability. When relevant, reference is made to effects predicted as part of NIRB environmental assessment processes (i.e., FEIS and FEIS addendum). Trends are identified using the following general guidance: <ul style="list-style-type: none"> A review of all work completed in the reporting year and/or previous reporting years (if applicable) relevant to the PC Condition is conducted. If the data is quantitative, an evaluation of trends and statistical analysis is completed (i.e., graphs and metrics presented), where sufficient data exists to do so. Quantitative, statistical trends are presented numerically and in graphs using previously collected data, if available to do so. For qualitative indicators, an evaluation of applicable reports, engagement sessions and meeting records applicable to the topic are evaluated to develop content for the 'trends' information presented.
Recommendations / Lessons Learned	<ul style="list-style-type: none"> Summary of any operational changes undertaken or recommended for the future to achieve compliance or to further enhance environmental performance. Assessment of effectiveness of monitoring program and whether any changes to the scope of monitoring are appropriate. Identification of any challenges related to implementing mitigation measures, undertaking monitoring, or obtaining data from other sources.

4.3 SUMMARY OF 2021 COMPLIANCE WITH CONDITIONS

Baffinland's performance in fulfilling the PC Conditions in 2021 is presented on Figure 4.1. A summary of each of the Conditions and the Project status with respect to the Conditions in 2021 is presented in Appendix A.

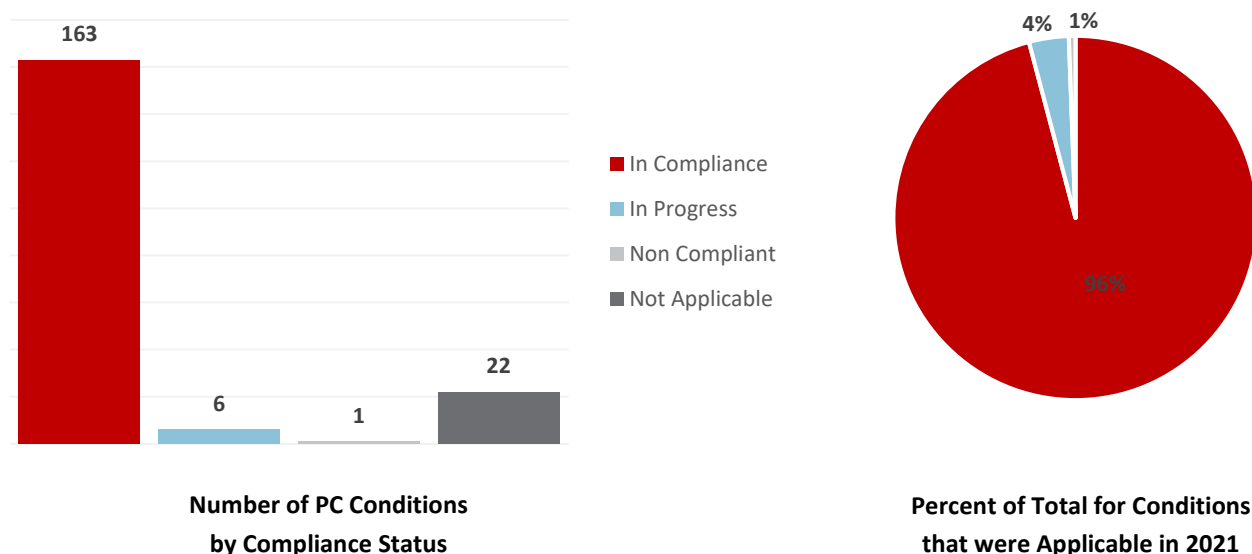


Figure 4.1: Baffinland's Overall Performance against Project Certificate Conditions in 2021

Overall, Baffinland is in compliance with the required terms and conditions for the Project. Of the 170 Project Certificate Conditions that were applicable to the Project in 2021, Baffinland is 96% In Compliance with these terms and conditions. This is consistent with 2020 and demonstrates Baffinland's continued commitment to maintaining compliance with the Project Certificate. In areas where improvement is still required, Baffinland will continue to make operational changes, implement adaptive management, and work with regulators and the communities to ensure the Project remains in compliance with Project Certificate No. 005.

4.4 PERFORMANCE ON GENERAL CONDITIONS

The following presents the performance on general conditions set out in Section 4.1 of the Project Certificate, and Baffinland's comment on the condition performance. Items one to four in this section of the Project Certificate speak to the NIRB's monitoring responsibilities, and Sections five (5) through 12 describe additional requirements for Baffinland. A 2021 status on these items is provided below.

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

Baffinland has received the necessary approvals from NIRB to construct and operate the 18 Mtpa (Steensby) rail project, the 4.2 Mtpa ERP, and for the temporary production increase to 6 Mtpa until the end of 2021 (NIRB, 2020a), as well as the permits necessary to operate the latter two components of the Project (Table 1.2). Baffinland will obtain additional permits prior to initiating construction of the 18 Mtpa rail project to Steensby.

These approvals often include additional permits with their own annual reporting requirements. Other major annual reports include the combined annual report for operations submitted to the QIA and the NWB, pursuant to

Baffinland's Type 'A' Water Licence and Commercial Lease. The Annual Report to the QIA and the NWB is substantial and, in comparison to the NIRB Annual Report, includes much greater detail on water, waste management activities, as well as spill management and other topics related to water as per guidance. These reports can be found on Baffinland's Document Portal at: <https://www.baffinland.com/media-centre/document-portal/>.

A separate annual report on the status of implementation of the IIBA in 2021 was issued to the QIA and Joint Executive Committee on March 31, 2021. The contents of the IIBA report address or partly address many components of socio-economic monitoring and management.

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

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

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

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

Closure and reclamation costs and resulting corresponding bonding requirements for the Mary River Project are determined through the Annual Security Review (ASR) process conducted in accordance with Schedule C of the Type 'A' Water License 2AM-MRY1325, Amendment No. 1, and the QIA Commercial Lease Q13C301. Under the Annual Security Review (ASR) process, Baffinland, the respective landowners (the QIA & the Crown), the Nunavut Water Board, and other interested parties meet and confer to determine the estimated closure and reclamation costs for an upcoming year. Baffinland submitted the Marginal Closure and Reclamation Financial Security Estimate to the NWB and QIA with the Annual Work Plan on November 1, 2020 for the 2021 year. Publicly available ASR document submissions for a respective year, describing in detail annual estimated closure and reclamation costs, can be downloaded from the NWB FTP site at: <ftp.nwb-oen.ca>.

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

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

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

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

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

From 2014 to 2021 Baffinland included a summary of all monitoring programs in the Popular Summary of the NIRB annual report which was translated into Inuktitut. Starting in 2019, Baffinland also began including a popular / executive summary translated into Inuktitut for all final report versions of the Socio-economic, Terrestrial and Marine Annual Monitoring reports. A translated executive summary is also included with the QIA/NWB Annual Report for Operations and the QIA/NWB Annual Report for Exploration and Geotechnical Drilling. Meeting minutes and presentation materials of the Terrestrial and Marine Environment Working Group meetings are also typically translated into Inuktitut.

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

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

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

The Environmental Effects Monitoring program components are reviewed on a regular basis through discussions with the Terrestrial and Marine Environmental Working Groups. Monitoring programs that are not managed under one of the environmental working groups are reviewed with applicable regulatory agencies. A summary of the effects of the Project compared to those predicted in the FEIS is also provided in Sections 4.5 through 4.7.

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

In 2017, Baffinland launched a Project-specific Document Portal on its corporate website in order to provide monitoring and reporting information to the public (<https://www.baffinland.com/media-centre/document-portal/>). The web portal has been live as of March 31, 2017 and remained operational throughout 2021, and remains operational as of the date of this report's submission. Where relevant, the web portal provides links to English and Inuktitut versions of the popular summary of most recent final reports as well as the main body of the report or document.

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

4.5 PERFORMANCE ON COMPLIANCE WITH REGULATORY INSTRUMENTS

General regulatory requirements under the PC requires Baffinland to take prompt and appropriate action to remedy any event of non-compliance, and to report all instances of non-compliance and associated follow-up annually to NIRB. Baffinland's compliance with applicable regulatory instruments in 2021 is discussed below.

4.5.1 Agency Inspections and Site Visits

To validate compliance with the Project's various regulatory instruments, Baffinland hosts regulatory inspections with representatives from CIRNAC, ECCC, QIA, DFO and the Workers' Safety and Compensation Commission (WSCC) throughout the calendar year. However, in 2021 due to travel restrictions related to the COVID-19 Pandemic, not all inspections were able to be completed in person. Wherever possible, Baffinland engaged with regulators to find alternative means for completion of inspections and site visits, including detailed photo journals and updates on specific activities. Where relevant, documentation and correspondence associated with these inspections are available in the 2021 QIA and NWB Annual Report for Operations (Baffinland, 2022b). The following subsections outline the inspections conducted by regulatory agencies and stakeholders at the Project in 2021. Details regarding NIRB's site visits are provided in Section 5.1.

4.5.1.1 CIRNAC Inspections

During 2021, CIRNAC Water Resources Officers conducted one (1) inspection of the Project. The date of the inspection is as follows:

- September 15 to 17, 2021.

Inspection results were conveyed during close-out meetings and are documented in a Water Licence Inspection Report subsequently distributed to Baffinland and the NWB. Baffinland responded to any concerns identified in the inspections to provide additional information and/or address the identified concerns. More details are available in the 2021 QIA and NWB Annual Report for Operations (Baffinland, 2022b).

4.5.1.2 QIA Inspections

In 2021, QIA completed two (2) inspections/visits of the Project under the Commercial Lease. The dates of the inspections are as follows:

- July 17 to 19, 2021; and,
- October 19 to 22, 2021.

In addition to the inspections, the QIA conducted one (1) environmental audit from September 28th to October 2nd, 2021.

The findings from the inspections and audit were conveyed during the close-out meetings between QIA personnel and Baffinland representatives, as well as documented in subsequent reports and correspondence. Baffinland responded to the concerns identified in the inspections to provide additional information and/or address the identified concerns. More details are available in the 2021 QIA and NWB Annual Report for Operations (Baffinland, 2022b).

Additionally, two (2) site-based QIA Environmental Monitors were employed by QIA and integrated into the Site Environment team. The QIA environmental monitors allow for QIA oversight of monitoring activities and data collection at the Project-site year round.

4.5.1.3 ECCC Inspections

ECCC Enforcement Officers did not conduct any inspections in 2021.

4.5.1.4 DFO Site Visit

In 2021, no site visits were undertaken by DFO, however engagement with DFO on key issues related to their mandate occurred throughout 2021 as needed.

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

The WSCC conducted one (1) inspection of the Project in 2021. The date of the inspection is as follows:

- October 6 to 7, 2021.

The reports generated from the inspection were distributed to Baffinland management as well as Baffinland's Occupational Health & Safety (OHS) Committee. The 2021 inspection resulted in directives being issued to the Company. All directives were reviewed by the management team and responses were sent to the Mines Inspector within a timely manner.

4.5.2 Unauthorized Discharges and Spills

During 2021, fourteen (14) spills were reported to the Northwest Territories-Nunavut (NT-NU) Spill Report Line, CIRNAC and QIA by the Project. Overall, this represented a frequency increase of 8% when compared to the frequency of reportable spills in 2020. Sediment-laden and contact surface water were the most commonly spilled product, at three (3) spills of each in 2021.

In addition to the original spill report submitted within 24 hours of each spill event in 2021, a detailed follow-up report was submitted within thirty (30) days of each reported spill. The follow-up reports included a description of the event, the immediate cause(s), corrective and preventative action(s), photos, and a map showing the location of the spill. Baffinland continued to investigate the basic causes of all spills that occurred on site in 2021 so that effective long-term corrective actions could be implemented to reduce the frequency of spills at Project sites. A summary of the 2021 spills reported by the Project are outlined in Table 4.3. Details regarding all spills reported to the NT-NU Spill Line in 2021, including follow-up and original spill reports and corrective actions and future plans for mitigation have been provided to relevant regulatory bodies in the 2021 Freshet Monitoring Report to the NWB, CIRNAC, ECCC and the QIA in March 2022 with the Annual Report for Operations (Baffinland, 2022b, 2022c).

A basic analysis of the spills reported in 2021 indicated that the most common causes for the spills were equipment failure (component malfunction, preventive maintenance), improper operation of equipment, and procedural issues (inadequate procedure or training). Baffinland continues to work to identify basic causes so that effective long term corrective actions can be implemented. A 5 WHYS analysis was conducted for all spills that were reported to the 24-hour NT-NU Spill Report Line, or other applicable reporting process, to assist in determining the root cause of a spill event and in identifying effective corrective actions. Mandatory spill reporting is enforced at all levels in the organization; and, in addition, improved preventive maintenance plans, daily pre-operational checks of all equipment, spill tray usage bulletins, tool box meetings, prescribed training sessions, specific product handling and spill reduction plans are all examples of initiatives undertaken by Baffinland to reduce the frequency spills at the Project.

Table 4.3: List of Reported Spills and Unauthorized Discharges – 2021

Date of Occurrence	Quantity (m ³)	Material Spilled	Approximate Location (UTM; NAD83 Zone 17W)		Proximity to a Water Body?	Spill Line ID No.
			Easting	Northing		
22-Jan-21	0.967/0.247	Glycol/Hydraulic Oil	563295	7913059	>100 m	21-021
23-Jan-21	2	Sewage	560599	7913409	90 m	2021-022
16-Mar-21	1	Sewage	503827	7975954	100 m	2021-099
2-May-21	Unquantified	Sediment-laden Water	557805	7914795	0 m	2021-146
6-May-21	Unquantified	Sediment-laden Water	561018	7912968	0 m	2021-164
26-May-21	Unquantified	Sediment-laden Water	-	-	0 m	2021-247
28-Jun-21	Unquantified	Surface Water	563431	7913131	300 m	2021-268
2-Jul-21	6.3	Surface Water	502957	7976179	200 m	2021-280
27-Jul-21	1	Hydraulic Oil	559448	7914059	100 m	2021-349
27-Jul-21	Unquantified	Surface Water	561496	7912981	> 1km	2021-322
9-Aug-21	0.8	Diesel Exhaust Fluid	503524	7976139	> 100 m	2021-338
30-Sep-21	0.145	Transmission Fluid	562381	7912592	> 60 m	2021-421
2-Oct-21	111	Diesel Fuel	521761	7949510	> 90	2021-423
4-Nov-21	0.205	Jet-A Fuel	504008	7976180	> 100	2021-465

4.5.3 Water Licence Compliance (Type ‘A’ 2AM-MRY1325 and Type ‘B’ 2BE-MRY2131)

In 2021, Baffinland operated the Mary River Project under its Type ‘A’ Water Licence (2AM-MRY1325 – Amendment No. 1) and a Type ‘B’ Water Licence (2BE-MRY2131). The scope of the Type ‘A’ Water Licence focuses on active mining operations while the scope of the Type ‘B’ Water Licence focuses on geotechnical and exploration activities, including drilling operations and the establishment of satellite exploration camps. Both Water Licences include conditions on water use, wastewater management and water quality monitoring as well as the management of waste.

Compliance with the conditions and requirements outlined in the Type ‘A’ Water Licence during 2021 is discussed in the 2021 QIA and NWB Annual Report for Operations (Baffinland, 2022b). Similarly, compliance with the conditions and requirements outlined in the Type ‘B’ Water Licence is discussed in the 2021 QIA and NWB Annual Report for Exploration and Geotechnical Activities (Baffinland, 2022d).

4.6 PERFORMANCE ON ECOSYSTEMIC CONDITIONS

4.6.1 Meteorology and Climate (PC Conditions 1 through 6)

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

Inuit & Stakeholder Feedback

Baffinland's stakeholders and local communities have identified climate change as a key issue in Nunavut, with communities reporting observations of the changing climate. NIRB prescribed several conditions in Baffinland's Project Certificate related to climate change, requesting Baffinland to identify Greenhouse Gas (GHG) emissions reduction opportunities and to share any research or observations of climate change with communities, agencies and researchers. Participants from the Mary River Inuit Knowledge Study (2007 to 2010; Baffinland, 2014a) shared observations related to climate change in the Arctic. Baffinland engaged the communities of Pond Inlet and Arctic Bay through workshops to discuss the Phase 2 Proposal in 2015 and 2016, and a limited amount of feedback was received regarding observations of climate change (JPCSL, 2017). Baffinland recorded questions from one community member during consultation events in 2017; the individual asked if the permafrost and the ocean was being monitored for climate change, if Baffinland was combining Inuit and scientific knowledge, and if rapid changes were being observed. Since then, climate change remained a topic in 2019 during Phase 2 community meetings (Sanirajak, Igloodik and Mary River), and was also identified during Phase 2 Community Risk Assessment Workshops (ERM, 2019) where there was the recognition that all aspects of the environment (land, sea, people, wildlife) are changing because of climate change and that this should be considered in addition to mine impacts. In 2020, climate change was not brought up directly, however during a Phase 2 radio show information session held hosted by Baffinland in December 2020, it was discussed that emissions were expected to be reduced should the proposed Phase 2 transport of ore via train instead of trucks be approved. In 2021, input on climate change considerations was specifically sought by various institutions, Inuit and community groups in order to further inform revisions to the Draft Climate Change Strategy (Appendix B).

Monitoring Activities

Baffinland operates two meteorological stations, and this information is made publically available for Mary River and Milne Inlet through The Weather Network and on the Baffinland website. A third station is located along the Haul Road at KM 110 to support internal local tracking. Details on annual weather conditions at both Mary River Mine and Milne Inlet are included in the Draft 2021 Annual Terrestrial Environment Monitoring Report (EDI, 2022) as well as the Air Quality Monitoring Report (Stantec, 2021).

Ongoing Project monitoring provides the potential to track potential changes in temperature, precipitation, and wind speed over time. In 2021, mean monthly air temperatures at the Mine Site rose above zero in June, reached an annual monthly high of 7°C in July, and fell back to zero in September. Mean monthly air temperatures at Milne Port rose above zero in June, reached the annual monthly high of 5.9°C in July, and then fell below zero once again in September. The timing and magnitude of mean monthly air temperatures at Mine Site and Milne Port were fairly consistent with baseline and post-baseline periods. Both the Mine Site and Milne Port experienced precipitation equipment malfunctions which made comparisons to previous years difficult. Wind speed and direction at the Mine Site were consistent with past years (generally a southeast wind). Milne Port generally experienced north-northeast winds off of Milne Inlet, and southeast winds.

Baffinland continues to track and monitor GHG emissions and report as per Environment and Climate Change Canada's GHG Emissions Reporting Program and National Pollutant Release Inventory (NPRI), which is included as part of the Air Quality and Noise Abatement Management Plan (Baffinland, 2021c). Baffinland submitted a Climate Change Strategy to NIRB on February 12, 2019 (Baffinland, 2019a). The Strategy included a description of the actions the Company will undertake to validate and update climate change impact predictions for the Project and the effects

of the Project on climate change. Baffinland has subsequently been working with an external expertise of a third-party partner since September 2019 to help refine and elaborate the existing Strategy and approach for effective implementation. Refinement of the Strategy will describe priorities and approach to greenhouse gas emissions management including plans for emissions reductions, assessment of anticipated impacts of climate change on the Project, and how Baffinland may work with Nunavummiut to monitor and adapt to climate changes in the North.

Table 4.4 provides a summary of monitoring completed in 2021, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum. The calculated gaseous emissions in 2021 (Table 4.4) are below the maximum annual GHG, Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) emissions predicted in the FEIS.

Table 4.4: Climate Impact Evaluation

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

Path Forward

As Baffinland further refines its existing Climate Change Strategy, updates regarding the status action plans will be provided as part of annual reporting efforts. The updated Climate Change Strategy will serve as an important tool to guide and articulate Baffinland's efforts on PC Conditions No. 2, 3 and 4. Baffinland will continue to undertake monitoring activities and develop initiatives to ensure any impacts that the Project may have on the climate are measured to the extent possible. Reporting on each PC condition is included in the pages that follow.

Project Certificate Condition No. 1

Category	Meteorology and Climate
Responsible Parties	The Proponent
Project Phase(s)	All phases
Objective	To provide feedback on the impacts that climate change might be having on the port facilities.
Term or Condition	The Proponent shall use Global Positioning System (GPS) monitoring or a similar means of monitoring at both Steensby Port and Milne Port, with tidal gauges to monitor the relative sea levels and storm surges at these sites.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	The Proponent shall summarize and supply these monitoring results to NIRB in the annual project report.
Status of PC Condition	Steensby Port - Active Milne Port – Active
Status of Compliance	Steensby Port – In Progress Milne Port – In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Draft 2021 MEEMP and NIS/AIS Monitoring Report (Golder, 2022a) Draft 2021 Marine Fish and Fish Habitat Studies in Steensby Inlet (Golder, 2022b)
Ref. Document Link	Not applicable

METHODS

Steensby Port:

The lack of existing marine infrastructure at Steensby Port means that a water level gauge cannot currently be installed by attaching it to a repeatable location on fixed infrastructure (e.g., a pier or ladder at a dock).

In September 2021, an oceanographic mooring was deployed southeast of the proposed Steensby ore dock in Steensby Inlet. The oceanographic mooring included two Acoustic Doppler Current Profilers (ADCPs) - one upward-looking and one downward-looking - that are programmed to continuously monitor currents, water levels, waves, salinity, and temperature until the mooring is recovered in August 2022. Relative water levels in Steensby Port will be established using the water depth data recorded by the upward-looking ADCPs (Golder, 2022b).

In September 2021, a local ground control point was established on Steensby Island using a survey-grade Real Time Kinematic Global Positioning System (RTK GPS). The RTK GPS survey was also used to take one measurement of the water surface elevation at the deployed oceanographic mooring location. In 2022, further water surface elevations will be taken at the deployed oceanographic mooring location. When the data from the ADCPs is retrieved following the recovery of the oceanographic mooring in 2022, the water level elevation data from the ADCPs will be referenced to a datum by comparing it to the surveyed water level elevations at the same time points (Golder, 2022b).

Milne Port:

In 2021, oceanographic monitoring continued at Milne Port using an RBRconcerto (RBR) Conductivity, Temperature, and Depth (CTD) sensor programmed to continuously measure water level, temperature, and conductivity.

Additionally, an RBRsolo D logger was deployed as a redundancy to measure water levels in case the RBRconcerto failed to return data. Detailed methods are provided in Golder Associates Ltd. (Golder, 2022a).

RESULTS

Steensby Port:

Not applicable. Results will be available once the oceanographic mooring has been recovered in August 2022 and the data from the upward-looking ADCPs has been processed and referenced to a datum by comparing it to the RTK GPS survey water level elevations.

Milne Port:

A continuous time-series of water level, temperature, and conductivity data was collected with detailed results presented in Golder (2022a). Water level data recorded at Milne Port indicated typical fluctuations resulting from tidal forcing. During the measurement period, a total of eight neap-spring tidal cycles were observed and there were no observable storm surges.

TRENDS

Steensby Port:

Not applicable.

Milne Port:

Results are consistent with prior years, indicating that the current approach for monitoring relative sea levels and storm surges is effective.

RECOMMENDATIONS / LESSONS LEARNED

Steensby Port:

Not applicable.

Milne Port:

To support future trends analyses, Baffinland plans to reinstall the tide gauge in 2022 at Milne Port and extend the multi-year analysis of relative sea level variance at Milne Port.

Project Certificate Condition No. 2

Category	Meteorology and Climate - Climate Change Validation and Studies
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide feedback on the impacts that climate change might be having on the Project.
Term or Condition	The Proponent shall provide the results of any new or revised assessments and studies done to validate and update climate change impact predictions for the Project and the effects of the Project on climate change in the Local Study Area and Regional Study Area as defined in the Proponent's Final Environmental Impact Statement.
Relevant Baffinland Commitment	58
Reporting Requirement	The Proponent shall provide new or revised assessments and studies to the NIRB, the affected communities, relevant regulatory authorities, and interested parties.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Climate Change Strategy (Baffinland, 2019a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.1

METHODS

No new or revised assessments or studies were required in 2021 to validate and/or update the climate change impact predictions for the Project. Prior to 2020, Baffinland submitted a Climate Change Strategy (the Strategy) to the NIRB on February 12, 2019 (Baffinland, 2019a). The Strategy describes the actions the Company will undertake to validate and update climate change impact predictions for the Project, and the effects of the Project on climate change. These include:

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

Baffinland sought the external expertise of a third-party partner in June 2019 to help refine and elaborate the Strategy and approach for effective implementation. Refinement of the Strategy will aim to identify priorities and

describe the approach to greenhouse gas emissions management including plans for emissions reductions, assessment of anticipated impacts of climate change on the Project, and how Baffinland may work with Nunavummiut to monitor and adapt to climate changes in the North.

RESULTS

In 2021, despite some ongoing delays related to challenges associated with the COVID-19 Pandemic, Baffinland continued to build upon the foundational basis initiated in September 2019 by continuing to work towards development of an amended the Strategy based on a two-staged approach as summarized below and initially presented in the 2019 Annual Report to the NIRB (Baffinland, 2020a):

- **Stage 1 (all tasks completed by end of January 2021):** Development of an amended Draft Strategy, informed by an external scan for benchmarking across similar sectors and region (Task 1); an internal scan to assess current and future state of operations which incorporated information across the organization (Task 2); establishment of a current state assessment and options for positioning in consideration of internal and external scans (Task 3); and development of a two-goal Draft Strategy document that defines Baffinland's goals, objectives and priority action areas and approaches, with specific options for consideration for implementation (Task 4; see Appendix G.1).
- **Stage 2 (in progress):** Refinement of the amended Draft Strategy and Action Planning, based on the following considerations including, external engagement using the d (Task 5); finalization of the Strategy based on external engagement and approval on path forward for establishment of short- to medium-term action areas (Task 6); and development of plans for supporting actions based on foundational elements (Task 7).

In collaboration with an environmental and sustainability consultancy, Baffinland completed all tasks associated with Stage 1 by the end of January 2021, including the current state assessment (iii), which was informed by the results of the external (i) and internal (ii) scans. The external scan consisted of a review of publically available documents pertaining to the state of climate change action in the North and the mining sector. The internal scan consisted of a comprehensive review of 60 documents, covering Project-related information including existing climate change and sustainability strategies, GHG emissions, relevant PC conditions, and the Mary River IIBA. Information was also collected through multiple interviews undertaken across multiple organization levels at Baffinland. Since then, Baffinland hosted internal focus group workshops in November and December 2020 with participation of operations and executive-level representatives to further seek input, guidance and direction on potential elements of the Draft Strategy including Guiding Principles, Key Goals, and Supporting Actions. An amended Draft Strategy was developed between December 2020 and into January 2021, based on this input and in consideration of information acquired through earlier activities.

Following completion of the Draft Strategy (Stage 1), Baffinland sought external feedback to better understand Inuit and stakeholder interests and expectations related to its management of climate change impacts. Where appropriate, focus was also placed on exploring opportunities for collaborative action on climate change.

The Draft Strategy presented as part of external engagement efforts included an overarching statement highlighting Baffinland's commitment for *improving energy efficiency and greenhouse gas emissions performance, and working with Nunavummiut to monitor and adapt to climate change* (See Appendix G.1). Interviews were completed by third-party consultant Stratos Inc., and Aglu Consulting and Training Inc., with various institutions (e.g., federal and territorial governmental, non-governmental and Inuit organizations) and community representatives between May and November 2021 (see Table 4.5). Requests for participation were sent to hamlets and hunters and trappers

organizations from all of the five North Baffin communities (i.e., Pond Inlet, Clyde River, Arctic Bay, Sanirajak and Igloolik). In addition, a number of outreach methods including posters on community boards, social media and local radio were used to reach out to interested residents willing to take part in an interview to obtain feedback on Baffinland's Draft Strategy. Interview guides were tailored for each type of organization and/or community representative engagement. These guides included a copy of the proposed Draft Strategy framework (the "one pager"; Appendix G.1) to support discussions, a list of targeted questions, and objectives for discussion including:

- Understanding the roles and actions that they may want to see Baffinland explore to manage its greenhouse gas emissions and to adapt to climate change;
- identifying potential areas for collaboration related to climate change; and
- identifying other sources of information or other groups working to research or address climate change in the North Baffin region.

Table 4.5: Summary of Completed External Engagement Interviews

Institutional Interviews	Community Interviews
<ul style="list-style-type: none"> • Environment and Climate Change Canada -Canadian Centre for Climate Services (ECCC-CCCS) • Government of Nunavut (GN) • Natural Resources Canada (NRCan) • Nunavut Tunngavik Incorporated (NTI) • Parks Canada • Qikiqtani Inuit Association (QIA) • Qulliq Energy Corporation (QEC) • World Wildlife Fund (WWF) 	<ul style="list-style-type: none"> • Hall Beach Hunters and Trappers Association (Sanirajak) • Hamlet of Clyde River • Ikajutit Hunters and Trappers Association (Arctic Bay) • Pond Inlet residents • SmartICE

Eight institutional and 5 community-based interviews were conducted by Stratos. Based on feedback heard, those interviewed indicated that the Draft Strategy was generally aligned with interests and concerns related to climate change for both Baffinland and communities, and contained many of the elements expected for a climate change strategy. However, Inuit and other stakeholders noted that they would like to see more detail in the final Strategy and underlying action plans, including specific targets, and additional commitments related to shipping and environmental impacts, which further reinforced the importance of including feedback obtained through external engagement efforts prior to finalizing an updated Strategy. Some areas requiring further consideration for integration into the final Strategy as identified through these engagements included (i) Inuit leadership and ownership; (ii) targets and timeframes aligned with international commitments; (iii) inclusion of shipping-related actions (e.g., black carbon) and the setting of environmental priorities of concern for action planning; (iv) community resilience and adaptation by assessing community and regional vulnerabilities; (iv) the importance of undertaking climate scenario analysis; and (v) the importance of monitoring and data sharing. Specific details are provided in Table 4.6 below.

Table 4.6: Summary of External Engagement Insights

Theme	Description
Inuit leadership and ownership	The interactive role that Inuit should take when finalizing and implementing the Strategy and supporting actions.
Targets and timeframes aligned with international commitments	Setting targets aligned with net zero by 2050 was considered important.
Transparency	It was stressed that Baffinland should continue to engage third parties and Inuit to provide independent assurance. Transparency was identified as being essential to the process.
Collaboration	Communities and institutions were all generally interested in collaborating on climate change. Network building was identified as being important for the promotion of renewable technology, industry collaboration and information sharing.
Shipping and other transportation	Strategy should include direct reference to shipping-related issues.
Environmental priorities	Action plans should consider environmental priorities of concern and development of monitoring plans (e.g., glacial melt, ice, sea levels)
Community resilience and adaptation	Action plans should consider community and regional vulnerabilities created by climate change. Communities should be supported through sharing of knowledge, resources and strategic investments.
Climate scenario analysis	Inclusion of such analyses are powerful, and they should be prioritized to inform specific actions, with consideration for closure planning and reclamation.
Data monitoring and reporting	Enhanced focus on data monitoring and sharing. Data collection is a major source of value that Baffinland can provide; monitoring should also be Inuit-led where feasible.

Baffinland will be revising/redefining its overarching statement, goals, guiding principles, and supporting actions in consideration of the feedback obtained during external engagement efforts. Once these revisions are completed, the newest draft will be workshopped with various Baffinland team members including representatives from both the operations and executive teams to confirm overall messaging and to validate supporting actions and timelines. These types of internal engagements will support the development of road maps based on priority supporting actions.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland remains committed to improving energy efficiency and greenhouse gas emissions performance, and working with Nunavummiut to monitor and adapt to climate change. The path forward is intended to be forged on guiding principles which at a minimum will include transparency, collaboration, and continual improvement. In 2022, Baffinland will aim to complete the various elements of Stage 2, which includes completion of the final Climate Change Strategy in consideration of the input received through the external engagements completed in 2021, as well as emerging expectations with respect to emissions reductions and target setting.

Once revisions to the Climate Change Strategy are finalized, Baffinland will make its approach to managing climate change publicly available, and this will include reporting performance relative to established targets. These results will be shared in future annual reports to NIRB, as well as part of the Mining Association of Canada's Towards Sustainable Mining reporting requirements.

Project Certificate Condition No. 3

Category	Meteorology and Climate - Green House Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To confirm that the Proponent is exploring and implementing concrete steps to reduce greenhouse gases.
Term or Condition	The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	The Proponent shall include relevant information in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Climate Change Strategy (Baffinland, 2019a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.1

METHODS

As operations progress and production increases, Baffinland has increased its efforts for exploring and implementing concrete steps towards the reduction of greenhouse gas emissions through the implementation of various initiatives. These initiatives were implemented prior to the formal development of a strategic plan aimed at reducing emissions because Project operations were still in their infancy, however they are all geared towards improving energy efficiency and greenhouse gas emissions performance.

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

From 2013 to 2017, Baffinland used solar/wind power generators to supplement energy requirements at its remote environmental monitoring sites (e.g., Bruce Head Camp). Substantial damage possibly from extreme cold prevented its use as a main energy source at Bruce Head Camp between 2019 and 2021, however both radio and Automatic Identification System relay systems continue to be powered by solar. Baffinland continues to have aspirations to explore the feasibility of incorporating alternative energy sources or enhanced energy storage capabilities that may be suitable for the remote reality of the Project's location and reduce dependency on fossil fuels. Further action planning will be informed by the updated Climate Change Strategy, which is anticipated to be finalized by end of June 2022.

Baffinland submitted a Climate Change Strategy (The Strategy) to the NIRB on February 12, 2019 (Baffinland, 2019a). The Strategy included a description of the actions the Company will undertake to validate and update climate change impact predictions for the Project and the effects of the Project on climate change. Baffinland subsequently sought the external expertise of a third-party partner in June 2019 and began background work in September 2019 to help refine and elaborate the Strategy and approach for effective implementation. Refinement of the Strategy will expand on descriptions of priorities and approach to greenhouse gas emissions management, the anticipated impacts on climate change on the Project, and how Baffinland will work with Nunavummiut to adapt to climate changes in the North.

In 2021, despite some ongoing delays related to challenges associated with the COVID-19 Pandemic and the reprioritization of activities, Baffinland continued to build upon the foundational basis initiated in September 2019 by working through the drafting of an amended Draft Climate Change Strategy (Draft Strategy) based on its two-staged approach as initially presented in the 2019 Annual Report to the NIRB (Baffinland, 2020a). Additional details on the status of the refinement initiative is summarized as part of Methods under PC Condition No. 02.

Recognizing that operations depend heavily on diesel fuel to produce energy and that emissions generated are tied directly to fuel consumption, and consistent with its objective to continually improve energy efficiency and greenhouse gas emissions performance, Baffinland completed the installation of two (2) new generators at the Mary River Mine Site to replace less fuel-efficient units in late February 2020. The site-based Power Generation and Distribution Department created in 2019 continues to bear the responsibility of overseeing power generation and distribution, which comprises, in part, the tracking of Key Performance Indicators (KPIs) on fuel/energy use, efficiencies, load factor, etc. As part of this transfer to more fuel efficient generators, tracking of fuel consumption is now implemented on a regular basis (and can be accessed daily) using an automated data collection tool. It is now possible to pull fuel consumption data directly from the engine control unit allowing to track weekly and monthly-based fuel consumption for each operating generator at the Mine Site and Milne Port to assess relative performance.

Due to reporting obligations related to the newly implemented Output-Based Pricing System (OBPS) established in mid-2019, a third-party verification of Baffinland's 2020 GHG emissions data was completed in 2021. An external verification of 2021 emissions data will occur in 2022. Results from this work will feed into the finalization of the Climate Change Strategy, and will contribute towards the setting of future GHG emissions targets.

As a member of the Mining Association of Canada (MAC), Baffinland also completes a self-assessment for the Energy Use and GHG Emissions protocol on an annual basis. Results from Baffinland's 2021 external verification are made publically available on the MAC website (<https://mining.ca/companies/baffinland-iron-mines-corporation/>).

RESULTS

As Baffinland continues to move forward with amending its existing Climate Change Strategy, Baffinland remains committed to implementing actions leading to improving its energy efficiency and greenhouse gas emissions performance.

One of the key steps to ensuring continued improvements in energy efficiency and GHG emissions performance is to focus on improving the management of energy/fuel use consumption. This includes developing and implementing processes that allow for tracking of energy use/fuel use by type of activity or infrastructure requirement. Tracking of energy consumption requires a good understanding of how much fuel is consumed by, for example, individual components of the heavy equipment fleet and how changes may lead to efficiencies (e.g., driving practices, regular maintenance), fuel required to run generators to heat individual buildings versus those connected on same power

grid, or key infrastructure components such as ore loader, crusher, and how efficiencies may be achieved through better ore handling sequencing, etc.

Baffinland constructed the Mine Haul Road Cross Cut in 2019, which significantly reduced the distance travelled for mine haul trucks as well as reduced the cycle time between Deposit No. 1 and the Run of Mine (ROM) stockpile at the Crusher Facility. As a result of this change in road configuration, the total fuel savings for 2020 have been estimated at 1,885,145 litres (L), equivalent to a reduction in fuel use of 16% and 29% for 777 and 793 mining trucks, respectively.

Baffinland has transitioned some existing infrastructure to more energy efficient generators. Through the use of its energy use/output tracking software, Baffinland has determined that its two newly installed generators run approximately 30% more efficiently than the previous units, which means that less fuel has been required to produce the same output of electricity at the Mine Site. An estimated 1,471,228 L of fuel was saved in 2020 as a result of servicing energy load from these more fuel efficient generators. For 2021, it is estimated that at least 5,240,720 L of fuel were saved by these new generators. This is equivalent to a saving of 18,866,591 kg Carbon Dioxide (CO₂) not produced (based on 3.6 kg CO₂ per litre of diesel).

Baffinland's third-party verification of its 2019 and 2020 GHG emissions completed in years 2020 and 2021, respectively, has confirmed that the data has been accurately calculated. The external verification of 2021 emissions will be undertaken in 2022. Results from this work will feed into the finalization of the amended Climate Change Strategy, and will contribute towards the setting of future GHG emissions targets.

As a member of the Mining Association of Canada, Baffinland also completes a self-assessment for the Energy Use and GHG Emissions protocol on an annual basis. Self-assessment scores from 2019 were externally verified in 2020 which provided an opportunity for Baffinland to evaluate its current status and identify opportunities for improvement in the coming years. Results from this external verification will be considered as part of final edits to the Strategy initiative and implementation of future supporting actions.

TRENDS

Between 2015 to 2021, Baffinland increased the amount of iron ore hauled on the Tote Road by 362%, although GHG produced by the Project only increased by 36% (Figure 4.2).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland actively looks for continuous improvement opportunities to lower its fuel/energy use. Baffinland will continue to modify or replace equipment with more energy efficient alternatives, and where possible will evaluate the use of renewable energy sources (e.g., wind, solar) to reduce dependence on diesel fuel. Baffinland will continue to identify opportunities for energy efficiency through optimizations in the Project design and considering more energy-efficient generators for power generation all in an effort to further reduce GHG emissions. Additional initiatives will be identified and prioritized through the update to the existing Climate Change Strategy, informing future opportunities for GHG emission reductions guided by the development of an action plan that specifies most appropriate next-steps to take. This is anticipated to be completed by the end of June 2022, pending NIRB's recommendation on the proposed Phase 2 expansion, and is expected to include the setting of emissions targets allowing to track relative performance of efforts through time.

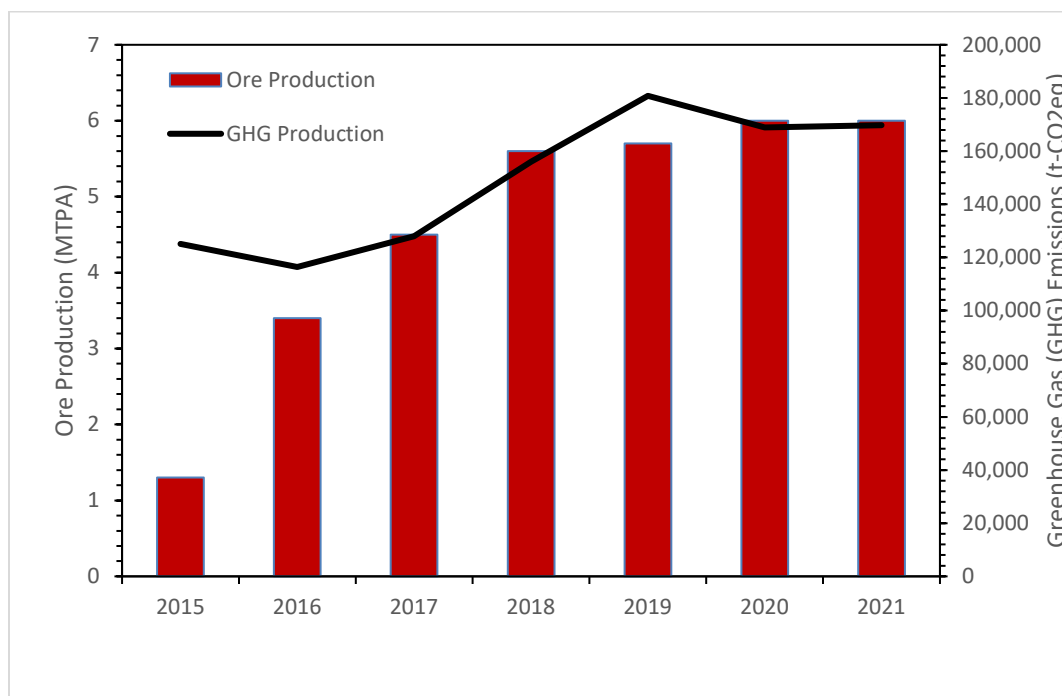


Figure 4.2: GHG Emissions Relative to Ore Production

Future updates regarding Baffinland’s GHG emission production and initiatives being undertaken to optimize efficiencies in energy requirements will continue to be reported in Baffinland’s Annual Report to the NIRB, in addition to any updates to the Strategy as Baffinland works through the refinement process. Additional supporting actions will be integrated into the amended Strategy should the Phase 2 proposal be approved, noting that a key component of the proposed amendment to the Project under Phase 2 is the transition from road to rail.

Project Certificate Condition No. 4

Category	Climate Change - Consultation on Climate
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote public awareness and engagement of affected groups.
Term or Condition	The Proponent shall endeavour to include the participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	Not Applicable
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Climate Change Strategy (Baffinland, 2019a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.1

METHODS

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

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

Baffinland has been working since 2019 to help refine and elaborate the Climate Change Strategy and approach for effective implementation. Refinement of the Strategy will expand on descriptions of priorities and approach to greenhouse gas emissions management, the anticipated impacts on climate change on the Project, and how Baffinland will work with Nunavummiut to adapt to climate changes in the North.

As part of one of its proposed goals to monitor changes in climate and associated risks to inform adaptation and closure strategies, one key supporting action that was included in the Draft Strategy was the importance of sharing information and approaches to help North Baffin communities to adapt to climate change. This proposed approach was well received by those interviewed. Baffinland continues to collect and report data on climate-related metrics such as temperature and tidal data, however it is anticipated that these types of data collection efforts, in addition to others that may be identified through future external engagement efforts will be identified and integrated into future action planning. Additional details on the efforts Baffinland has made to further amend the existing Strategy is further described in PC Condition No. 2.

Results from these efforts will help to guide future participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research as identified through the development of a Strategy action road maps showing specific action plans.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

As Baffinland refines the existing Climate Change Strategy and implements new measures, updates regarding the status of these activities, including consultation/collaborating with Inuit communities and identifying opportunities to integrate the participation of Inuit into climate change studies, will be provided in future relevant updates in the Annual Report to the NIRB.

Project Certificate Condition No. 5

Category	Meteorology and Climate - Weather Monitoring Data
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide families of employees with up to date information.
Term or Condition	The Proponent shall endeavour to explore and implement reasonable measures to ensure that weather-related information for the various Project sites is readily accessible to the public on a continual basis throughout the life of the Project.
Relevant Baffinland Commitment	5
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Baffinland Corporate Website
Ref. Document Link	https://www.baffinland.com/operation/mary-river-mine/

METHODS

Baffinland ensures that weather-related information is publicly accessible for the Mary River Project Site by posting current weather information on the by selecting the “+ Operation>Mary River Mine” tab on the Baffinland website (www.baffinland.com). Weather related information is pulled onto its website from the publically available website, www.weathernetwork.com, for the two weather stations, Mary River and Milne Inlet.

RESULTS

Weather related information for Project sites is publicly available.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 6

Category	Meteorology and Climate – Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide feedback on the Project's emissions.
Term or Condition	The Proponent shall provide the results of any emissions calculations conducted to determine the level of sulphur dioxide (SO ₂) emissions, nitrogen oxide (NO _x) emissions and greenhouse gases generated by the Project using fuel consumption or other relevant criteria as a basis.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland used guidance documents provided by Environment and Climate Change Canada (ECCC, 2016; 2017, 2019; 2020, 2021) and the Intergovernmental Panel on Climate Change (IPCC, 2006) along with published emission factors to estimate the Project's annual GHG, SO₂ and Nitrogen Oxide (NO_x) emissions. Annual emissions were calculated based on on-site fuel consumption and waste management at the Project.

Baffinland continues to report annual emissions to ECCC through the NPRI and GHG reporting programs.

RESULTS

Baffinland's 2020 annual emissions for GHGs, SO₂ and NO_x are presented in Table 4.7.

Table 4.7: Calculated 2021 Project Gaseous Emissions

Gaseous Emission	Units	Calculated Emissions
GHG	t-CO ₂ eq	169,719
SO ₂	t (SO ₂)	13
NO _x	t (NO ₂)	3,757

TRENDS

Total gaseous emissions have remained consistent from 168,919 tonnes in 2020 to 169,719 tonnes in 2021, and when compared to FEIS predictions, Baffinland's 2021 total Scope 1 gaseous direct emissions from equipment owned or controlled by the company are below FEIS predicted emissions estimates.

Recognizing that operations depend heavily on diesel fuel to produce energy and that emissions generated are tied directly to fuel consumption, and consistent with its objective to continually improve energy efficiency and greenhouse gas emissions performance. In 2020, Baffinland completed the installation of two (2) new generators at the Mary River Mine Site to replace less fuel-efficient units. The site-based Power Generation and Distribution Department has the responsibility of overseeing power generation and distribution, which comprises, in part, the tracking of Key Performance Indicators (KPIs) on fuel/energy use, efficiencies, load factor, etc. Through the use of its energy use/output tracking software, Baffinland has determined that its two newly installed generators run approximately 30% more efficiently than the previous units, which means that less fuel has been required to produce the same output of electricity at the Mine Site. These energy efficient generators continued to be operated in 2021.

Baffinland constructed the Mine Haul Road Cross Cut in 2019, which continues to significantly reduced the distance travelled for mine haul trucks as well as reduced the cycle time between Deposit No. 1 and the ROM stockpile at the Crusher Facility. As a result of this change in road configuration, the total fuel savings have resulted in decreased emissions compared to the 2019 reported values.

RECOMMENDATIONS / LESSONS LEARNED

Consistent with the existing Climate Change Strategy for the project, Baffinland will continue to modify or replace equipment with more energy efficient alternatives, research and where possible implement renewable energy sources, and identify opportunities for energy efficiency through optimizations in the Project design, all to further reduce emissions from the Project.

4.6.2 Air Quality (PC Conditions 7 through 12)

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

Inuit & Stakeholder Feedback

During review of the FEIS and FEIS Addendum, communities and regulators expressed concerns focused on dust, including dustfall and potential impacts to soil, vegetation and forage to caribou. The focus of stakeholder feedback on dustfall and potential impacts on soil, vegetation and wildlife, along with several years of exceedances of the predicted levels for dustfall presented in the FEIS, has prompted Baffinland to implement additional dust mitigation measures described in the updates to PC Conditions No. 10 and 58c. Concern about dust was expressed several times during 2021 consultation activities, mostly in relation to the Phase 2 Expansion Project Proposal, but also in regard to current operations (Appendix B). As a direct result of concerns regarding the extent of dust, particularly at Milne Port, in 2020 Baffinland began an investigation to evaluate additional mitigation measures that could be implemented at the ore stockpiles and identified a crusting agent (DusTreat) for trial implementation, with the objective of reducing the generation of wind blown fugitive dust. In 2021 Baffinland moved forward with a third party audit of current and future dust sources across the Project with the intent to evaluate and propose control improvements. The third party auditor is working directly with a Dust Audit Committee, formed by Inuit representatives from the 5 North Baffin communities, who are both guiding and contributing to the audit.

Monitoring Activities

Table 4.8 provides a summary of air quality effects, monitoring completed in 2021, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum.

Table 4.8: Air Quality Impact Evaluation

Component	Effect	Monitoring Program	Impact Evaluation
Incineration of combustible non-hazardous wastes	Release of air contaminants, including particulate matter (PM), carbon monoxide (CO), mercury, dioxins, furans	Incinerator stack testing was completed at commissioning. The results of stack testing completed in 2019 and 2020 demonstrated exceedances of the in-stack standards for dioxin/furan parameters compared to the Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards (CWS), while commissioning of the units in 2013 demonstrated compliance with the applicable standards. Additional testing is required to demonstrate that corrective actions put into place have been effective.	Air quality limits should be met under normal operating conditions and appropriate use of incinerators. Corrective actions implemented include additional maintenance work on the incinerators.
Release of air contaminants from mobile and stationary	Increased concentrations of total suspended particulate (TSP), sulphur dioxide	Continuous NO ₂ and SO ₂ monitoring was conducted at Milne Port and the Mine Site throughout 2021. Continuous TSP and PM _{2.5} monitoring began in the Fall of 2021.	2021 air quality monitoring was within Nunavut Ambient Air Quality Standards (AAQS) and FEIS predictions.

Component	Effect	Monitoring Program	Impact Evaluation
equipment due to fuel combustion	(SO ₂), nitrogen dioxide (NO ₂), CO and potential acidic input (PAI)		
Earthworks, mining, hauling, stockpiling and transfer of ore	Ore handling and transport, including wheel entrainment from haulage of ore	Monitoring showed that although dustfall exceeded FEIS predictions at select locations, in general, total annual dustfall across the Project area in 2021 was within the ranges observed in previous years. These results demonstrate the ongoing effectiveness of reducing dust generation from crushing and ore stockpiling, and Tote Road traffic, despite increases in the production level at the Project and the volume of Tote Road traffic.	Monitoring showed that although dustfall exceeded FEIS predictions at select locations, in general, total annual dustfall across the Project area in 2021 was within the ranges observed in previous years. Dust does not appear to be having measurable impacts in other environmental media (freshwater quality, vegetation, etc.)
Haulage of ore and other traffic on the Tote Road	Particulate matter emissions and dustfall from wheel entrainment	Monitoring showed that although dustfall exceeded FEIS predictions at select locations, in general, total annual dustfall across the Project area in 2021 was within the ranges observed in previous years. These results demonstrate the ongoing effectiveness of reducing dust generation from crushing and ore stockpiling, and Tote Road traffic, despite increases in the production level at the Project and the volume of Tote Road traffic.	Monitoring showed that although dustfall exceeded FEIS predictions at select locations, in general, total annual dustfall across the Project area in 2021 was within the ranges observed in previous years.

Baffinland continues to evaluate and report on dustfall through its approved dustfall monitoring program at the Mine Site, Port Site and Tote Road, including additional monitoring stations deployed in 2019 and 2021. In 2021, 14 new dustfall monitoring stations were installed: four (4) additional monitors at Milne Port to better characterize dustfall near Milne Port; four new monitors along the section of the proposed Phase 2 railway that departs the Tote Road (approximately between Km 63-80) to define baseline conditions; and, in response to a request from the QIA and the TEWG, six dustfall monitors installed to collect dust at 0.5 m — ‘short’ monitors as a pilot study to investigate the variability between dustfall sampling at the standardized height of 2.0 m and at closer to ground level.

Baffinland has worked diligently towards decreasing dust generated by wheel entrainment across the Project Sites, specifically reducing dust generation from ground surfaces by applying water and/or chemical suppressants such as calcium chloride to road surfaces and site layouts during summer conditions. In 2021, Baffinland continued application of Dust Blockr® along the entire Tote Road. Dust Blockr® performance is currently being evaluated to determine the suitability for long-term use and possible application on the airstrip. Baffinland’s effort with respect to the application of dust suppressants on the Tote Road are documented in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022).

In November 2020, Baffinland began a pilot project to apply a crusting agent (DusTreat) to stockpiles at Milne Port to address wind generated dust from the ore stockpiles. Baffinland continued to apply DusTreat throughout 2021, in addition to continuing other mitigation measures such as shroud covers, ore stockpile management, and continuous monitoring of conveyor drop height.

The inspection, maintenance and monitoring of dust mitigation equipment i.e. dust shrouds and hoods at the Crusher Facility was integrated into the equipment inspection and maintenance planning process in 2020 and continued throughout 2021. The integration of dust mitigation equipment maintenance into the equipment inspection and maintenance planning process has improved the availability of that equipment.

Path Forward

In 2022, Baffinland will continue its monitoring programs of gaseous emissions and dustfall. The company will also continue to evaluate opportunities to further mitigate dustfall on the Project and implement adaptive management that considers feedback from communities, monitoring data, and available and novel mitigation measures. Baffinland will also review the results of the third-party, community-driven Dust Audit and look to implement preliminary and final recommendations from the Audit throughout 2022, as applicable. Reporting on each PC condition related to air quality is presented in the next several pages. Dustfall monitoring is described in more detail in Section 4.6.8 (PC Condition No. 58, Item c).

Project Certificate Condition No. 7

Category	Air Quality – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions.
Term or Condition	The Proponent shall update its Air Quality and Noise Abatement Management Plan to provide for continuous monitoring at land-based monitoring stations designed to capture operations phase ship-generated SO ₂ and NO ₂ emissions at Steensby Port and Milne Port. Continuous monitoring is to be carried out through several shipping seasons at each port as required to determine that emissions are at acceptable levels.
Relevant Baffinland Commitment	57, 61, 62
Reporting Requirement	The updated plan shall be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2021c) 2021 Annual Air Quality, Dustfall and Meteorology Report (Stantec, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.3 Appendix G.26

METHODS

Continuous ambient air quality monitoring equipment was set up at Milne Port and the Mine Site to monitor sulphur dioxide (SO₂) and nitrogen oxides (NO_x) levels at Project sites in 2014. Continuous ambient air quality monitoring commenced in November 2014 and continued throughout 2015. Monitoring throughout 2015 concluded that all results were well below the Government of Nunavut (2011) Air Quality Standards, resulting in the discontinuation of the monitoring program in 2016. To ensure compliance with Project Certificate Condition No. 7 and collect additional data over multiple shipping seasons, the monitoring program resumed at Milne Port in March 2017 and at the Mine Site in November 2017; both programs continue to run to this day. Results of the monitoring conducted in 2021 were compared to both the Nunavut Air Quality Standards and the Canadian Ambient Air Quality Standards (CAAQS). The CAAQS were developed by the Canadian Council for the Ministers of the Environment (CCME) to manage air emissions and ambient air quality concentrations in a regional air shed; CAAQS are not intended to determine compliance at the fence line for an industrial facility and are provided for comparison purposes only.

The Air Quality and Noise Abatement Management Plan was updated in April 2021.

RESULTS

In summary, the results of the monitoring during 2021 at the Mary River site are as follows:

- Sampling was conducted January to December, 2021.

- Sulphur Dioxide (SO₂) data at the Mine Site Complex (MSC) ambient air quality monitoring station had 62.12% valid data for 2021 with a low of 0% for September through December due to an internal pump failure.
- The SO₂ concentrations remained very low throughout 2021 and did not exceed the hourly (172 ppb), 24-hour (57 ppb) or annual (11 ppb) air quality objectives (GN, 2011).
- The maximum hourly recorded concentration was 2% of the Nunavut Air Quality Hourly Standard, 1% of the Nunavut Air Quality 24-hour Standard.
- It was not possible to calculate the annual average SO₂ concentration due to data gap associated with the Internal Pump failure.
- The maximum 1-Hour Sulphur Dioxide concentration was 2% of the 1-Hour CAAQS.
- Nitrogen Dioxide (NO₂) data at the Mary River MSC ambient air quality monitoring station had 98.9% valid data for 2021 with a low of 87.37% for the month of August due to equipment maintenance and calibration.
- NO₂ levels did not exceed the hourly (213 ppb), 24-hour (106 ppb) or annual (32 ppb) NAAQS (GN, 2011) with concentrations of 123 ppb, 27 ppb and 13.8 ppb, respectively.
- The highest average hourly maximum occurring on January 28, 2021 (122.6 ppb). The NO₂ concentrations exceeded the 1-hour CAAQS in <1% of the hourly averaged data (1 occurrence) with a recorded level of 122.6 ppb.
- NO₂ concentrations trend higher during the winter months and fall during the summer months, which is consistent with historical trends (RWDI 2015, 2018, Stantec, 2021).

In summary, the results of the monitoring during 2021 at the Milne Inlet site are as follows:

- Sampling was conducted January to December, 2021.
- The SO₂ data at the PSC ambient air quality monitoring station had 89.97% valid data for 2021 with a low of 0% for December due to an internal pump failure, the pump was replaced in January 2022 and the meter brought back online.
- For the eleven months of recording, the SO₂ concentrations remained very low (0-10.1 ppb) throughout 2021 and did not exceed the hourly (172 ppb), 24-hour (57 ppb) or annual (11 ppb) air quality objectives (GN, 2011).
- The maximum hourly recorded SO₂ concentration was 6% of the Nunavut Air Quality Hourly Standard, 2% of the Nunavut Air Quality 24-hour Standard and 4% of the Nunavut Annual Standard.
- SO₂ levels were highest in the winter and lowest in the summer months.
- Nitrogen Dioxide (NO₂) data at the Milne Port PSC had 96.4% valid data for 2021, with a lower value of 46.24% for December due to an extended power failure and subsequent shut down. The data validity for December falls below the >75% criteria, therefore December's data is considered invalid.
- For the months with valid data, the NO₂ concentrations did not exceed the hourly (213 ppb), 24-hour (106 ppb) or annual (32 ppb) NAAQS (GN, 2011) with concentrations of 175.4 ppb, 24.9 ppb and 13.4 ppb, respectively.
- The NO₂ concentrations exceeded the 1-hour CAAQS in <1% of the hourly averaged data (12 occurrences) with the highest average hourly maximum occurring on November 16, 2021 (175.40 ppb).
- The NO₂ concentrations were highest in the winter and lowest in the summer months, consistent with historical trends (RWDI 2015, 2018, Stantec, 2021).

TRENDS

Ambient air quality data were collected at two Baffinland sites (Mine Site Complex and Port Site Complex). Data were compared to previous years' data as provided by RWDI annual summary reports. The 2021 Data collected at Mine Site Complex and Port Site Complex were consistent to previous years' data trends, with the highest SO₂ and NO₂ levels occurring during the winter months and falling sharply during the summer periods.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor SO₂ and NO₂ levels at Milne Port and the Mine Site during 2022. Air quality monitoring at Steensby Port will be implemented when the Port is developed and shipping activities commence.

Project Certificate Condition No. 8

Category	Air Quality - Greenhouse Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions.
Term or Condition	The Proponent shall demonstrate through monitoring of air quality at the mine site and at the Steensby Inlet and Milne Inlet port sites that SO ₂ and NO ₂ emissions remain within predicted levels and, where applicable, within limits established by all applicable guidelines and regulations. In cases where exceedances are manifested, the Proponent shall provide an explanation for the exceedance, a description of planned mitigation, and shall conduct additional monitoring to evaluate the effectiveness of mitigative measures.
Relevant Baffinland Commitment	61
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	None
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2021c) 2021 Annual Air Quality, Dustfall and Meteorology Report (Stantec, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.3 Appendix G.26

METHODS

Continuous ambient air quality monitoring equipment was set up at Milne Port and the Mine Site to monitor sulphur dioxide (SO₂) and nitrogen oxides (NO_x) levels at Project sites in 2014. Continuous ambient air quality monitoring commenced in November 2014 and continued throughout 2015. Monitoring throughout 2015 concluded that all results were well below the Government of Nunavut (2011) Air Quality Standards, resulting in the discontinuation of the monitoring program in 2016. To ensure compliance with Project Certificate Condition No. 7 and collect additional data over multiple shipping seasons, the monitoring program resumed at Milne Port in March 2017 and at the Mine Site in November 2017; both programs continue to run to this day. Results of the monitoring conducted in 2021 were compared to both the Nunavut Air Quality Standards and the Canadian Ambient Air Quality Standards (CAAQS). The CAAQS were developed by the Canadian Council for the Ministers of the Environment (CCME) to manage air emissions and ambient air quality concentrations in a regional air shed; CAAQS are not intended to determine compliance at the fence line for an industrial facility and are provided for comparison purposes only.

The Air Quality and Noise Abatement Management Plan was updated in April 2021.

RESULTS

In summary, the results of the monitoring during 2021 at the Mary River site are as follows:

- Sampling was conducted January to December, 2021.

- Sulphur Dioxide (SO₂) data at the Mine Site Complex (MSC) ambient air quality monitoring station had 62.12% valid data for 2021 with a low of 0% for September through December due to an internal pump failure.
- The SO₂ concentrations remained very low throughout 2021 and did not exceed the hourly (172 ppb), 24-hour (57 ppb) or annual (11 ppb) air quality objectives (GN, 2011).
- The maximum hourly recorded concentration was 2% of the Nunavut Air Quality Hourly Standard, 1% of the Nunavut Air Quality 24-hour Standard.
- It was not possible to calculate the annual average SO₂ concentration due to data gap associated with the Internal Pump failure.
- The maximum 1-Hour Sulphur Dioxide concentration was 2% of the 1-Hour CAAQS.
- Nitrogen Dioxide (NO₂) data at the Mary River MSC ambient air quality monitoring station had 98.9% valid data for 2021 with a low of 87.37% for the month of August due to equipment maintenance and calibration.
- NO₂ levels did not exceed the hourly (213 ppb), 24-hour (106 ppb) or annual (32 ppb) National Ambient Air Quality Standards (NAAQS; GN, 2011) with concentrations of 123 ppb, 27 ppb and 13.8 ppb, respectively.
- The highest average hourly maximum occurring on January 28, 2021 (122.6 ppb). The NO₂ concentrations exceeded the 1-hour CAAQS in <1% of the hourly averaged data (1 occurrence) with a recorded level of 122.6 ppb.
- NO₂ concentrations trend higher during the winter months and fall during the summer months, which is consistent with historical trends (RWDI 2015, 2018, Stantec, 2021).

In summary, the results of the monitoring during 2021 at the Milne Inlet site are as follows:

- Sampling was conducted January to December, 2021.
- The SO₂ data at the PSC ambient air quality monitoring station had 89.97% valid data for 2021 with a low of 0% for December due to an internal pump failure, the pump was replaced in January 2022 and the meter brought back online.
- For the eleven months of recording, the SO₂ concentrations remained very low (0-10.1 ppb) throughout 2021 and did not exceed the hourly (172 ppb), 24-hour (57 ppb) or annual (11 ppb) air quality objectives (GN, 2011).
- The maximum hourly recorded SO₂ concentration was 6% of the Nunavut Air Quality Hourly Standard, 2% of the Nunavut Air Quality 24-hour Standard and 4% of the Nunavut Annual Standard.
- SO₂ levels were highest in the winter and lowest in the summer months.
- Nitrogen Dioxide (NO₂) data at the Milne Port PSC had 96.4% valid data for 2021, with a lower value of 46.24% for December due to an extended power failure and subsequent shut down. The data validity for December falls below the >75% criteria, therefore December's data is considered invalid.
- For the months with valid data, the NO₂ concentrations did not exceed the hourly (213 ppb), 24-hour (106 ppb) or annual (32 ppb) NAAQS (GN, 2011) with concentrations of 175.4 ppb, 24.9 ppb and 13.4 ppb, respectively.
- The NO₂ concentrations exceeded the 1-hour CAAQS in <1% of the hourly averaged data (12 occurrences) with the highest average hourly maximum occurring on November 16, 2021 (175.40 ppb).
- The NO₂ concentrations were highest in the winter and lowest in the summer months, consistent with historical trends (RWDI, 2015, 2018, Stantec, 2021).

TRENDS

Ambient air quality data were collected at two Baffinland sites (Mine Site Complex and Port Site Complex). Data were compared to previous years' data as provided by RWDI annual summary reports. The 2021 Data collected at Mine Site Complex and Port Site Complex were consistent to previous years' data trends, with the highest SO₂ and NO₂ levels occurring during the winter months and falling sharply during the summer periods.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor SO₂ and NO₂ levels at Milne Port and the Mine Site during 2022. Air quality monitoring at Steensby Port will be implemented when the Port is developed and shipping activities commence.

Project Certificate Condition No. 9

Category	Air Quality - Greenhouse Gas Emissions
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To provide feedback on the Project's emissions.
Term or Condition	The Proponent shall provide calculations of greenhouse gas emissions generated by activities at the Steensby Inlet and Milne Inlet port sites and other Project sources including aircraft associated with the Project. Calculations shall take into consideration, fuel consumption as measured by Baffinland's purchase and use as well as the fuel use of its contractors and sub-contractors.
Relevant Baffinland Commitment	57
Reporting Requirement	To be included in the Proponent's annual reporting to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland used guidance documents provided by Environment and Climate Change Canada (ECCC, 2016; 2017, 2019, 2020, 2021) and the Intergovernmental Panel on Climate Change (IPCC, 2006) along with published emission factors to estimate the Project's annual GHG emissions. Annual emissions were calculated based on on-site fuel consumption and waste management at the Project.

Baffinland continues to report annual emissions to ECCC through the GHG reporting and National Pollutant Release Inventory (NPRI) programs. In accordance with ECCC guidance, Baffinland reports on Scope 1 emissions. Baffinland's 2021 annual emissions for GHGs are presented in Table 4.9.

Table 4.9: Calculated 2021 Project Greenhouse Gas Emissions

Gaseous Emission	Units	Calculated Emissions
GHG	t-CO ₂ eq	169,719

TRENDS

Total gaseous emissions have remained consistent from 168,919 tonnes in 2020 to 169,719 tonnes in 2021, and when compared to FEIS predictions, Baffinland's 2021 total Scope 1 gaseous direct emissions from equipment owned or controlled by the company including fuel used by contractors and sub-contractors onsite, are below FEIS predicted emissions estimates.

Recognizing that operations depend heavily on diesel fuel to produce energy and that emissions generated are tied directly to fuel consumption, and consistent with its objective to continually improve energy efficiency and

greenhouse gas emissions performance. In 2020, Baffinland completed the installation of two (2) new generators at the Mary River Mine Site to replace less fuel-efficient units. The site-based Power Generation and Distribution Department has the responsibility of overseeing power generation and distribution, which comprises, in part, the tracking of key performance indicators (KPIs) on fuel/energy use, efficiencies, load factor, etc. Through the use of its energy use/output tracking software, Baffinland has determined that its two newly installed generators run approximately 30% more efficiently than the previous units, which means that less fuel has been required to produce the same output of electricity at the Mine Site. These energy efficient generators continued to be operated in 2021.

Baffinland constructed the Mine Haul Road Cross Cut in 2019, which continues to significantly reduced the distance travelled for mine haul trucks as well as reduced the cycle time between Deposit No. 1 and the ROM stockpile at the Crusher Facility. As a result of this change in road configuration, the total fuel savings have resulted in decreased emissions compared to the 2019 reported values.

RECOMMENDATIONS / LESSONS LEARNED

Consistent with the Climate Change Strategy (2019) for the project, Baffinland will continue to modify or replace equipment with more energy efficient alternatives, research and where possible implement renewable energy sources, and identify opportunities for energy efficiency through optimizations in the Project design, all in an effort to further reduce GHG emissions. Future updates regarding Baffinland's GHG emission production and initiatives being undertaken to optimize efficiencies in energy requirements will continue to be reported in Baffinland's Annual Report's to NIRB.

Project Certificate Condition No. 10

Category	Air Quality - Dust Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to air quality from dust dispersion.
Term or Condition	<p>The Proponent shall update its Dust Management and Monitoring Plan to address and/or include the following additional items:</p> <ol style="list-style-type: none"> Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site. Identify the specific adaptive management measures to be considered should monitoring indicate that dust deposition from trains transporting along the rail route is greater than initially predicted. Outline specific plans for monitoring dustfall at intervals along and in the vicinity of the Milne Inlet Tote Road to determine the amount and extent of dustfall. Identify the specific adaptive management measures to be considered if monitoring indicates that dust deposition from traffic on the Milne Inlet Tote Road is greater than initially predicted. The Proponent shall implement its Dust Management and Monitoring Plan, report all monitoring data to the NIRB annually, and take all adaptive management measures described in its Dust Management and Monitoring Plan if monitoring indicates that dust in the ambient air or dust deposition from the increased traffic associated with the increased volume of ore being shipped is greater than initially predicted.
Relevant Baffinland Commitment	2, 57
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Water Board, Nunavut Impact Review Board, Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Environment and Climate Change Canada
Reference	<p>Air Quality and Noise Abatement Management Plan (Baffinland, 2021c)</p> <p>Roads Management Plan (Baffinland, 2020b)</p> <p>Dust Mitigation Action Plan (Golder, 2016a)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>Air Quality Memo (Stantec, 2022)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.3 Appendix G.29

METHODS

Dust management and monitoring were incorporated into the Air Quality and Noise Abatement Management Plan and the Roads Management Plan before starting construction. Dust monitoring and mitigation measures continued to be implemented in 2021 at the Mine site, Port Site, and Tote Road. In 2021, 14 new dustfall monitoring stations

were added to the existing monitoring program: four additional monitors at Milne Port to better characterize dustfall near Milne Port; four new monitors along the section of the proposed Phase 2 railway that departs the Tote Road right-of-way (ROW) to define baseline conditions; and, in response to a request from the QIA and the TEWG, six (6) dustfall monitors installed to collect dust at 0.5 m — ‘short’ monitors as a pilot study to investigate the variability between dustfall sampling at the standardized height of 2.0 m and that closer to ground level.

A *Dust Mitigation Action Plan* (Plan) was developed in 2016 to identify specific measures to be implemented to reduce dust emissions (Golder, 2016a). Plan implementation continued in 2021, consistent with past years. Additionally, in 2021, Dust Blockr® (previously branded as Dust Stop®) was applied along the entire Tote Road. Initial applications occurred on June 13 along the whole Tote Road. Subsequent maintenance applications of Dust Blockr® were made throughout the summer as needed based on routine visual inspections. Approximately 514,801 L of Dust Blockr® was applied along the Tote Road in 2021. Dust Blockr® performance is currently being evaluated to determine the suitability for long-term use and possible application on the airstrip.

The inspection, maintenance and monitoring of dust mitigation equipment at the Crusher Facility was integrated into the equipment inspection and maintenance planning process in 2020 and continued throughout 2021. The integration of dust mitigation equipment maintenance into the equipment inspection and maintenance planning process has improved the availability of that equipment.

Finally, to address concerns from the MHTO that passive dustfall sampling and reporting did not give a “picture” of what the dustfall looks like on the ground, a satellite imagery analysis was conducted in 2021 to assess winter dustfall extent around the Project from 2014 to 2021. Dustfall extent and relative magnitude were extracted from Landsat and Sentinel-2 satellite images collected between mid-March and mid-May using the reflective differences between dust and snow within a 20 km buffer of the Project Development Area.

RESULTS

Monitoring showed that although measured dustfall exceeded FEIS predictions at select locations, in general, total annual dustfall across the Project area in 2021 was within the ranges observed in previous years. However, satellite imagery analyses of dustfall extents identified that the overall range of dustfall might be greater than illustrated in the dustfall modelled predictions. These results demonstrate the ongoing effectiveness of reducing dust generation from crushing and ore stockpiling and Tote Road traffic, despite an increased production level of up to 6 Mtpa at the Project and the volume of Tote Road traffic. The total dustfall extent area in 2021 was greater than in 2020, but less than 2019 for the Sentinel-2 dataset. Further discussion on dustfall monitoring, including the analysis of satellite imagery and results are included in Section 7 of the Draft 2021 Mary River Project Terrestrial Environment Annual Monitoring Report (EDI, 2022).

TRENDS

Overall, dustfall remains relatively constant at most year-round sampling locations throughout the Project area. The magnitude of annual dustfall in 2021 was consistent with recent years at the Mine Site. In 2021, the highest dustfall at the Mine Site area was associated with the airstrip. The airstrip has consistently had the highest dustfall deposition in the Mine Site area, except in 2019 when dustfall was highest near the ore haul road. The magnitude of dustfall at Milne Port has remained constant, or in some cases, has decreased slightly, a trend that began in 2018. This decreasing trend is attributed to increased mitigations employed since 2019, including shroud covers, ore stockpile management, and continuous monitoring of conveyor drop height. The 2021 dustfall extents decreased at Milne Port, potentially due to the application of DusTreat to the stockpiles. Along the Tote Road, the 2021 dustfall extents

were similar to previous years. The dustfall extents appeared to cover more surrounding terrain than the 2020 extents but were similar to the 2019 extents.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is committed to continuous improvement in its work activities to reduce risks to the environment and improve operational effectiveness. The strategy employed by Baffinland is regular monitoring supported by operational change and the adoption of other mitigating measures as warranted. As per Baffinland's Health, Safety and Environment (HSE) Management Framework (SD-SDT-001) requirements, Baffinland will regularly conduct and document management reviews of the Air Quality and Noise Abatement Management Plan. Such reviews will ensure that monitoring results for the Air Quality and Noise Abatement Management Plan are integrated with other aspects of the Project, and that necessary adjustment are implemented as required.

In 2022, Baffinland will continue to apply Dust Blockr® along the entire Tote Road. Based on the application in 2020 and 2021, using Dust Blockr® in combination with regular use of water for dust suppression on Project roadways is anticipated to reduce dust generation. Baffinland plans to assess the possibility of applying Dust Blockr® to the airstrip in addition to regular water applications. Baffinland will also continue to apply DusTreat®, as per the application techniques and dosage calculations provided by the manufacturer, as sections of Milne Port stockpiles are formed throughout the year.

Baffinland will also review the results of the third-party, community-driven Dust Audit and look to implement recommendations from the Audit throughout 2022 as applicable.

Project Certificate Condition No. 11

Category	Air Quality - Incineration Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to air quality from incineration activities.
Term or Condition	The Proponent shall develop and implement an Incineration Management Plan that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (EC, 2010).
Relevant Baffinland Commitment	57
Reporting Requirement	Updated Incineration Management Plan to be provided to the NIRB at least 60 days prior to the commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	Waste Management Plan (Baffinland, 2020c) Incinerator Operation Procedure (see Waste Management Plan)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

RESULTS

Baffinland adheres to the six-step process for batch waste incineration as outlined in the EC's Technical Document (EC, 2010), including conducting periodic waste stream audits and waste sorting for the dual chamber incinerators, which are installed at both the Mine Site and Milne Port.

In addition to ongoing employee education, routine inspections of Project facilities operations are completed with a focus on waste volume, composition and overall conformance to the Project's Waste Sorting Guidelines, which were recently updated in 2021.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 12

Category	Air Quality – Incineration
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to air quality from incineration activities.
Term or Condition	Prior to commencing any incineration of on-site Project wastes, the Proponent shall conduct at least one stack test immediately following the commissioning of each temporary and permanent incinerator.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	Stack test results to be reported to the NIRB and Environment Canada annually as required.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Environment and Climate Change Canada, Nunavut Impact Review Board
Reference	Air Quality and Noise Abatement Management Plan (Baffinland, 2021b) Waste Management Plan (Baffinland, 2020c)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Stack testing was conducted on the Mine Site and Milne Port incinerators when commissioned in 2013, as required by PC Condition No. 12. As part of ongoing operations, Baffinland conducts periodic monitoring of the dual chamber incinerator operation data. This data can be utilised to determine if the incinerators are operating to original specifications. Data includes operational temperature data, burn cycle times, and bottom residual ash composition results. In addition, Baffinland will conduct routine stack tests for dioxins, furans and mercury every five years following commissioning to confirm the above monitoring, in accordance with commitments made to the NIRB following recommendations on the 2018 Annual Report to the NIRB. As a result of this commitment, stack testing was completed in 2019 and 2020 on the existing Mine Site and Milne Port incineration units.

RESULTS

Stack testing completed on the Mine Site Incinerator and Milne Port Incinerator units was completed in 2013 upon commissioning of the units, and demonstrated compliance with the applicable emissions standards.

Stack testing completed in August 2019 on the Mine Site Incinerator and Milne Port Incinerator units indicated mercury concentrations below the applicable Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards (CwS) at both locations, however both incinerators demonstrated exceedances of dioxin/furan parameter standards compared to the CCME CwS. During the 2020 stack testing program, abnormal operating conditions were identified during two (2) of the six (6) tests, resulting in potential impacts in the validity of these stack test results. Baffinland retained a third party consultant to further review and assess the results of the 2020 stack testing program, including the system logs for the incinerators from the days the units were being tested. The consultant concluded that with four (4) of the six (6) tests producing results that were well below the criteria level, the incinerators appear to be capable of meeting operational targets. The consultant further concluded that the

two (2) tests run during abnormal operating conditions should be considered not to be representative of normal incinerator operations and should be classified as outliers. Further confirmatory stack testing is required to verify emissions standards continue to be met.

In 2021, Baffinland implemented a real-time monitoring system on the network, to monitor incinerator operating parameters during burns to identify abnormal operating conditions.

TRENDS

Baffinland has noted that the residual bottom ash generated by the dual chamber incineration process rarely exceeds the guidelines outlined in the Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste Facilities (GN, 2011). Any exceedances are reported in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b). In 2021, all ash samples were below the threshold values for monitored parameters. These results suggest that the incinerators are generally operating as commissioned.

It is noted that the results of stack testing completed in 2019 and 2020 demonstrated exceedances of the in-stack standards for dioxin/furan parameters, while commissioning of the units in 2013 demonstrated compliance with the applicable standards. Additional testing is required to demonstrate that corrective actions put into place have been effective.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will conduct additional confirmatory stack testing in 2022 and report results to demonstrate corrective actions were effective and confirm emissions standards are met. The third party consultant will be present onsite during further confirmatory stack testing scheduled to be completed in 2022 to verify emissions standards continue to be met and to provide on-site support to ensure representative testing conditions are established and maintained throughout the 2022 stack testing program. Baffinland will also continue to monitor the incinerator operational and residual bottom ash data to identify changes in operational effectiveness.

4.6.3 Noise & Vibration (PC Conditions 13 through 15)

Five (5) PC conditions (including No. 13, 14, 14a, 14b and 15) relate to the potential impacts of the Project on noise and vibration.

Inuit & Stakeholder Feedback

Noise and vibration effects to fish and marine mammals as a result of site works was identified as a potential impact during the regulatory process. This was subsequently reflected in Fisheries Act Authorizations issued for the Project. Additionally, concern over noise and vibration levels at the accommodation facilities was identified as an issue for consideration for the health and safety of Project employees. Accordingly, Baffinland made several enhancements to improve noise levels near the accommodation facilities in 2018; a new 800-person camp (Sailiivik Camp) was established at a different location, between the mine infrastructure area and Sheardown Lake. Additionally, through the TEWG the potential for noise disturbance to impact wildlife interacting with the Project was raised as an issue that required monitoring to confirm FEIS predictions. A 2020 noise monitoring program was implemented in response to this.

Monitoring Activities

In September and December 2021, accommodations at the Mine Site Complex (MSC), Sailiivik Camp, Port Site Complex (PSC) and 380-Person Camp were tested for noise and vibration. Due to limitations associated with the ongoing COVID-19 Pandemic, noise and vibration testing was not conducted at Project accommodations sites prior to September in 2021.

No in-water works that had the potential to create noise or vibratory impacts to fish or marine mammals were undertaken in 2021.

Table 4.10 provides a summary of noise effects monitored in 2021, and an evaluation of impacts relative to the predictions presented in the FEIS and FEIS Addendum.

Table 4.10: Noise and Vibration Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Ambient Noise and Vibration	Disturbance of sleeping workers, affecting worker health and safety	<p>Indoor noise and vibration levels were measured in September and December 2021. Occupational noise and vibration at Baffinland was assessed according to the Mine Health and Safety Act, Consolidation of Mine Health and Safety Regulation, R-125-95, Part IX and Schedule 5.</p> <p>Indoor noise measurements taken in the accommodation facilities at the Mine Site in 2021 were an average of 50.24 dBA (A-weighted Decibels) and therefore respected the 75 dBA exposure level. This is consistent with overall average noise levels recorded at the Mine Site in 2020 (<65 dBA) and with average recorded noise levels in 2019 (43 dBA). In general, average noise levels have experienced an increase over average recorded noise levels in years prior to 2018 (28 dBA in 2017, 30.6 dBA in 2016, and 34.8 in 2015);</p>	Effect within FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
		however, values remained below the 75 dBA exposure criteria. Potential causes of the trend are discussed further in relation to PC Condition No. 14	
Noise and Vibration Levels	Increased noise or vibration levels affecting fish in nearby watercourses	Not applicable in 2021.	Not applicable in 2021.
Terrestrial Wildlife	Noise disturbance from the Project acting as a deterrent to wildlife	Results from the 2020 Noise Monitoring Study indicate that although the Project generates impulsive anthropogenic sound events in all Project areas that are loud enough to elicit a wildlife response at 1.5 km from the Project Development Area (PDA) (i.e., above 55 dB), these loud noises are infrequent and unlikely to cause significant wildlife disturbance. No noise monitoring was completed in 2021.	Within FEIS predictions.

Path Forward

Baffinland will continue to implement noise and vibration monitoring in relation to human health and safety twice per year, at each receptor location (Milne Port and Mine Site). To ensure that noise and vibrations at the accommodations within the Project Sites are not adversely affecting our employees and contractors, Baffinland will continue to monitor noise levels in relation to human health and safety. Should the data identify a need for noise or vibration reduction efforts, a plan will be formulated to address these concerns in consultation with stakeholders.

Reporting on each PC condition is provided in the pages that follow.

Project Certificate Condition No. 13

Category	Noise and Vibration - Use of Explosives
Responsible Parties	The Proponent, Fisheries and Oceans Canada
Project Phase(s)	Construction
Objective	To determine appropriate protection of fish and aquatic life in the Arctic.
Term or Condition	The Proponent is encouraged to work with Fisheries and Oceans Canada at the regulatory phase and to take a precautionary approach when selecting the overpressure threshold to be applied to explosives use for the protection of fish and aquatic life.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Fisheries and Oceans Canada, Nunavut Water Board, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board, Qikiqtani Inuit Association
Reference	Environmental Protection Plan (Baffinland, 2021d) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e) Quarry Blasting Operations Management Plan (Baffinland, 2013b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

The aforementioned plans described above mitigate the possibility of an explosive to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 100 Kilopascals (kPa; 14.5 pounds per Square Inch [psi]) in the swim bladder of a fish.

RESULTS

Not applicable. No blasting occurred in 2021 within the required setback distances detailed in the DFO guidance document (Wright and Hopky, 1998).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 14

Category	Noise and Vibration - Noise and Vibration Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate noise and vibration at Project sites, especially living areas.
Term or Condition	The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development.
Relevant Baffinland Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Consolidation of Mine Health and Safety Regulation, R-125-95 Noise and Vibration Surveys (HDS, 2022)
Ref. Document Link	Appendix G.2

METHODS

Noise and vibration monitoring at the Mine Site and Milne Port accommodations is scheduled annually by Baffinland Health and Safety staff. Monitoring uses a sound meter with microphone and a vibration pad with meter set-up in different rooms and wings of accommodation buildings at both sites. Monitoring is conducted in the summer and winter seasons. Noise or vibration concerns brought forth by employees are taken seriously and addressed on an as-needed basis. Occupational noise and vibration at Baffinland is assessed according to the *Mine Health and Safety Act, Consolidation of Mine Health and Safety Regulation, R-125-95, Part IX and Schedule 5*.

The numerical thresholds from which protection is required include 8-hour equivalent sound exposures equal to or greater than 85 dBA, based on the expectation that a worker has a sound environment of 75 dBA or less for the remainder of the day. The noise monitoring equipment is calibrated before and after use as well as between the periods.

Since the *Mine Health and Safety Act* does not provide specific numerical limits, 8-hour equivalent vibration criteria are taken from the European Physical Agents Vibration Directive – 2002/44/EC. For whole body vibration, the directive provides an exposure action value of 0.5 Meter per Second Squared (m/s^2), and an exposure limit of 1.15 m/s^2 . The action value provides the threshold for increased vigilance to prevent reaching the exposure limit.

In 2021, adaptive management continued to be employed to reduce noise and vibration near accommodation complexes:

- Quiet work hours continued to be implemented;
- Operation of equipment was limited in the vicinity of accommodation complexes, where practicable; and,

- The Mine Site helicopter dedicated landing zone was located in a separate location from accommodations complexes, and flight paths were adjusted to ensure helicopters stayed clear of camps.

In September and December 2021, accommodations at the MSC, Sailiivik Camp, PSC and 380-Person Camp were tested for noise and vibration. Given that there were restrictions on personnel coming to site, and the Health and Safety team focuses on crisis management as a result of the ongoing COVID-19 Pandemic and the timing of the on-site Delta variant outbreak during the spring of 2021, noise and vibration testing was not conducted at Project accommodations sites until September 2021.

Sleeping accommodation sound level measurements demonstrate levels that are well below the 75 dBA level for off-work hours that is associated with the 8-hour exposure criterion. Summary statistics of average noise measurements collected within sleeping accommodations are presented in Table 4.11.

Table 4.11: Summary Statistics of 2021 Noise Monitoring Results

Sampling Period	Average Noise Level (dBA)
September Monitoring	
Sailiivik Camp	60.7
MSC	41.9, 51.2
PSC	45.5
380-Person Camp	51.9
December Monitoring	
Sailiivik Camp	50.2
MSC	49.8
PSC	50.3
380-Person Camp	50.4

Vibration measurements were below the applicable criteria, and are presented in Table 4.12.

TRENDS

Indoor noise measurements taken in the accommodation facilities at the Mine Site in 2021 were an average of 50.24 dBA and therefore respected the 75 dBA exposure level. This is consistent with overall average noise levels recorded at the Mine Site in previous years (<65 dBA in 2020¹, 43 dBA in 2019, 45 dBA in 2018). In general, average noise levels have experienced an increase over average recorded noise levels in years prior to 2018 (28 dBA in 2017, 30.6 dBA in 2016, and 34.8 in 2015); however, values remained below the 75 dBA exposure criteria. The gradual increase in noise levels may have been the result of additional construction activities that have occurred since 2017 in comparison to previous years.

Indoor noise measurements taken in the accommodation facilities at Milne Port in 2021 were an average of 50.17 dBA and therefore respected the 75 dBA exposure level. This is consistent with overall average noise levels recorded at Milne Port in previous years (<65 dBA in 2020¹, 46 dBA in 2019, 48 dBA in 2018, 43 dBA in 2017 and 50 dBA in 2016).

¹ Note, in 2020 the dosimeters were set on a dynamic sampling range of 70 dBA – 140 dBA for noise measurements. Therefore, specific measurements under 70 dBA were not recorded as they were outside of the instrument's sampling range.

Table 4.12: Summary Statistics of 2021 Vibration Monitoring Results

Sampling Period	Peak ¹ Vibration Exposure (m/s ²)
September Monitoring	
Sailiivik Camp	0.020
MSC	0.033, 0.062, 0.071
PSC	0.219
380-Person Camp	0.082
December Monitoring	
Sailiivik Camp	0.160
MSC	0.055
PSC	0.065
380-Person Camp	0.091

Notes:

¹ 2021 results presented as Apeak (frequency-weighted, peak acceleration sum over the sampling period) same as 2020, whereas 2019 results were presented as the maximum Aeq (frequency-weighted, time-weighted acceleration sum over the sampling period).

Vibration levels measured in 2021 (0.020 to 0.219 m/s²) were comparable to previous years (0.022 to 0.052 m/s² in 2020; 0.003 to 0.18 m/s² in 2019), slightly higher than vibration levels measured in 2018 (0.001 to 0.008 m/s²) and lower than vibration measured in 2017 (0.49 m/s²).

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 14 (a)

Erin Category	Noise and Vibration - Noise and Vibration Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate potential impacts of noise to marine wildlife during project construction.
Term or Condition	The Proponent, through coordination with the MEWG as may be appropriate, shall demonstrate appropriate adaptive management for construction activities at Milne Inlet that have the potential to disrupt marine mammal species, including pile driving and ore dock construction, are undertaken.
Relevant Baffinland Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Steensby Port - Not Active Milne Port – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

No construction activities occurred at Milne Inlet in 2021. In the event that future construction activities are undertaken at Milne Inlet that have the potential to disrupt marine mammal species, including pile driving and ore dock construction, the Proponent will work with DFO to ensure the relevant permits are obtained and that appropriate adaptive management measures are put in place.

RESULTS

Not Applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Prior to any future construction in the marine environment, Baffinland will develop an associated Construction Environmental Management Plan that would include mitigation and adaptive management measures to protect marine mammals during in-water and nearshore construction works including pile driving, infilling, dredging and other dock construction activities.

Project Certificate Condition No. 14 (b)

Category	Noise and Vibration- Noise and Vibration Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To mitigate potential impacts of noise to wildlife and people during project operations.
Term or Condition	The Proponent, through coordination with the TEWG as may be appropriate, shall demonstrate appropriate adaptive management for project activities during operations which have the potential to produce noise and sensory disturbance to wildlife and other users of project areas.
Relevant Baffinland Commitment	32
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

In 2020, noise monitoring stations were established to assess noise levels that may disturb wildlife. The monitoring program consisted of three (3) transects: at the Mine Site, Tote Road, and Milne Port. Along each of the three transects, a noise monitoring station was established at three (3) distance classes: Near (200 m from current Project infrastructure), Far (1.5 km from the edge of the mapped PDA), and Reference (≥ 3 km from the edge of the mapped PDA), for a total of nine (9) noise monitoring stations. Near sites were selected to capture a representative noise sample near Project activities. The 1.5 km distance for Far sites was selected based on noise modelling completed by RWDI Air Inc. (2008), which predicted slightly elevated noise levels at this distance but approaching background levels. The ≥ 3 km Reference distance was selected based on the same noise modelling, which predicted no elevated Project-related noise at this distance.

Noise monitoring stations comprised one AudioMoth Automatic Recording Unit (ARU) and one SongMeter4 (SM4) ARU mounted approximately 1 m above the ground. Before field deployment, all noise monitoring units were calibrated using a 94 dB tone. Each unit's microphone was directed towards Project activities to maximize noise capture from the Project. The SongMeters were programmed to record using only the right-hand microphone to maintain comparability with AudioMoth units with a single microphone.

Additional details on the methods are provided in the 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2021a).

RESULTS

As was predicted, directly near Project infrastructure, operational activities generate frequent and impulsive anthropogenic noise loud enough to elicit a wildlife response (i.e., continuous peak sound or impulsive sound events above 55 dBA). For example, both the Tote Road and Mine Site Near (200 m distance) stations (200 m from the Tote Road) had typical continuous Sound Pressure Levels (SPLs) above 55 dBA. However, over 90% of continuous sound

at 1.5 Km from the PDA was below 55 dBA in all Project Areas, which would not be expected to illicit a wildlife response, and these were only detected 3% of the time. Furthermore, noise was below 40 dBA at 3km from all Project areas, and Project-related noise was typically not audible at 3km from the Project.

Impulsive anthropogenic sound events above 55 dBA were detected at all distance categories and all Project areas but, as expected, were more frequent and intense at Near stations. Although impulsive aircraft sounds (i.e., airplanes, helicopters) were consistently above 55 dBA in all distance categories, these sound events were rare, especially away from the Mine Site. Excluding the Mine Site Near site, no single site exceeded 1% frequency of impulsive aircraft noise, and the cumulative frequency of impulsive aircraft noise over these sites was less than 2%. Any disturbance to wildlife caused by aircraft noise would be infrequent and short in duration. Generally, impulsive machinery and vehicle sound events dissipated to the near-threshold of wildlife response (i.e., 55 dBA to 60 dBA) at 1.5 km distance from the PDA. These occurred less than 3% of the time. Although the Project generates impulsive anthropogenic sound events in all Project areas that are loud enough to elicit a wildlife response, at 1.5 km from the PDA (i.e., above 55 dB), these loud noises are infrequent and unlikely to cause significant wildlife disturbance.

TRENDS

Trend will be evaluated as additional noise monitoring programs are implemented in future years.

RECOMMENDATIONS / LESSONS LEARNED

The monitoring did not occur in 2021 based on results from 2020. However, based on comments received from the TEWG and results of the 2020 monitoring, additional noise monitoring is being contemplated for 2022.

Project Certificate Condition No. 15

Category	Noise and Vibration - Noise and Vibration Monitoring
Responsible Parties	The Proponent, Qikiqtani Inuit Association, local Hamlet organizations
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enhance public safety when travelling around the Project area.
Term or Condition	The Proponent shall collaborate to the extent possible with the Qikiqtani Inuit Association and local Hamlet organizations when undertaking consultation with all affected communities regarding railway, tote road and marine shipping operations. During these consultations, it is recommended that the Proponent provide information including video, audio, and photographic representation as well as any other aids (i.e. models) that may enhance the general public's understanding of railway, Tote Road and marine shipping operations, as well as all safety considerations for members of the public who may be travelling around the project area.
Relevant Baffinland Commitment	32
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	2021 MEWG Meeting Minutes 2021 Shipping and Monitoring Program Meeting Records
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/ Appendix C.1 Appendix G.4

METHODS

Baffinland continues to work with local Hamlet organizations, Hunters and Trappers Organizations (e.g., MHTO) and the Qikiqtani Inuit Association (QIA) regarding safety considerations for travel and interaction with the Project for those travelling in the area. In support of this, the QIA initially established the Mary River Community Group (which included representatives from the MHTO, the local Hamlet of Pond Inlet and Baffinland). In addition, the QIA and the MHTO are members of the Marine and Terrestrial Environment Working Groups, which are kept updated on relevant operations (marine and terrestrial transportation) and associated monitoring programs.

Baffinland has created full-time Baffinland Community Liaison Officer (BCLO) roles in each of the five North Baffin communities. BCLOs provide for regular and ongoing opportunities for the dissemination of Project-related information and receipt of community-based input.

Through feedback obtained through various engagement activities (see Table 2.1 and Appendix B for summary of 2021 engagement activities), changes in communications have been made over time to better inform communities about Baffinland's operations. For example, based on feedback received through pre-shipping season and end of shipping season meetings held in 2018 and 2019, it was recommended that communications be enhanced on daily shipping activities. In response, Baffinland created two (2) full-time Shipping Monitor roles based out of the Pond

Inlet office located in the MHTO office building starting in 2019 to act as a liaison between community members, hunters and Baffinland. Daily vessel transit updates at various intervals throughout the day are provided to the community of Pond Inlet and land users using a variety of communication methods including announcements on local Pond Inlet radio, marine VHF radio (aimed at informing those traveling on the water) and via social media (Facebook). Anticipated vessel schedules are also sent to the MHTO and the Hamlet of Pond Inlet on a regular basis to provide advance notifications of upcoming shipping activity. These updates were introduced in 2020 to again expand the breadth of information provided to community members.

In order to support visual tracking of its vessels transiting to Milne Port, Baffinland also contracts annually exactEarth®, a global vessel monitoring and tracking service to track and report on vessel movements using Automatic Identification System (AIS) technology. The ship tracks are typically accessible to residents of Pond Inlet at the Baffinland office on a large wall-mounted monitor (See Photo 27 in Appendix D in Baffinland, 2021f) and individual viewing computer station and, more generally, also publicly accessible through the Baffinland website during the shipping season.

The computer station set-up in Baffinland's Pond Inlet office also allows visitors to view Baffinland reports, management plans, and general company information found on the online Document Portal of its corporate website. Baffinland continues to provide information related to the Project on the Baffinland corporate website including:

- Images of operational activities; and
- Ship tracks.

Baffinland also makes available posters showing Project components (Mine Site, Tote Road and Milne Port), in addition to a three-dimensional model showing the entire Project Area during Public Community Tours.

Baffinland hosted a site visit with MHTO in August 2018. The site visit included a discussion and mapping exercise of important travel areas in and near the Project area. Since then, Baffinland continues to welcome feedback from hunters on most appropriate areas to cross the Tote Road.

Through the development of the Phase 2 Proposal, Baffinland also carried out several knowledge gathering exercises that gave community members direct experience observing shipping through ice outside of Nain, Labrador at the Voiseys Bay Project (2015), and in Trois Rivier, Quebec an active railway operation owned by Genesee and Wyoming. There were also a series of IQ workshops held between 2015 and 2016 that sought a better understanding of contemporary land and ice use in the Project area that may overlap modified or increasing transportation activities associated with the Project. Despite the relationship between these activities and Phase 2, they are equally relevant to the modes and nature of transportation activities approved as part of the current Project.

Baffinland has also in place a Hunter and Visitor Access Procedure which clearly identifies safe access route to, and within, Project areas and provides specific rules that must be followed when hunters and visitors arrive at these sites. This procedure was updated in 2020 to include safe access procedures during the ongoing COVID-19 Pandemic. BCLOs are in continuous contact with Site to ensure up to date, important information is relayed to their communities via radio and posters. Baffinland continues to encourage hunter and visitors, via announcements and posters, to provide their BCLOs with advanced notice of intent to visit the Mary River Project areas.

RESULTS

During the June 29, 2021 MEWG meeting Baffinland reviewed the plans for the 2021 shipping schedule, mitigation and management, and communications protocol to be implemented during the 2021 shipping season. In addition,

Baffinland hosted a pre-shipping season teleconference meeting (May 28, 2021; see Appendix G.4) in Pond Inlet with representatives of the Hamlet, and MHTO (slides sent to QIA but did not attend), and later developed a Shipping and Marine Monitoring Fact Sheet and a large map showing the Northern Shipping Route for distribution throughout Pond Inlet (e.g., Hamlet of Pond Inlet, Northern, Co-Op). The change in the shipping route near Bruce Head, as requested by the MHTO, was implemented in 2020 to further minimize potential interactions between hunters and vessels traveling through Milne Inlet. This continued into 2021.

Baffinland continues to accommodate all hunting parties and other visitors that travel to the Project, though alternative practices were developed in 2020 and 2021 to address transmission risks related to the COVID-19 Pandemic. To prevent potential transfer of the COVID-19 virus to Nunavummiut, all visits to Project facilities by non-project staff were continued to be halted in 2021. As a result of the temporary closure, all camps and accommodations were closed to non-Project staff, however, the MHTO Cabins and Visitor Communication Centres remained available for use by hunters/visitors.

Regular public communications via radio occur in Pond Inlet to notify personnel of the temporary closure at site and protocols in place. The BCLO monitors social media and advises Nunavummiut of the COVID-19 protocols in place at the Project. Baffinland also maintains COVID-19 signage at the HTO hunting cabins and Visitor Communication Centers. Hunter and visitor supply requests continued to be accommodated in 2021 based upon supplies available on site.

To eliminate any potential contact with site personnel during the COVID-19 Pandemic, a non-contact Visitor Communication Center was maintained at each work site (Mary River and Milne Inlet), eliminating the necessity for visitors and Baffinland employees to interact closely. The Visitor Communication Center includes a radio with a dedicated channel for hunters/visitors to contact Security directly. Requests for food and other goods were dropped off at the Visitor Communication Centers at a predetermined drop off time. During COVID-19, vehicles used for hunter/visitor transport purposes are sanitized before and after use. Roll off trailers continue to be utilized to transport all terrain vehicles on the Tote Road.

During the 2021 shipping season, Baffinland trained and hired ten (10) Shipping Monitors, consisting of part-time, full-time employees and summer students based in Pond Inlet (see Photo 27 in Appendix D; additional information available in summary sheet for PC Condition No. 102). Baffinland notes that due to COVID-19 restrictions, the office was often closed to visitors over the length of the shipping season, and as a result viewing of vessels from the office was limited, though they could be observed by accessing the website through individual access points. Baffinland also continued to maintain its “Baffinland Shipping” Facebook page to further enhance regular communications over the shipping season, attracting hundreds of followers during the active shipping season.

TRENDS

Baffinland continues to build upon its foundation for increasing community awareness and understanding of Project operations and related activities.

RECOMMENDATIONS / LESSONS LEARNED

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

4.6.4 Hydrology and Hydrogeology (PC Conditions 16 through 19)

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

Inuit & Stakeholder Feedback

The NWB is the primary stakeholder regulating water use and waste disposal through its issuance of water licences. The QIA is also a key stakeholder, and has a Water Compensation Agreement in place with Baffinland, pursuant to Article 20 of the Nunavut Agreement (CIRNAC and Nunavut Tunngavik, 2010). Water diversions have the potential to impact fish and fish habitat, and DFO administers the fish and fish habitat sections of the Fisheries Act.

Monitoring Activities

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

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

The Type 'A' Water Licence specifies water withdrawal limits. Under the authorization of the Type 'A' Water Licence, freshwater was withdrawn during 2021 to sustain three key activities at the Project: potable water supply (domestic), dust suppression, and for miscellaneous (industrial) uses. During 2021, daily water volume withdrawal limits, stipulated in the Type 'A' Water Licence, for domestic, industrial and dust suppression purposes were not exceeded at approved Project water sources, with the following exceptions:

- During 2021, two (2) exceedances of source specific daily water withdrawal limits, outlined in the Type 'A' Water Licence, occurred at two (2) approved dust suppression water sources along the Tote Road including one (1) exceedance at Muriel Lake, and one (1) at KM 32 Lake. Both of the exceedances which occurred in 2021 resulted from a water use accounting issue which occurred because the water use limits are daily limits and do not correspond with operator work shifts which occur over two (2) partial days. This is a 94% decrease and a significant improvement over 2020, when thirty-one (31) exceedances of the daily water volume for dust suppression use exceeded the dust suppression daily withdrawal limits, and is attributed to improved controls for tracking daily water use at the individual water sources with respect to the daily limits.

Further discussion on the water withdrawals at the Project, including all supporting daily and monthly volumes, are provided in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

Table 4.13 provides an evaluation of the Project's impacts on hydrology and hydrogeology based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.13: Hydrology and Hydrogeology Impact Evaluation

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

Path Forward

Baffinland will continue to operate its long-term hydrometric network, and will monitor and report water use to the NWB under the company's water licences. Baffinland plans to improve the documentation and categorization of water volumes withdrawn to support Project activities and enforcement of the source specific daily water withdrawal limits at approved water sources.

Project Certificate Condition No. 16

Category	Hydrology and Hydrogeology - Water Infrastructure
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To provide assurance that the potential impacts to flow and quantity of water in the Project area are minimized.
Term or Condition	The Proponent shall ensure that the water related infrastructure or facilities that are designed and constructed, including the modification of culverts, diversion of watercourses, and diversion of runoff into watercourses along the railway, access roads, port sites, the Milne Inlet Tote Road, and other areas of the Project site, are consistent with those proposed in the FEIS and FEIS Addendum in terms of type, location, and scope and that the requirements of all relevant regulatory authorities are satisfied advance of constructing those facilities.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Final Environmental Impact Statement (FEIS; Baffinland, 2012) FEIS Addendum - Early Revenue Phase (Baffinland, 2013a)
Ref. Document Link	Not applicable

METHODS

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

RESULTS

During 2021, the following work was completed on water related infrastructure and facilities at the Project. Note that all are consistent with the broad descriptions of works described in EIS documents, but may have been further evaluated with respect to more detailed environmental permitting requirements by NWB (water license modification) or DFO (request for review):

- Maintenance of site surface water drainage infrastructure (i.e. culverts) to address sedimentation concerns and improve surface water drainage;
- Continued implementation of the Ore Crusher Pad Regrading Strategy to prevent the pooling of water on and around the Crusher Facility pad and installation of a pumping system to transfer collected water to Crusher Facility Pond MS-06;
- Completed expansion of the Waste Rock Facility and associated water management ditching;

- Continued maintenance of the Tote Road to improve surface water drainage and address safety and operational concerns, including works proposed in the Tote Road Earthworks Execution Plan (TREEP) and the Hatch Ltd. (Hatch, 2013) design;
- Implementation of preventative and corrective measures along the Tote Road (i.e. check dams, silt fences, excavating culverts of snow and ice, etc.) to address sedimentation concerns during high flow periods; and,
- Construction of the MS-11 Surface Water Management Pond as part of the first phase of the implementation of the Long Term Water Management Plan at the Mine Site.

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

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Water related infrastructure and facilities constructed to date are consistent with those proposed in the FEIS (Baffinland, 2012) and FEIS Addendum (Baffinland, 2013a) in terms of type, location, and scope. Any adjustments to water related infrastructure that occur under the broad descriptions contained in EIS documentation have been and will continue to be subject to permitting administered by the NWB (water license modifications) and DFO (request for reviews).

Project Certificate Condition No. 17

Category	Hydrology and Hydrogeology - Effluent Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to water bodies from effluent.
Term or Condition	The Proponent shall develop and implement effective measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment.
Relevant Baffinland Commitment	6
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (FWSSWMP; Baffinland, 2022e) Metals and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2022) Metals and Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERp; Baffinland, 2020d) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2022f) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Wastewater and effluent management practices are outlined in the Project's FWSSWMP (Baffinland, 2022e) and the MDMER ERp (Baffinland, 2020d). Surface water monitoring, management practices and procedures are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2021e). Water quality discharge criteria (discharge criteria) for effluent generated by the Project are stipulated in the Type 'A' Water Licence issued by the NWB, and Schedules 4 and 5 of the MDMER (Minister of Justice, 2022).

Consistent with the FWSSWMP (Baffinland, 2022e), prior to discharge, wastewater (e.g. treated sewage, treated contact water, oily water, etc.) is sampled to ensure the wastewater's water quality meets the applicable discharge criteria. Wastewater that meets the applicable discharge criteria is discharged to the receiving environment. Water samples are routinely taken prior to and during wastewater discharges to ensure the water quality remains in compliance with the applicable discharge criteria. In the event that water quality sampling during a discharge indicates that the water quality has changed and is no longer in compliance with the applicable discharge criteria, the discharge of the non-compliant wastewater is halted.

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

All water sampling at the Project is conducted in accordance with the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland; 2022f).

As required by the Type 'A' Water Licence, volumes and water quality analysis of all wastewater discharged to the receiving environment are reported to regulators (CIRNAC, NWB) on a monthly and annual basis. As a requirement of MDMER, volume and water quality results for discharges from the surface water management ponds associated with the Crusher Facility (CF), KM 106 Run of Mine Ore Stockpile Facility and Waste Rock Facility (WRF) at the Mine Site are reported to ECCC on a quarterly and annual basis.

RESULTS

Effluents generated and managed by the Project in 2021 included sewage, contact water retained in surface water management ponds associated with ore and waste rock facilities and oily water retained in containment areas, such as bulk fuel facilities. Effluent treatment systems operated at the Project in 2021, included:

- Sewage Treatment Plants (STPs) at Milne Port (MP-01, MP-01B) and the Mine Site (MS-01, MS-01B);
- Dissolved Air Flotation (DAF) Treatment System at Milne Port to treat and discharge wastewater stored in Milne Port PWSP (MP-01A);
- Mobile Oily Water Treatment System (OWTS), at the Mine Site and Milne Port; and the,
- Waste Rock Facility Wastewater Treatment Plant (WRF WTP) at the Waste Rock Facility (MS-08).

Four (4) discharges of effluent at the Project in 2021 did not comply with the applicable discharge criteria. These were single isolated events at the Milne Port Bulk Fuel Storage Facility (MP-03), the Milne Port Landfarm Facility (MP-04), and the Milne Port Contaminated Snow Containment Berm (MP-04A). These events are outlined as follows:

- On July 9, 2021, at the Milne Port effluent monitoring station MP-03, total lead was observed to be 0.00656 mg/L, exceeding the monitoring station's total lead grab sample criteria of 0.001 mg/L. Upon receiving the lab results indicating elevated levels of total lead, the discharge of effluent from the Milne Port Bulk Fuel Storage Facility was complete. Subsequent samples taken in August at the Milne Port Bulk Fuel Storage Facility confirmed total lead levels are below the applicable total lead criteria. Potential causes for the elevated total lead observed in the July 9 sample include sampling error and/ or analytical error.
- On July 12, 2021, at the Milne Port effluent monitoring station MP-04, TSS was observed to be 17.3 mg/L, exceeding the monitoring station's TSS grab sample criteria of 15 mg/L. Upon receiving the lab results of the elevated Total Suspended Solids (TSS) level observed on July 12 at MP-04, discharge from the Milne Port Landfarm Facility was halted. Baffinland continues to make the necessary adjustments to the OWTS at the Milne Port Landfarm Facility to ensure effluent discharged from the Milne Port Landfarm Facility is compliant with all applicable criteria.
- On August 2, 2021, at the Milne Port Contaminated Snow Containment Berm effluent monitoring station (MP-04A), total lead was observed to be 0.00403 mg/L, exceeding the monitoring station's total lead grab sample criteria of 0.001 mg/L. Subsequently, on August 20, 2021, TSS was observed to be 19.8 mg/L, which exceeded the monitoring station's TSS grab sample criteria of 15 mg/L. Upon becoming aware of the

elevated levels of total lead and TSS observed on August 2 and August 20, 2021, respectively, discharge of effluent from the Milne Port Snowdump Facility (MP-04A) was halted immediately. Effluent discharge was only reinitiated once it had been confirmed that the effluent's water quality was compliant with the monitoring station's water quality criteria. Potential causes for the elevated total lead and TSS levels observed during August include sampling error and/or analytical error.

2021 water quality exceedances for effluents monitored under the Type 'A' Water Licence were reported to CIRNAC, the NWB and the QIA in the monthly monitoring reports prescribed by the Type 'A' Water Licence. A full discussion of the Project's 2021 monitoring results under the Type 'A' Water Licence is provided in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

During 2021, in June to September, operation of the WRF WTP was effective at mitigating any water quality concerns for the effluent to be compliant with the applicable criteria. Beginning in June 2021, controlled discharges of effluent from the WRF Pond were conducted and resulted in no exceedances of the water licence water quality discharge criteria in 2021 observed in samples collected under Schedule I of the Type 'A' Water Licence. Additional effluent discharge sampling was completed to satisfy the requirements of the MDMER. The results of sampling completed to satisfy MDMER requirements are detailed in Baffinland's 2021 MDMER annual effluent monitoring report for the Mary River Mine Site.

Periodic controlled discharges of the effluent from the CF Pond occurred during May to September 2021. Controlled effluent discharges from the CF in 2021 involved pumping retained surface water runoff from the CF Pond through a direct-discharge pipeline shared with the Mine Site STPs and releasing the effluent at an approved discharge point near the Mary River. During periods of discharge, water quality monitoring was conducted to ensure compliance with the applicable water quality discharge criteria outlined in the MDMER and the Type 'A' Water Licence. No exceedances of the applicable water quality discharge criteria were observed during the 2021 CF effluent discharges.

Periodic controlled discharges of effluent from the KM 106 Run-of-mine (ROM) Ore Stockpile Facility occurred in July and August 2021. Controlled effluent discharges from the ROM Ore Stockpile Pad in 2021 involved pumping retained surface water runoff from the ROM Ore Stockpile Facility to an approved discharge location near the Mary River. During periods of discharge, water quality monitoring was conducted to ensure compliance with the applicable water quality discharge criteria outlined in the MDMER and the Type 'A' Water Licence. No exceedances of the applicable water quality discharge criteria were observed during the 2021 ROM Ore Stockpile Facility effluent discharges.

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

To ensure the accuracy of future water quality sampling results, Baffinland will continue to train all personnel involved with sampling effluents at the Project in the proper sampling practices and procedures, as outlined in the Project's Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2022f).

In preparation for discharge of stormwater from containment areas in 2022, the mobile OWTS will be inspected and, if necessary, the media will be replaced prior to operation of the mobile OWTS. In addition, all operators of the

mobile OWTS will be thoroughly trained in the system's operation to ensure the media continues to be replaced at the frequency recommended by the media's manufacturer.

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

Project Certificate Condition No. 18

Category	Hydrology and Hydrogeology - Pit Lake Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enhance predictions for mine site closure conditions.
Term or Condition	The Proponent shall carry out continued analyses over time to confirm and update, accordingly, the approximate fill time for the mine pit lake identified in the FEIS.
Relevant Baffinland Commitment	42
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Interim Closure and Reclamation Plan (Baffinland, 2018a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

The latest revision of the Interim Closure and Reclamation Plan (ICRP; Baffinland, 2018a) discusses the estimated fill time for the mine pit lake. In order to address uncertainty in the estimated fill times and pit lake conditions at closure, reclamation research programs to evaluate the Open Pit flooding timeline are outlined in Appendix D.2 of the ICRP.

RESULTS

Current mining activities have not yet created a pit at Deposit No. 1, the active mining area remains a hilltop outcrop. No additional information is available at this time to update the estimated fill time of the mine pit lake. A reclamation research program to evaluate the Open Pit flooding timeline is outlined in Appendix D.2 of the ICRP, however Tasks 1 and 2 under this program cannot be completed until an Open Pit has formed and active dewatering is occurring.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 19

Category	Hydrology and Hydrogeology - Water Infrastructure Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to natural water flow.
Term or Condition	The Proponent shall ensure that it develops and implements adequate monitoring and maintenance procedures to ensure that the culverts and other conduits that may be prone to blockage do not significantly hinder or alter the natural flow of water from areas associated with the proposed mine. In addition, the Proponent shall monitor, document and report the withdrawal rates for water removed and utilized for all domestic and industrial purposes.
Relevant Baffinland Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Environmental Protection Plan (EPP; Baffinland, 2021d) Fish Habitat Monitoring – 2021 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2021g) Fisheries Authorization No. NU-06-0084 (For Tote Road Crossings; DFO, 2007) Roads Management Plan (Baffinland, 2020b) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e) 2021 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2022d) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b) Review of 2020 Dust Suppression Water Withdrawals, Mary River Project (Knight Piésold, 2021)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.20

METHODS

Routine inspections of water crossings (i.e. culverts, bridges) at the Project are conducted throughout the year by the Project's Road Maintenance Department and environmental monitoring personnel, to ensure water crossings are not obstructed and are working as designed. Monitoring and routine maintenance activities completed for Project water crossings are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e), Roads Management Plan (Baffinland, 2020b) and EPP (Baffinland, 2021d).

As a requirement of Baffinland's *Fisheries Act* Authorization for the Milne Inlet Tote Road (NU-06-0084; DFO, 2007), fish bearing water crossings at the Project are, at a minimum, assessed annually by a third-party Professional Fisheries Biologist. The assessment focuses on ensuring that surface water flows and fish passage is not being hindered or altered at Project fish bearing water crossings. The annual assessment is documented and summarized

in an annual report (Baffinland, 2021e) submitted to DFO each year. Baffinland's DFO Tote Road Report is included in Appendix G.17. Concerns identified by the annual assessment (i.e. perched culvert) are communicated to the Road Maintenance Department for corrective action and promptly addressed.

As stipulated by the Project's Type 'A' and 'B' Water Licences, the Project is required to monitor, document and report the Project's water withdrawal rates from approved water sources. This information is submitted to the CIRNAC, the NWB and the QIA on a monthly basis for the Type 'A' Water Licence, and compiled and presented annually in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b). Water withdrawal under the Type 'B' Water Licence is presented annually in the 2021 QIA & NWB Annual Report for Exploration and Geotechnical Drilling (Baffinland, 2022d).

RESULTS

During 2021, Baffinland continued to monitor Project water crossings to ensure surface water flows were not being hindered or altered. Routine preventative maintenance conducted at Project water crossings in 2021 included the clearing of snow and ice at the ends of culverts prior to and during freshet. Baffinland will discuss proposed remediation works with the DFO at the identified culverts in Baffinland's DFO Tote Road Report prior to remediation works proceeding at these fish bearing crossings, as necessary, to ensure planned modifications to culverts and road embankments are in compliance of the *Fisheries Act* and the interim codes of practice for culvert maintenance and temporary cofferdams and diversion channels (as published). No significant blockages that had the potential of hindering or altering surface water flow volumes downstream of Project water crossings were observed in 2021.

Water withdrawal rates in 2021 for approved water sources under the Type 'A' and 'B' Water Licences are presented in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b) and the 2021 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2022d), respectively.

Under Table 3 of the Type 'A' Water Licence, source specific water withdrawal limits are specified for both domestic and industrial purposes for each approved water source. During 2021, daily water volume withdrawal limits, stipulated in the Type 'A' Water Licence, for domestic, industrial and dust suppression purposes were not exceeded at approved Project water sources, with the following exceptions for dust suppression purposes:

- During 2021, two (2) exceedances of source specific daily water withdrawal limits, outlined in the Type 'A' Water Licence, occurred at two (2) approved dust suppression water sources along the Tote Road including one (1) exceedance at Muriel Lake, and one (1) at KM 32 Lake. Both of the exceedances which occurred in 2021 resulted from a water use accounting issue which occurred because the water use limits are daily limits and do not correspond with operator work shifts which occur over two (2) partial days. This is a 94% decrease and a significant improvement over 2020, when thirty-one (31) exceedances of the daily water volume for dust suppression use exceeded the dust suppression daily withdrawal limits, and is attributed to improved controls for tracking daily water use at the individual water sources with respect to the daily limits.

Corrective actions that Baffinland has taken to prevent similar incidents from re-occurring include installing signs at dust suppression water sources that indicate the daily water use limits in numbers of truckloads per day, and implementing an improved water truck operator log that indicates when the maximum daily volume of water has been collected from each source based on the number of water truck loads filled. Waterproof storage systems were installed at each water source in 2021 to house daily water use logs, which enabled the use of a common log sheet for all operators and improved tracking between different trucks using the same source on the same day.

In 2020, a third party consultant reviewed dust suppression water withdrawals to assess the effects of the daily water withdrawal exceedances on instantaneous flows of streams and lake outflows, using estimated mean monthly and 10-year low flows (Knight Piésold, 2021). The consultant's memo that summarizes the assessment provided in Appendix G.20 concluded that the exceedances in 2020 were not environmentally consequential and are not expected to adversely affect stream flows, lake outflows, fish, or fish habitat. Water withdrawal exceedances of daily limits in 2021 were of significantly less volume when compared to the 2020 exceedances.

Further discussion on the water withdrawals at the Project, including all supporting daily and monthly volumes, are provided in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

As required by the Type 'A' and 'B' Water Licences, Baffinland will continue to monitor, document and report water withdrawal rates from approved water sources to the appropriate agencies. Baffinland will continue to work on improving the enforcement of the source specific daily water withdrawal limits at approved water sources.

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

Eleven (11) PC conditions relate to the potential impacts of the Project on groundwater and surface water. There is overlap in the scope of these PC conditions with PC Conditions No. 16 to 19 for hydrology and hydrogeology. Several of the conditions require the development of management plans. These conditions also overlap with aspects of the Project that are regulated under Baffinland's Type 'A' Water Licence (for mining) and Type 'B' Water Licence (for mineral exploration). PC Conditions No. 29 and 30 require Baffinland to submit construction designs, as-built drawings and site-specific management plans to the relevant regulatory agency, as required under Part D of the Type 'A' Water Licence.

Inuit & Stakeholder Feedback

As described in Section 4.6.4 (Hydrology and Hydrogeology), the NWB is the primary stakeholder regulating water use and waste disposal through its issuance of water licences. The QIA is also a key stakeholder; the QIA and Baffinland have a Water Compensation Agreement should the Project substantially affect the quality, quantity or flow of water through Inuit Owned land (IOL). ECCC is a key regulator administering the section of the *Fisheries Act* regarding the prohibition on the release of deleterious substances to fish-bearing waters. Groundwater is limited to minor seepage through the active layer during the brief snow-free period. Surface water quality, however, is a key resource to Inuit and to regulatory agencies, and it is among the most closely regulated aspects of the environment through effluent monitoring and an aquatic effects monitoring program under the Project's water licences. In 2021, community members have expressed concern regarding the potential for dust to impact water quality in local streams (Appendix B).

Monitoring Activities

Throughout 2021, Baffinland continued to implement the Surveillance Network Program (SNP) outlined in Schedule I of the Type 'A' Water Licence, analyzing effluents (i.e. treated sewage, treated oily stormwater) discharged to the receiving environment and monitoring surface water quality within specific Project areas (i.e. surface water runoff downstream of Project areas). Based on a review of 2021 SNP results reported to the NWB, CIRNAC and the QIA, exceedances of applicable discharge criteria in 2021 involved mainly surface water runoff and effluents with elevated Total Suspended Solids (TSS) and total lead levels. In each case, appropriate control measures were implemented to restore TSS and total lead levels below applicable discharge criteria. Baffinland continues to assess and implement the appropriate corrective and mitigation measures to address ongoing sedimentation concerns at the Project.

Baffinland continued to implement the Tote Road Monitoring Program to assess Project-related impacts to surface water resulting from sedimentation and erosion events. The program, jointly developed with the QIA, evaluates upstream and downstream concentrations of total suspended solids in surface water proximal to the Tote Road at select crossings considered representative of the respective catchment areas, where fisheries crossings have been identified, and other sources of sedimentation such as snow stockpiles and historic borrow sources.

In addition to the above monitoring programs, Baffinland implements ongoing environmental monitoring and effects studies, including the Project's Aquatic Effects Monitoring Plan (AEMP), in accordance with the Type 'A' Water Licence and PC terms and conditions.

Table 4.14 provides an evaluation of the Project's impacts on groundwater and surface water, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.14: Groundwater and Surface Water Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Groundwater Quality	Adverse seepage from project areas (landfill, landfarm, waste rock stockpile) affecting groundwater quality	A groundwater monitoring program was continued at the landfill and expanded to monitor the Mine Site Hazardous Waste Berm areas in 2021. Future monitoring will seek to evaluate additional project areas as warranted, and to establish trends.	Groundwater monitoring identified the potential for mine related influence. Further monitoring is required to understand extent, and the applicable criteria as there are no established groundwater criteria in Nunavut.
Surface Water Quality	Releases of TSS or other changes in water quality due to point-source discharges (i.e., stormwater and sewage effluents)	Effluents are monitored prior to discharge under the SNP; the receiving aquatic environment is monitored in accordance with the AEMP.	Elevated TSS concentrations detected downstream of Project infrastructure and water crossings during freshet; within FEIS predictions. Discharges of effluent at the Project met the applicable discharge criteria, with the exception of four (4) events involving water quality exceedances of discharge criteria outlined in the Type 'A' Water Licence.
	Releases of TSS or other changes in water quality due to non-point source releases (i.e., erosion and sedimentation)	Runoff from ground disturbance areas (construction areas, quarries) are monitored for TSS; site is inspected visually for evidence of erosion and sedimentation, with follow-up sampling if required.	TSS exceedances occurred at the Mine and along the Tote Road corridor. Erosion and sedimentation impacts were within FEIS predictions.
	Releases of TSS or other changes in water quality due to airborne emissions	Site is inspected visually for evidence of erosion and sedimentation, with follow-up sampling if required. Lake sedimentation monitored under the AEMP.	Site runoff did not exceed FEIS predictions

Path Forward

Baffinland will continue to implement the TREEP and other sedimentation and erosion mitigation measures in 2022, and will monitor effluents and receiving waters in accordance with Type 'A' Water Licence and AEMP.

Baffinland plans to continue the groundwater monitoring program in 2022, and plans to implement a further expansion to the program to gain a better understanding of natural groundwater chemistry at the Project site. Due to challenges associated with sampling methodologies for groundwater data collection in a permafrost environment and the challenges in interpreting this data, however, long-term trends will likely not be identified even with an expanded dataset. Despite these operational challenges, Baffinland is committed to continuing to work with

groundwater consultants that are knowledgeable in Arctic environments, to further assess the current program and implement additional recommendations in 2022.

Project Certificate Condition No. 20

Category	Groundwater/Surface Waters - Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the areas surrounding the Project.
Term or Condition	The Proponent shall monitor the effects of explosives residue and related by-products from Project-related blasting activities as well as develop and implement effective preventative and/or mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the Project and surrounding areas.
Relevant Baffinland Commitment	57, 65
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Aquatic Effects Monitoring Plan (Baffinland, 2022b) Canadian Water Quality Guidelines for the Protection of Aquatic Life - Nitrate Ion (CCME, 2012) Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (CCME, 2010) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2022f) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.5

METHODS

Surface water runoff downstream of Project mining areas and quarries is monitored as prescribed by the Type 'A' Water Licence, with water quality results reported to CIRNAC, the NWB and the QIA on a monthly and annual basis. Water samples are collected using the practices and procedures described in Baffinland's Sampling Program - Quality Assurance and Quality Control Plan (QA/QC Plan; Baffinland, 2022f), which is an approved plan under the Type 'A' Water Licence.

In addition, the Aquatic Effects Monitoring Plan (AEMP; Baffinland, 2022b), a follow-up monitoring program identified in Baffinland's FEIS and prescribed by the Baffinland's Type 'A' Water Licence, monitors the receiving aquatic environment downstream of Project activities at the Mine Site.

RESULTS

During 2021, surface water runoff downstream of active quarries and mining areas was monitored for the water quality parameters outlined by the Type 'A' Water Licence, including parameters related to explosives residue, such as ammonia and nitrate. Both quarries were inactive during the 2021 open water season. Un-ionized ammonia and

nitrate levels were below the CCME water quality guideline for all samples downstream of the quarries except for select samples at one of Milne Port Q1's monitoring sites (MP-Q1-02). However, the concentration of both ammonia and nitrate in the sampling site (MS-C-H) downstream of MP-Q1-02 was below CCME guidelines for all samples in 2021, and thus within FEIS predictions (CCME, 2010; 2012). All acute toxicity water samples collected in 2021 downstream of Project quarries and mining areas were demonstrated to be acutely non-lethal. A complete discussion of the 2021 water quality monitoring results collected under the Type 'A' Water Licence is provided in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

Monitoring under the AEMP in 2021 included the Core Receiving Environment Monitoring Program (CREMP), a key component of the AEMP used to detect Project-related changes in water quality, sediment quality, phytoplankton (chlorophyll a), benthic invertebrate community metrics, and arctic char (*Salvelinus alpinus*) populations in lakes and streams near the Mine Site. Evidence of Project-related change was observed in Camp Lake and Sheardown Lake systems as well as the Mary River. Within these systems, elevated levels of nitrate and/or ammonia were observed in 2021 when compared to baseline and/or reference conditions, however no adverse effects to phytoplankton, benthic invertebrates or arctic char were indicated. The 2021 AEMP reports, including a complete analysis and discussion of the 2021 CREMP results, are provided in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

TRENDS

Overall, 2021 monitoring results for surface water runoff and aquatic environments downstream of Project mining areas and quarries were generally consistent with monitoring results observed in prior years.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor surface water runoff and aquatic environments downstream of Project mining areas and quarries as outlined in the Type 'A' Water Licence and the Project's AEMP (Baffinland, 2022b).

Project Certificate Condition No. 21

Category	Groundwater/Surface Waters - Aquatic Effects Monitoring Plan and Dustfall Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To mitigate potential impacts to surface and ground waters.
Term or Condition	<p>The Proponent shall ensure that the scope of the Aquatic Effects Monitoring Plan (AEMP) includes, at a minimum:</p> <ul style="list-style-type: none"> a. Monitoring of non-point sources of discharge, selection of appropriate reference sites, measures to ensure the collection of adequate baseline data and the mechanisms proposed to monitor and treat runoff, and sample sediments b. Measures for dustfall monitoring designed as follows: <ul style="list-style-type: none"> i. To establish a pre-trucking baseline and collect data during Project operation for comparison ii. To facilitate comparison with existing guidelines and potentially with thresholds to be established using studies of arctic char egg survival and/or other studies recommended by the Terrestrial Environment Working Group (TEWG) iii. To assess the seasonal deposition (rates, quantities) and chemical composition of dust entering aquatic systems along representative distance transects at right angles to the Tote Road and radiating outward from Milne Port and the Mine Site.
Relevant Baffinland Commitment	2
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	<p>Aquatic Effects Monitoring Plan (Baffinland, 2022b)</p> <p>Final Environmental Impact Statement (FEIS; Baffinland, 2012)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix G.5

METHODS

The AEMP was initially submitted to the NWB on June 27, 2014, as required by the Type 'A' Water Licence, and was subsequently approved by the NWB. On March 31, 2022, Revision 2 of the AEMP was submitted to the NWB with the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

The AEMP has been structured to serve as an overarching 'umbrella' that conceptually provides an opportunity to integrate results of individual but related aquatic monitoring programs including water and sediment quality, dustfall monitoring and freshwater biota and fish health. Key component studies of the AEMP that were conducted in 2021,

included the Core Receiving Environment Monitoring Program (CREMP), Lake Sedimentation Monitoring Program and the Dustfall Monitoring Program.

The CREMP evaluates potential mine-related influences on water quality, sediment quality, and/or biota (including phytoplankton, benthic invertebrates and fish) within aquatic environments near the Mine Site. Under the CREMP, receiving aquatic environments near the Mine Site are monitored during several periods throughout the year and include the Camp Lake, Sheardown Lake and Mary Lake Systems, as well as Reference Lake 3 and several reference tributaries. The AEMP includes benchmarks and an action framework to evaluate monitoring data and determine next steps and/or corrective actions, if required.

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

Annual monitoring reports for both the CREMP and Lake Sedimentation Monitoring Program provide further discussion of the methods used and annual monitoring results, and are provided as appendices to the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

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

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

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

Results collected under the dustfall monitoring program are provided on an annual basis to NIRB and other relevant regulatory agencies and stakeholders in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022).

RESULTS

Reports discussing the 2021 results for the CREMP and Lake Sedimentation Monitoring Program are provided in Appendix G.6 and G.7 and as appendices to the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b). The 2021 results of the Dustfall Monitoring Program are presented in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022), which has been released to the Working Group for review and comment.

The current revision of the Project's AEMP (Rev. 2; Baffinland, 2022b) meets the requirements and intended scope outlined in PC Condition No. 21 and has been approved by the NWB.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with appropriate stakeholders and regulatory agencies to identify required revisions to the AEMP and associated environmental monitoring programs. Baffinland submitted Revision 2 of the AEMP with the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b) that captures current operational activities and monitoring requirements.

Project Certificate Condition No. 22

Category	Groundwater/Surface Waters - Sediment and Erosion Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To develop appropriate sediment and erosion controls to prevent impacts to surface waters.
Term or Condition	The Proponent shall develop a detailed Sediment and Erosion Management Plan to prevent and/or mitigate sediment loading into surface water within the Project area.
Relevant Baffinland Commitment	57
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

A comprehensive sediment and erosion management plan is incorporated into Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2021e). An earlier revision of the SWAEMP was submitted to and approved by the NWB prior to the commencement of Early Revenue Phase construction.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 23

Category	Groundwater / Surface Waters - Groundwater Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to groundwater quality.
Term or Condition	The Proponent shall develop and implement a Groundwater Monitoring and Management Plan to monitor, prevent and/or mitigate the potential effects of the Project on groundwater within the Project area.
Relevant Baffinland Commitment	57
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2021e) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b) 2021 Groundwater Monitoring Report (Tetra Tech, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

A groundwater monitoring program, involving the installation of shallow groundwater wells downstream of Project infrastructure, is discussed in Baffinland's SWAEMP (Baffinland, 2021e). A standalone plan for Groundwater monitoring is not required due to inclusion in the above noted plan.

Baffinland continued to implement the groundwater monitoring program, as outlined in the 2021 Groundwater Monitoring Report in Appendix G.8. In 2021, Baffinland retained groundwater consultants that are specialized in Arctic environments to further assess the current program and provide recommendations. The consultants completed a desktop review of available groundwater monitoring data, as well as available data regarding lithology and hydrogeology in the area of the Mary River Project, to identify any trends in groundwater quality, groundwater flow, and any discernable information about the condition of subsurface and stratigraphy of the investigated area, and reviewed methodologies used in the execution of the previous monitoring programs including the use of drive-point piezometers and low-flow sampling techniques. Following this review, the consultants made recommendations on the implementation of the groundwater monitoring program for 2021 and subsequently executed the recommendations during the 2021 field season and completed the groundwater monitoring program. The 2021 groundwater monitoring program was expanded to include the installation of additional temporary shallow monitoring wells around the Mine Site Hazardous Waste Berms to establish background conditions and assess down-gradient groundwater quality.

In September 2021, the groundwater monitoring program was completed using the same methodology as in previous years and involved the installation of shallow groundwater wells up-gradient and down-gradient of the

Mine Site Non-Hazardous Waste Landfill Facility (Landfill Facility) and Mine Site Hazardous Waste Berms using drive-point piezometers. Groundwater wells were established to the depth of permafrost (approx. 1.1 to 1.8 meters) and water samples were collected near the depth of the active layer. The methodology for the 2021 groundwater monitoring program is detailed in the 2021 QIA and NWB Annual Report for Operations (Baffinland, 2022b). The 2021 Groundwater Monitoring Report, which includes the results of the desktop review, is provided in Appendix G.8.

RESULTS

During the 2021 program, groundwater was sampled at seven (7) monitoring wells at the Mine Site Hazardous Waste Berm area; three of which were up-gradient of the berms. Three additional monitoring wells were installed, however did not produce any water. Groundwater was sampled at five (5) monitoring wells at the Landfill Facility; two of which were up-gradient of the Facility. Three additional monitoring wells were installed, however did not produce any water.

Contoured groundwater elevations at the Landfill Facility for 2021 continued to suggest that the shallow groundwater flow direction across the Landfill Facility is towards the southwest, under an estimated horizontal hydraulic conductivity of 0.05 m/m, which is consistent with the local surface topography.

Contoured groundwater elevations at the Hazardous Waste Berm area for 2021 continued to suggest that the shallow groundwater flow direction across the Hazardous Waste Berm area was towards the west and southwest, towards Camp Lake located approximately 300 m to the west and southwest of the Hazardous Waste Berm area, under an estimated horizontal hydraulic gradient of 0.005 m/m, which is consistent with the local surface topography.

At the Landfill Facility; at monitoring locations MS-LF-GW1, chloride concentrations were greater than the Federal Interim Groundwater Quality (FIGQ) Guideline and were elevated compared to concentrations observed at the reference locations and further down-gradient piezometers. At monitoring locations MS-LF-GW1, MS-LF-GW2, and MS-LF-GW3, sulphate concentrations were greater than the FIGQ Guideline and were elevated compared to concentrations observed at the reference locations and further down-gradient piezometers. Dissolved metal parameters including copper, boron, cadmium, lead, nickel, and uranium exceeded their respective FIGQ Guideline at one (1) or more down-gradient monitoring locations MS-LF-GW1, MS-LF-GW2 and MS-LF-GW3. This also suggests the presence of groundwater impacts due to landfill operations; however, these results also suggest the potential impacts are limited to the immediate vicinity of the Landfill Facility.

At the Mine Site Hazardous Waste Berm area; all dissolved copper and nickel were greater than their respective FIGQ Guideline at one or more drive-point piezometers during the 2021 Groundwater Monitoring Program, including at one or more of the reference locations. All Polycyclic Aromatic Hydrocarbon (PAH) parameters were reported below their respective FIGQ Guidelines with the exception for naphthalene which was reported above the FIGQ Guideline at MS-HWB-GW7.

TRENDS

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

A statistical analysis was conducted on results from the Landfill Facility wells to evaluate the significance of changes in groundwater quality over time. Since sampling was conducted for the first time at the Mine Site Hazardous Waste

Berm area in 2021, statistical analysis could not be completed for those sites. Parameters selected for trend analysis included chloride, sulphate, and dissolved metals parameters: boron, cadmium, iron, lead, manganese, nickel, and uranium. These parameters were greater than the Federal Interim Groundwater Quality Guidelines at one or more of the piezometers. The trend analysis was conducted using the non-parametric Mann Kendall method for results of all previously installed piezometers with sufficient data points. The piezometers installed in 2020 and 2021 had only one to two data points and therefore were not included in the trend analysis. The Mann Kendall analysis was conducted with a confidence level of 95%. Results of the trend analysis indicate that sulphate, dissolved iron, dissolved nickel and dissolved uranium are demonstrating an increasing trend and chloride is demonstrating a decreasing trend. These results should be interpreted with caution given the methodological challenges with implementing a groundwater monitoring program in a permafrost rich environment, as outlined in the Recommendations section below.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to retain consultants to execute the groundwater monitoring program in 2022, which will be implemented based on the assessment and recommendations from the 2021 groundwater monitoring report. In 2022, Baffinland plans to evaluate the implementation of further expansion of the program to gain a better understanding of natural groundwater chemistry and potential project related effects at the Project site.

Implementing a groundwater program in a permafrost-rich environment presents significant methodological challenges including quantifying groundwater direction, flow and interpretation of groundwater quality. Additionally, groundwater flow dynamics are driven primarily by the permafrost table elevations rather than soil stratigraphy, resulting in significant challenges to determine flow direction and gradient. Given the challenges associated with sampling methodologies for groundwater data collection in a permafrost environment and the challenges in interpreting this data, long-term trends may not be identified even with an expanded dataset. Despite these operational challenges, Baffinland is committed to continuing to retain groundwater consultants specialized in Arctic environments to assess and provide recommendations for further expansion of the groundwater monitoring program in 2022 to gain a better understanding of natural groundwater chemistry and potential project related effects at the Project site.

Project Certificate Condition No. 24

Category	Groundwater/Surface Waters - Effluent Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to groundwater and surface waters from effluent discharge.
Term or Condition	The Proponent shall monitor as required the relevant parameters of the effluent generated from Project activities and facilities and shall carry out treatment if necessary to ensure that discharge conditions are met at all times.
Relevant Baffinland Commitment	6
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Methods for monitoring and reporting on Project Certification Condition No. 24 are discussed in response to Project Certificate Condition No. 17.

RESULTS

Results are discussed in the Project Certificate Condition No. 17.

TRENDS

Trends are discussed in the Project Certificate Condition No. 17.

RECOMMENDATIONS / LESSONS LEARNED

Recommendations/ lessons learned are discussed in the Project Certificate Condition No. 17.

Project Certificate Condition No. 25

Category	Landforms - Additional Geotechnical Investigations
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to sensitive landforms.
Term or Condition	The Proponent shall undertake additional geotechnical investigations to identify sensitive landforms, modify engineering design for Project infrastructure, develop and implement preventative and/or mitigation and monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Water Board, Indigenous and Northern Affairs Canada, Qikiqtani Inuit Association
Reference	2021 Annual Geotechnical Inspections (Wood, 2021) 2019 Inspection of the Milne Inlet Tote Road and Associated Borrow Sources (See Appendix G.15 in Baffinland, 2020f) Borrow Source Management Plan - Kilometre 97 (Baffinland, 2014b) 2021 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2022d) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix G.19

METHODS

In 2021, Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), completed two (2) geotechnical inspections of the following Project facilities and infrastructure:

- Bulk fuel and waste storage facilities;
- Water management ponds and associated surface water drainage infrastructure;
- Polishing and Waste Stabilization Ponds (PWSPs);
- Select water crossings and areas along the Tote Road;
- Non-hazardous Landfill Facility;
- Landfarm Facility;
- Deposit No. 1 Pit walls;
- Existing and proposed rock quarries; and
- Critical watercourse crossings including bridges (4) and selected culverts (19) along the Tote Road.

The inspections took place from June 17 to 24, 2021 and from September 14 to 17, 2021. The inspections were carried out in accordance with the guidelines set out in the Canadian Dam Association's Dam Safety Guidelines 2007 (CDA, 2013).

The inspections primarily focused on the following aspects:

- The structures were inspected for conformance with the design basis as presented in "as constructed" and "as-built" drawings (provided in the first and subsequent reports);
- The structures were specifically inspected for settlement, cracking, and seepage through the berms;
- The areas around the structures were examined for evidence of seepage;
- Quarry and pit walls were reviewed for relative stability.
- New structures under construction were reviewed for conformity with design drawings; and
- The berms of the containment structures were examined with respect to possible tears in liner membranes.

Geotechnical investigations continued to be conducted at Project sites and proposed infrastructure contained within the Phase 2 Proposal, to support engineering studies for future Project infrastructure. Geotechnical investigations completed by Wood can be found in Appendix G.19.

RESULTS

Results from the geotechnical inspections at the Mine Site indicate there has been little to no erosion from wind or rain and the dykes constructed of the sand/gravel soil for fuel and waste storage facilities have remained structurally stable with no sign of seepage.

Minor repairs and actions were recommended at Hazardous Waste Berms to remove timber/lumber and/or regrading damaged slopes and crest, and to limit foot and truck traffic on slopes and crest of the berms, at MS-06 to remove granular soil clogging a culvert, at MS-08 to remove boulders from the wet ditch, at the generator fuel berm to redirect melting snow in an adjacent area prone to flooding, and at the effluent discharge area to correct minor surface erosion. Actions were also recommended to address ponding water at the QMR2 quarry, and a diversion berm at the KM 106 ore facility (formerly D1Q2 quarry area). These are scheduled to be addressed in 2022.

At Milne Port, minor repairs and actions were recommended at the Hazardous Waste Storage facility, and the Ore Stockpile Pond Actions were also recommended to address minor sloughing and other minor repairs at four (4) surface water collection ditch locations.

Along the Tote Road, the abutments at the four (4) inspected bridges were observed to be in good condition and no scour in the riverbed around the abutments was observed. Water crossings by culverts at the inspected locations were observed to be generally in good condition. Minor repairs and actions to address minor erosion, culvert extensions and other minor observations were recommended at several locations.

As identified in previous years, Project activities have led to localized permafrost degradation along the Tote Road. Baffinland has developed a multi-year Execution Plan to address locations identified as high-priority. Implementation of the Execution Plan was initiated in 2019 and continued in 2021. Works outlined in the Execution Plan are expected to continue in 2022.

Details of the geotechnical investigations (e.g. drilling) completed in 2021 are discussed in the 2021 QIA & NWB Annual Report for Exploration and Geotechnical Drilling Activities (Baffinland, 2022d). The 2021 Geotechnical inspections reports, along with Baffinland's plans to address any identified concerns, are included in Appendix G.19.

TRENDS

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

Tetra Tech assessed the Tote Road and associated borrow sources in 2009, 2014 and 2019. The observations have established that there are clear links between some borrow pit locations adjacent to the road and thaw settlement observed on the road embankment.

RECOMMENDATIONS / LESSONS LEARNED

Results from geotechnical investigations conducted in 2021 will be used to support the design of future Project infrastructure. Recommendations outlined in the 2021 geotechnical inspections reports will be completed in 2022 to address outstanding issues at Milne Port and Mary River, and along the Tote Road.

Baffinland has developed a multi-year Execution Plan to address locations identified as high-priority in the Tetra Tech assessment of the Tote Road and associated borrow sources completed in 2019. Implementation of the multi-year Execution Plan was initiated in 2019 with significant efforts executed in 2020 and additional works in 2021. An action plan was submitted to the NWB and QIA to address these priority locations, and was included in the 2019 NIRB Annual Report.

Baffinland plans to continue implementing the borrow source's progressive reclamation and rehabilitation plan outlined in Appendix B of the borrow source's approved management plan titled Borrow Source Management Plan - Kilometre 97 (Baffinland, 2014b).

Project Certificate Condition No. 26

Category	Landforms and Soils - Erosion Management Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To develop appropriate measures for preventing destabilization and erosion.
Term or Condition	The Proponent shall develop and implement a comprehensive erosion management plan to prevent or minimize the effects of destabilization and erosion that may occur due to the Project's construction and operation.
Relevant Baffinland Commitment	57
Reporting Requirement	Plan to be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Environmental Protection Plan (Baffinland, 2021d) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

A comprehensive erosion management plan is included in the Project's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP; Baffinland, 2021e). An earlier revision of the SWAEMP was approved by the NWB prior to the commencement of Early Revenue Phase construction.

Activity specific sediment and erosion control measures and procedures used at the Project are also discussed within the Project's Roads Management Plan (Section 3.4.5) and Environmental Protection Plan (Baffinland, 2021d):

- Section 4.03 Land Disturbance;
- Section 4.09 Sediment and Erosion Control;
- Section 4.17 Road Construction and Borrow Development;
- Section 4.18 Tote Road Watercourse Crossing Installation;
- Section 4.25 Quarry and Borrow Pit Operation; and
- Section 2.27 Excavations and Foundations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 27

Category	Landforms, Geology and Geomorphology - Natural Aesthetics
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to natural aesthetics.
Term or Condition	The Proponent shall include within its public consultation report information related to the sentiments expressed by affected communities about the impacts that changes to the topography and landscape have had on the aesthetic value of the Project area.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active – Milne
Status of Compliance	In Compliance
Stakeholder Review	The Communities of: Arctic Bay, Clyde River, Sanirajak, Igloodik and Pond Inlet
Reference	2021 Community Meeting Notes
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B

METHODS

Due to the travel/health restriction measures in Nunavut as established by the Government of Nunavut Public Health Department related to the COVID-19 Pandemic, Baffinland's typical and preferred approach for holding community group meetings at frequencies or in-person formats as done in previous years continued to be limited for most of 2021. Alternative methods were explored and implemented as described in Section 2.3. Regardless of format, meetings provide an important opportunity for Baffinland to share information with the Communities related to current operations, the results of ongoing environmental monitoring programs and future planning to support the development of the Project. These meetings provide an opportunity for community representatives to discuss ongoing concerns, interests in participating in the environmental management related to the Project, which can include any changes they may have seen in the landscape as a result of the Project. Public and Community Group meetings held in 2021 are presented in Tables 2.1 and 2.2. respectively, with additional details provided in Appendix B.

RESULTS

Public consultation continues to not reveal any significant concerns from affected communities about specific impacts that changes to the topography and landscape have had on the aesthetic value of the Project area. Most comments about changes to the land and sea were focused on ensuring the effects of the Project were being monitored and mitigated, and concerns with potential Project related effects on land use (hunting and harvesting). Concerns related to dust (specifically on snow), which may be visible on the landscape depending on distance from the Project, continue to be voiced as part of current operations particularly around Milne Port and along the Tote Road and with respect to proposed Phase 2 operations. This topic has been brought forward during individual and public meetings, including during radio shows. Aesthetic concerns related to the use of dust-laden snow to make tea by land users traveling near Project sites (e.g., see February 2020 TEWG Meeting Records; Appendix C.2 in Baffinland,

2021f). Baffinland takes seriously the concerns provided by community members on generation of dust by Baffinland activities. Accordingly, Baffinland undertakes annual dust monitoring throughout Project areas, and has modified its operations and incorporated changes through the years to minimize dust generation (for additional details, refer to PC Condition No. 10). In 2021, an independently-led Dust Audit was initiated to further investigate dust concerns related to Baffinland's operations. The third party auditors work with a Dust Audit committee composed of representatives from each of the 5 North Baffin communities including Pond Inlet, Arctic Bay, Sanirajak, Igloolik and Clyde River. Committee members were nominated by Hamlet and Hunters and Trappers Organizations to participate in the Audit. The third party auditor has already completed one field investigation with the support of the Dust Audit Committee, with another planned for the Spring or Summer. Following that a final Recommendation report including recommendations for actions to take to better manage dust at the Mary River Project will be released for public review.

Other discussions on aesthetic values as they relate to mine closure and the final state of the mine following reclamation were initiated by Baffinland during the May 7, 2019 Community Risk Workshop at the Mary River Mine Site. While limited direct feedback on aesthetic values was gained during the workshop discussion, Baffinland will continue to engage with Inuit to identify closure objectives and criteria that respect the aesthetic values and end land use, while incorporating and respecting Inuit Qaujimajatuqangit.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 28

Category	Landforms, Geology and Geomorphology - Permafrost
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that permafrost integrity is maintained.
Term or Condition	The Proponent shall monitor the effects of the Project on the permafrost along the railway and all other Project affected areas and must implement effective preventative measures to ensure that the integrity of the permafrost is maintained.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Environment Climate Change Canada, Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	2021 Annual Geotechnical Inspections (Wood, 2021) 2019 Inspection of the Milne Inlet Tote Road and Associated Borrow Sources ((See Appendix G.15 in Baffinland, 2020f)) Environmental Protection Plan (Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix G.19

METHODS

Bi-annual geotechnical inspections were completed by Wood Environment & Infrastructure Solutions in 2021, as required by the NWB Type 'A' Water Licence No. 2AM-MRY1325, for the following on-site engineered Project facilities and infrastructure:

- Bulk fuel and waste storage facilities;
- Water management ponds and associated surface water drainage infrastructure;
- Polishing and Waste Stabilization Ponds (PWSPs);
- Select water crossings and areas along the Tote Road;
- Non-hazardous Landfill Facility;
- Landfarm Facility;
- Deposit No. 1 Pit walls;
- Existing and proposed rock quarries; and
- Critical watercourse crossings including bridges and selected culverts (12) along the Tote Road.

Inspections in 2021 took place between June 17 and 24, 2021, and from September 14 to 17, 2021. The inspection reports are provided to regulators for review and comment. Inspections are carried out in accordance with the Canadian Dam Association (CDA) *Dam Safety Guidelines* (CDA, 2013).

The inspections primarily focused on the following aspects:

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

Geotechnical investigations continued to be conducted at Project sites and proposed infrastructure contained within the Phase 2 Proposal, to support engineering studies for future Project infrastructure. Additionally, in 2019 Baffinland retained Tetra Tech to complete an evaluation of the stability and condition of the Milne Inlet Tote Road and the historic borrow sources within the Tote Road corridor (See Appendix G.15 in Baffinland, 2020f). The investigation completed by Tetra Tech was included in the 2019 Annual Report to the NIRB. Geotechnical investigations completed by Wood can be found in Appendix G.19.

RESULTS

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

Previous bi-annual geotechnical inspections indicated that the Mary River PWSPs 1, 2 and 3 were noted to be experiencing minor overall settlements of the structures with respect to the surrounding area. The minor settlement was restricted to the berms. The 2019, 2020, and 2021 bi-annual geotechnical inspections confirmed that these berms have stable foundations, which is supported by the fact that there are no indications of differential settlements, sinkholes, or sloughing at the perimeter berms.

TRENDS

Baffinland continues to monitor, research strategies and remediate identified locations as required. Tetra Tech assessed the Tote Road and associated borrow sources in 2009, 2014 and most recently in 2019. The observations have established that there are clear links between some borrow pit locations adjacent to the road and thaw settlement observed on the road embankment.

RECOMMENDATIONS / LESSONS LEARNED

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

To improve historical permafrost degradation issues along the Tote Road, Baffinland will continue to develop and prioritize preventative and mitigation measures to minimize the impacts of the Project's activities and infrastructure on landforms along the Tote Road. To address recommendations from the Tetra Tech inspection, Baffinland has developed an Execution Plan for locations identified as high-priority. Implementation of the multi-year Execution Plan was initiated in 2019 with significant efforts executed in 2020, and additional works in 2021.

Project Certificate Condition No. 29

Category	Landforms, Geology and Geomorphology - Design Plans
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To confirm constructed components meet design as assessed.
Term or Condition	The Proponent shall provide to the respective regulatory authorities, for review and acceptance, for-construction engineering design and drawings, specifications and engineering analysis to support design in advance for constructing those facilities. Once project facilities are constructed, the Proponent shall provide copies of the as-built drawings and design to the appropriate regulatory authorities.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Not applicable
Ref. Document Link	ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MRY1325%20BIMC/3%20TECH/6%20MODIFICATIONS%20(G)/

METHODS

Not applicable.

RESULTS

As required by the Project's Type 'A' Water Licence and Commercial Lease with QIA, one engineering submission was provided to regulatory agencies and stakeholders in 2021, comprising a Design Brief and Issued-for-Construction (IFC) Drawings, as summarized in Table 4.15.

Table 4.15: 2021 Submissions to Regulatory Agencies and Stakeholders

Date of Submission	Regulatory Agencies and Stakeholders	Content
June 28, 2021	NWB, CIRNAC, QIA	KM 105 Sedimentation Pond - Design Brief and Issued for Construction Drawings

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 30

Category	Landforms, Geology and Geomorphology - Quarries
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To provide oversight on quarry design and management.
Term or Condition	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit.
Relevant Baffinland Commitment	65
Reporting Requirement	Plans to be provided to the NIRB for review and comment at least 30 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

To date, site-specific management plans for quarries and borrow sources have been developed and provided to the relevant agencies prior to development, for active quarry sources. No new management plans were submitted to the NIRB for review and comment in 2021.

RESULTS

During 2021, Baffinland operated several quarries and borrow sources to support Project road maintenance and infrastructure construction. Quarries and borrow sources in operation during 2021 included the Q1 Quarry at Milne Port, the QMR2 Quarry at the Mine Site and the KM 97 Borrow Source near the Mine Site. It should be noted that while specified substances were crushed and removed from the quarries Q1 and QMR2 in 2021, there were no blasting activities to support this extraction, as blasting had been completed in 2019. Newly proposed quarries have not been developed, and are pending submission and/or review of Quarry Management Plans.

TRENDS

None.

RECOMMENDATIONS / LESSONS LEARNED

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

4.6.6 Vegetation (PC Conditions 31 through 40)

Ten (10) PC conditions relate to the potential impacts of the Project on vegetation and several of the conditions require the development of vegetation monitoring plans within the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016).

Inuit & Stakeholder Feedback

Key stakeholders who have expressed concern regarding vegetation include local land users, the QIA, ECCC and the Government of Nunavut (GN). Comments have focused on the need to minimize the Project's overall footprint, concerns related to the potential introduction of invasive plants, and the potential for ore dust deposited on vegetation and soil to be taken up by plants, which could lead to potential uptake effects on wildlife such as caribou through consumption of forage near the Project area. Stakeholders have also expressed an interest in revegetation being incorporated into reclamation plans. Responses to these issues are reflected in PC Conditions No. 31 through 40.

Monitoring Activities

Baffinland's vegetation monitoring programs include the following components:

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

The objectives of the vegetation and soil base metals monitoring program are to monitor metal concentrations in vegetation and soil, particularly caribou forage (i.e., lichen) near Project infrastructure and verify that metal concentrations are below or within the acceptable range for established soil quality guidelines and relevant vegetation indicator values. Given that dustfall deposition is the primary source of anthropogenic metals at the Project, the vegetation and soil base metals monitoring program has been designed to align and facilitate comparisons with the dustfall monitoring program (Section 7 Dustfall) to assess metals uptake in vegetation and soil related to Project activities.

The vegetation and soil base metals program was completed at a reduced scale in 2021 to address follow-ups from the 2020 program. In 2021, samples were collected from 12 sites, most of which were near Milne Port (9/12) and within 100m of the Project area (11/12). Soil-metal concentrations at the Project predominantly indicated no net change (i.e., no significant increases) from the baseline values. Values were below or within an acceptable range for soil-metal concentrations. Lichen-metal concentrations had some discrete increases at the Project, but all sample locations were below or within an acceptable range for lichen-metal concentrations. As such, soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health. Baffinland will continue monitoring these conditions and further document CoPCs. Should these values increase and result in exceedances of threshold values, it may be necessary to re-evaluate and refine potential triggers and corrective actions. These results indicate that current effects levels are within predictions outlined in the Final Environmental Impact Statement (FEIS), which stated that some soil metal levels would exceed criteria guidelines by the end of the Project life (arsenic, manganese, cobalt, chromium, copper, nickel, and selenium). It was also predicted that that sensitive vegetation classes might be affected by metal uptake. However, vegetation changes were predicted to be indistinguishable from natural variation, limited to within and near the PDA, and not significant at the RSA scale.

The vegetation abundance monitoring program was not carried out in the 2021 season, consistent with its 3 to 5-year schedule. The last sampling year was 2019. The 2019 program included 15 transects, 75 sites, and 179 plots. Fifteen control (Reference) sites were established within the Regional Study Area (RSA), approximately 20 Km from the Project footprint. Of these 15 Reference sites, nine were newly added in 2019. The evaluation of vegetation abundance monitoring methods demonstrated that the method used to measure vegetation is highly objective and repeatable, confirming that it is appropriate for addressing the vegetation abundance monitoring program's objectives. Direct loss of plant habitat remains limited to developed areas of the Project Development Area (PDA). Outside of this, there were no distinguishable Project-related effects on vegetation ground cover, canopy cover, or plant group composition. These results are consistent with the FEIS prediction of no significant impact.

Given that year-over-year trends have shown that invasive plants do not appear to be a significant potential effect of concern, no targeted exotic invasive plant monitoring was conducted in 2021. During opportunistic incidental monitoring opportunities, no exotic invasive plants were identified,

The revegetation research program was initiated in 2019, establishing test plots to monitor for post-disturbance natural revegetation. Follow-up monitoring continued in 2021, which included an exception of survey location and reclamation trial sites. Study plots were established at four (4) locations selected to represent different revegetation timeframes, from 1-Year Post-Disturbance up to >60 Years Post-Disturbance. A key observation of the revegetation survey is that natural/unassisted revegetation does occur at the Project. The results of the study conducted to date will be shared with Stakeholders through a Mine Closure Working Group, which could convene as early as 2022. Updates on the outcome of the ongoing reclamation research study and activities of the Mine Closure Working Group will be provided to the NIRB as they become available.

Table 4.16 provides an evaluation of the Project's impacts on vegetation.

Table 4.16: Vegetation Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Vegetation Health	Ore dust emissions result in an increase in concentrations of contaminants of potential concern in soils and vegetation	Vegetation and soil base metals sampling was completed in 2021.	Soil-metal and lichen-metal concentrations at the Project generally indicated no significant increases compared with Baseline values. Some discrete increases in CoPC metal concentrations have been identified, but all values were either below or within an acceptable range. Soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health. Results within FEIS predictions.
Vegetation Abundance	Dustfall results in changes in species composition and vegetation abundance	Vegetation abundance monitoring was last completed in 2019.	No Project-related effects on vegetation ground cover, canopy cover or plant group composition. Results within FEIS predictions
Invasive Species	Invasive species introduction to North Baffin Island	Exotic Invasive Vegetation Targeted Monitoring was completed in 2020. Incidental monitoring continued in 2021	No new exotic invasive vegetation was identified during incidental sampling in 2021. Results within FEIS predictions.

Path Forward

Soil-metal concentrations at the Project predominantly indicated no net change (i.e., no significant increases) from the baseline values. Values were below or within an acceptable range for soil-metal concentrations. Lichen-metal concentrations had some discrete increases at the Project, but all sample locations were below or within an acceptable range for lichen-metal concentrations. As such, soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health. Baffinland will continue monitoring these conditions and further document CoPCs. Should these values increase and result in exceedances of threshold values, it may be necessary to re-evaluate and refine potential triggers and corrective actions.

Project Certificate Condition No. 31

Category	Vegetation - Construction and Operations
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To minimize impacts to vegetation.
Term or Condition	The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Environmental Protection Plan (Baffinland, 2021d) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016) 2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

- Using pre-cast concrete where feasible, including the use of integrated module foundations;
- Using pre-assembled material packages, such as building wall and roof panels, ground conveyors, elevated conveyors, conveyor belts, fuel tanks etc.;
- Conducting Environmental Protection Plan training, which outlines the importance of minimizing disturbed land at the Project and the process that must be followed before construction on undisturbed ground;
- Ensuring appropriate approvals are met with applicable stakeholders and land lease agreement; and
- Documenting and tracking land disturbance approvals associated with the Project.

RESULTS

As of the end of 2021, the total Project footprint was 587 ha, which is less than what was assessed in the FEIS (7,618 ha). Any unauthorized land disturbance or deviation from the PDA is reported as an incident and investigated. Overburden suitable for re-use is stockpiled for the area's remediation, wherever possible. No unauthorized land disturbance occurred in 2021, and all disturbed land is reported in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022).

TRENDS

As is to be expected, the Project footprint has increased modestly during operations to facilitate maintenance activities and support production increases (e.g. expanding equipment laydowns). Initial direct habitat loss occurred primarily due to surface disturbance during construction activities, including compaction, burial, and removal. During the operations phase, vegetation loss occurs mainly as ore extraction expands within Deposit No. 1, laydowns are constructed for material storage and infrastructure development, and quarries expand to support ongoing maintenance. The Project footprint impacts on vegetation have not exceeded FEIS predictions. Terrestrial vegetation studies have not detected any significant vegetation abundance trends and diversity within the RSA to date associated with Project's footprint.

RECOMMENDATIONS / LESSONS LEARNED

Long-term vegetation surveys will continue to determine if vegetation is being impacted outside of the PDA. The Project footprint will continue to be minimized wherever possible to limit land disturbance and associated impacts.

Project Certificate Condition No. 32

Category	Vegetation - Construction and Operations
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent the introduction of invasive species.
Term or Condition	The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board
Reference	2019 Terrestrial Environment Annual Monitoring Report (EDI, 2020) 2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Service agreements and contracts sent to suppliers were updated at the beginning of 2018 to include a clause “*All equipment delivered to site must be free and clear of soils that may contain seeds of invasive species.*” Baffinland staff also conduct visual inspections of equipment and supplies during offloading to verify compliance.

RESULTS

No exotic invasive plant species have been identified as being introduced via equipment or supplies brought to the Project sites. In 2019, an exotic species (garden tomato plant; *Solanum lycopersicum*) was observed growing at the Mine Site below the sewage/effluent discharge pipe during the 2019 exotic invasive species survey, presumably introduced via a food pathway and not related to equipment. Targeted monitoring was conducted in 2020 to verify the presence of garden tomato plants in this location. No tomato plants were found during two surveys during the growing season, and the population was determined to have been eradicated. No other exotic invasive species plant was identified during incidental monitoring in 2021. Refer to PC Condition No. 37 for additional information.

TRENDS

The potential for introducing exotic invasive vegetation appears to be well managed through current practices for reducing risk.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland staff, contractors and suppliers will continue to clean, inspect, and monitor all equipment and supplies before loading at source and during offloading at Milne Port, as applicable. If multiple non-compliance events were

to occur, Baffinland will consider using a third-party auditor to monitor compliance for better enforcement of contractual policies.

Project Certificate Condition No. 33

Category	Vegetation – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To facilitate monitoring.
Term or Condition	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP).
Relevant Baffinland Commitments	57
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Updates to the TEMMP are developed on an as-needed basis, although adjustments to the monitoring program are not always formally updated yearly in the management plan itself. The updates are based on a statistical analysis of data and adjustments necessary to improve robustness of survey design and methods and as a result of discussion with the TEWG. The TEWG is engaged regularly to discuss annual monitoring programs for the terrestrial environment. Feedback received from TEWG members is incorporated into annual monitoring reports and updates to the TEMMP where needed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 34

Category	Vegetation – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	Monitor metals concentrations in both soils and vegetation, particularly caribou forage (i.e., lichen) at varying distances from the PDA to compare metal concentrations in soil and vegetation between near (impacted) and far (control) sites. Determine if metal concentrations in soil and vegetation exceed CCME and relevant available threshold levels provided in the literature.
Term or Condition	The Proponent shall conduct soil sampling to determine metal levels of soils in areas with berry-producing plants near any of the project development areas, prior to commencing operations.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Mary River Project Final Environmental Impact Statement: Volume 6 — Terrestrial Environment (Baffinland, 2012) Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

This Project condition is addressed through the implementation of a long-term vegetation and soil base metals monitoring program. Given that dustfall deposition is the primary source of anthropogenic metals at the Project, the vegetation and soil base metals monitoring program was designed to align and facilitate comparisons with the dustfall monitoring program to assess metals uptake in vegetation soils related to Project activities.

Procedures for the vegetation and soils base metals monitoring program have evolved over time. Initially in 2012 and 2013, vegetation sampling focused on three focal groups: lichen (*Flavocetraria cucullata*, *Flavocetraria nivalis*, *Cladina arbuscula* and *Cladina rangiferina*), willow (*Salix spp.*), and blueberry (*Vaccinium uliginosum*). In 2014, sampling design and intensity were increased to improve data capture and analysis. Lichen— recognized as sensitive indicators of environmental conditions and accumulators of atmospheric pollutants (Naeth and Wilkinson 2008, Aslan et al. 2011) — was selected as the key indicator and focal group for metal uptake. Blueberry and willow were removed as assessment targets due to their limited abundance in the area.

The study design examines the spatio-temporal trends in soil-metals and lichen-metals by comparing metal concentrations ‘Before’ the development period (i.e., baseline sampling) and ‘After’ the development period (i.e.,

post-baseline sampling). Soil and vegetation sampling is conducted in three-to-five-year intervals, typically during the summer (late July to early August). Data has been collected in 2012, 2013, 2014, 2016, 2019, 2020 and 2021.

The study area was divided into three Project areas (Milne Port, Tote Road, Mine Site), and sampling was conducted at three distances from the PDA (Near: 0–100 m, Far: 101–1,000 m, and Reference: >1,000 m). Sampling distances were informed based on the dustfall monitoring program results; vegetation and soil sample sites were paired in proximity to permanent dustfall locations.

Soil and vegetation samples were analyzed for a total of 36 elements. Reporting and interpretation of data trends focused on six (6) Contaminants of Potential Concerns (CoPCs): arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), selenium (Se), and zinc (Zn). Base metal concentration thresholds and indicator values were informed by soil quality standards in Canada and values drawn from peer-reviewed literature relevant to the Canadian Arctic. All soil-metals and lichen-metals sample data were vetted and compared with CCME soil quality guidelines and lichen indicator values. Any aberrant values or potential exceedances (i.e., above CCME threshold or lichen indicator values) were flagged and communicated to Baffinland personnel. Data trends and statistical relationships were then examined according to the project area and sampling distances (listed above) to identify tendencies that could warrant further investigation.

RESULTS

Comprehensive summaries of the 2021 Monitoring Program are presented in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022), which has been released to the Working Group for review and comment. The soil-metal concentrations at the Project predominantly indicated no net change (i.e., significant increases) from the Baseline values. Values were below or within an acceptable range for soil-metal concentrations. Lichen-metal concentrations had some discrete increases at the Project, but all sample locations were below or within an acceptable range for lichen-metal concentrations. As such, soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health and safety.

Dustfall deposition is presumed to be the primary source of increased metals in soil and vegetation at the Project. A key objective of the study, which is driven by feedback provided by the TEWG, was to align and (where possible) correlate data from the dustfall monitoring program. This is intended to bridge interpretations of the effects of dustfall on soil-metal and lichen-metal concentrations and align any corrective actions. So far, no cohesive trends have been identified. Further analysis following data collection in future years will help draw meaningful conclusions and recommendations. These outcomes will be presented (as necessary) to examine this information's current and potential value to inform the vegetation and soil base metals monitoring program.

TRENDS

The soil-metal concentrations at the Project predominantly indicated no net change (i.e., significant increases) from the Baseline values. Values were below or within an acceptable range for soil-metal concentrations. Lichen-metal concentrations had some discrete increases at the Project, but all sample locations were below or within an acceptable range for lichen-metal concentrations. As such, soil-metal and lichen-metal concentrations presently represent a low risk to environmental and human health and safety.

RECOMMENDATIONS / LESSONS LEARNED

Presently, soil-metal and lichen-metal concentrations represent a low risk to environmental and human health and safety. Future monitoring and subsequent analysis would assist in enhancing understanding of the relationship

between dustfall and the vegetation and soil base metals monitoring program, but the results of the program to-date do not suggest immediate additional investigations are required.

Project Certificate Condition No. 35

Category	Vegetation – Monitoring
Responsible Parties	The Proponent, local Hunters and Trappers Organizations
Project Phase(s)	Construction, Operations
Objective	To determine baseline metal levels in foraging caribou.
Term or Condition	The Proponent shall undertake monitoring of baseline metal levels in organ tissue from caribou harvested within the local study area, prior to commencing operations. The Proponent is strongly encouraged to coordinate with local Hunters and Trappers Organizations regarding procurement of harvested caribou organs.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

As part of the approved Northern Contaminants Program (NCP) project funding for the 2020 to 2021 Caribou Contaminant Monitoring Program, of which Baffinland Iron Mines Corporation is a collaborator, tissue samples of caribou harvested by hunters will be analyzed for metals, in addition to other potential contaminants. NCP project co-leads are working with the GN and the Mittimatalik Hunters and Trapper Organization to secure samples for analysis.

RESULTS

Three (3) samples for Baffin caribou were collected in 2020, which included two livers, two muscle, one kidney and one incisor bar. The samples are currently undergoing analysis. Results will be shared with the TEWG as they become available.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

During an August 2021 call with the GN Regional Wildlife Biologist regarding Caribou Health Monitoring, it was confirmed by both Parties that Baffinland conducting this in parallel to the GN led program would create a potential conflict. In light of that consideration, it was agreed that the best approach was to defer to data made publically available through the NCP to meet our requirements for PC Condition No. 35. Once the GN program is complete, and depending on the results, Baffinland may put in a separate permit application to extend this type of research.

Project Certificate Condition No. 36

Category	Vegetation – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	Measure percent plant cover and plant group composition of available caribou forage within the RSA to track potential changes at varying distances from the edge of the PDA through long-term monitoring.
Term or Condition	The Proponent shall establish an ongoing monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations.
Relevant Baffinland Commitments	67
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Mary River Project Final Environmental Impact Statement: Volume 6 — Terrestrial Environment (Baffinland, 2012) 2019 Terrestrial Environment Annual Monitoring Report (EDI, 2020) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

The vegetation abundance and diversity monitoring program considers the abundance and composition of caribou forage at sites of varying distances from the Mine Site, Milne Port, and the Tote Road. Lichen (caribou forage) monitoring is included in the broader vegetation abundance program. The vegetation abundance program should be executed every 3 to 5-year; but was previously run from 2014 to 2019. Based on proposed scheduled, the program should be repeated in 2022 or 2023.

RESULTS

Direct loss of plant habitat remains limited to the PDA. Outside of this, there were no distinguishable Project-related effects on vegetation ground cover, canopy cover, or plant group composition based on 2019 vegetation abundance results. These results are consistent with the FEIS prediction of no significant impact.

TRENDS

There was evidence of annual variation in total vegetation abundance and specific plant group cover, including lichen, in the Project area, but no evidence that these changes were due to a Project-related effect in 2019. These differences were attributed to natural variation between years rather than a Project-related effect. Trends will continue to be examined when monitoring vegetation abundance and diversity analyses are repeated (planned for 2022 or 2023).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue with the scheduled vegetation abundance and diversity monitoring program per the TEMMP.

Project Certificate Condition No. 37

Category	Vegetation – Monitoring
Responsible Parties	The Proponent, Government of Nunavut Department of Environment
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent the establishment of invasive species.
Term or Condition	The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g. surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment.
Relevant Baffinland Commitments	43, 68
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016) 2021 TEWG Meeting Records 2019 Terrestrial Environment Annual Monitoring Report (EDI, 2020)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

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

As outlined in the TEMMP, exotic invasive vegetation and natural regeneration monitoring are scheduled every three to five years or triggered by observations of exotic invasive plant species. Exotic invasive species monitoring occurred in 2014 and 2019. In 2020, follow-up targeted exotic invasive species monitoring focused on one location where an exotic plant was located during the 2019 survey.

RESULTS

In 2019, a garden tomato plant (*Solanum lycopersicum*) was observed growing at the Mine Site below the sewage/effluent discharge pipe. Twenty (20) plants were scattered throughout the rock armour and down the outlet pipe's slope. All plants were in a vegetative state, and none were flowering or fruiting. Due to the short growing season and the growth requirements of tomatoes, the plants were not capable of producing flowers or fruit and were not acting invasive, and were not expected to survive over the winter. Targeted monitoring was conducted in 2020 to verify the presence/absence of garden tomato plants in this location. During the growing season, no tomato

plants were found during two surveys (July 13 and July 20, 2020), and the population was determined to have been eradicated. In 2021, no additional exotic invasive species were identified through incidental monitoring activities.

TRENDS

The potential for introducing exotic invasive vegetation appears to be well managed through current practices for reducing risk.

RECOMMENDATIONS / LESSONS LEARNED

As demonstrated by the detection and response to the garden tomato plants, Baffinland's exotic invasive plant monitoring program effectively detects and manages exotic invasive plants before they can establish permanent populations. The program will continue to monitor for the occurrence of exotic invasive plants in disturbed areas following methods outlined in the TEMMP.

Project Certificate Condition No. 38

Category	Vegetation - Adaptive Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to vegetation abundance, diversity, and health.
Term or Condition	The Proponent shall review, on an annual basis, all monitoring information and the vegetation mitigation and management plans developed under its Environmental Management System, Terrestrial Environment and Monitoring Plan (TEMMP) and adjust such plans as may be required to effectively prevent or reduce the potential for significant adverse Project effects on vegetation abundance, diversity and health.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2021 TEWG Meeting Records Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

The vegetation monitoring program findings are summarized in each Terrestrial Environment Annual Monitoring Report for the given assessment year (EDI, 2022). As part of an adaptive management approach, these findings are carefully reviewed by Baffinland and presented to the TEWG to discuss the study design and methods' effectiveness. Recommendations to modify the vegetation monitoring programs are evaluated and implemented based on the appropriate rationale supported by data trends, interpretations, and statistical analyses. Any changes to assessment objectives and protocols are documented in the Terrestrial Environment Annual Monitoring Reports.

RESULTS

As described in the Summary for Term and Condition No. 34, based on TEWG feedback, in 2022 the soils and vegetation metals survey was designed to align and (where possible) correlate data from the dustfall monitoring program. This is intended to bridge interpretations of the effects of dustfall on soil-metal and lichen-metal concentrations and align any corrective actions. So far, no cohesive trends have been identified. Further analysis following data collection in future years will help draw meaningful conclusions and recommendations. These outcomes will be presented (as necessary) to examine this information's current and potential value to inform the vegetation and soil base metals monitoring program.

TRENDS

The current adaptive management approach based on engagement with the working groups has led to modifications to the study design and methods supported by data trends, interpretations, and statistical analyses. Baffinland will continue with this approach.

RECOMMENDATIONS / LESSONS LEARNED

The current adaptive management approach based on engagement with the working groups has led to modifications to the study design and methods supported by data trends, interpretations, and statistical analyses. Baffinland will continue with this approach. See also Summary for Term and Condition No. 49.

Project Certificate Condition No. 39

Category	Vegetation - Reclamation and Revegetation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent erosion and promote progressive revegetation of disturbed areas.
Term or Condition	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such program to incorporate measures for the use of test plots, reseeding and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.
Relevant Baffinland Commitment	39
Reporting Requirement	To be provided to the NIRB for review and comment at least 60 days prior to commencement of construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	Interim Closure and Reclamation Plan (Baffinland, 2018a) Implications for Reclamation Practices & Trials at the Mary River Project (EDI, 2019a) Revegetation Survey & Preliminary Reclamation Trial 2021 (EDI, 2021b).
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.15

METHODS

As described in the ICRP, a Reclamation Research program was proposed to identify best practices for promoting natural revegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. Due to limited research conducted to date for mines in the Canadian Arctic, the research will focus on developing methods to successfully achieve sustainable vegetation cover that meets the desired land use for the Project sites post-closure in the shortest duration possible. These sites include gravel roads, gravel pads, waste rock, stockpiles, and waste dumps. The objective of the Reclamation Research Program is to identify methods to successfully achieve a sustainable vegetation cover, and the ability of a vegetation cover to enhance physical stability and/or achieve the desired aesthetic conditions for the Project site at closure.

In 2019, Baffinland retained Environmental Dynamics Inc. (EDI) to complete a desktop review of available practices and recent advances from Arctic mine reclamation in Canada's northern territories and Alaska, USA (EDI, 2019a). Following this, a field program to assess current conditions and establish test plots was implemented in 2019. EDI developed a pilot study designed to document the status of select post-disturbance areas of the Site, initiate preliminary reclamation trials to assess methods and approaches considered appropriate for the challenges of the Arctic environment, and identify future research opportunities (EDI, 2021b). Following a survey of existing disturbance sites, the pilot program involved the establishment of reclamation plots to assess methodologies for surface preparation. Two surface configurations were applied: (1) 'rough and loose' where the digging bucket of an excavator/loader is used to open small holes and generate mounds with the landscape, creating heterogeneity and

micro-site conditions favourable to seed germination; and (2) 'track packing' which refers to the use of tracked equipment to create surface roughness and is typically used to reduce soil erosion potential by enhancing surface stability, as well as providing micro-site conditions for seed germination.

RESULTS

A field study for the revegetation program was not conducted in 2020, as the ability to measure revegetation success within a single year is limited. The test plot locations were therefore maintained in 2020, and then revisited in 2021 to evaluate revegetation success to date. A key observation of the revegetation survey is that natural/unassisted revegetation does occur at the Project. Predictably, revegetation following disturbance appeared to be shaped by initial starting conditions, such as the level of landscape disturbance (i.e., landscape form and function), soil characteristics (i.e., nutrient availability and organic matter content), and integrity of nearby 'undisturbed' vegetation (i.e., as a source of native seed) (EDI, 2021b).

TRENDS

The reclamation trial's sample size ($n=3$) is small and presently represents a short-term timeframe, and therefore imposes some design limitations. However, it does provide insight into some of the conditions, challenges and opportunities at the Project (i.e. that unassisted revegetation does occur at the Project). Ultimately, it is still too early within the reclamation trial to identify conclusive trends.

RECOMMENDATIONS / LESSONS LEARNED

The preliminary reclamation trials from 2019 and 2021 are intended to be a starting point for research and development to examine revegetation strategies appropriate for and adaptable to the Project. The reclamation trial sites will require periodic monitoring to determine revegetation status and growth. Since natural revegetation patterns and processes in the Arctic are characteristically slow, annual or biannual surveys are expected to be adequate to assess the long-term performance of surface configurations and to characterize rates of revegetation by early succession species. The results of the study conducted to date will be shared with Stakeholders through a Mine Closure Working Group, which could convene as early as 2022. Updates on the outcome of the ongoing reclamation research study and activities of the Mine Closure Working Group will be provided to the NIRB as they are available.

Project Certificate Condition No. 40

Category	Vegetation - Reclamation and Revegetation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent erosion and promote progressive revegetation of disturbed areas.
Term or Condition	The Proponent shall include revegetation strategies in its Site Reclamation Plan that support progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	QIA
Reference	Interim Closure and Reclamation Plan (Baffinland, 2018a) Revegetation Survey & Preliminary Reclamation Trial (EDI, 2021b) Implications for Reclamation Practices & Trials at the Mary River Project (EDI, 2019a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.15

METHODS

As described in the ICRP, a Reclamation Research program was proposed to identify best practices for promoting natural revegetation that will inform the progressive revegetation program for disturbed areas that are no longer required for operations. Due to limited research conducted to date for mines in the Canadian Arctic, the research will focus on the development of methods to successfully achieve sustainable vegetation cover that meets the desired land use for the Project sites post-closure in the shortest duration possible. These sites include gravel roads, gravel pads, waste rock, stockpiles, and waste dumps. The objective of the Reclamation Research Program is to identify methods to successfully achieve a sustainable vegetation cover, and the ability of a vegetation cover to enhance physical stability and/or achieve the desired aesthetic conditions for the Project site at closure.

In 2019, Baffinland retained EDI to complete a desktop review of available practices and recent advances from Arctic mine reclamation in Canada's northern territories and Alaska, USA (EDI, 2019a). Following this, a field program to assess current conditions and establish test plots was implemented in 2019. EDI developed a pilot study designed to document the status of select post-disturbance areas of the Site, initiate preliminary reclamation trials to assess methods and approaches considered appropriate for the challenges of the Arctic environment, and identify future research opportunities (EDI, 2021b). Following a survey of existing disturbance sites, the pilot program involved the establishment of reclamation plots to assess methodologies for surface preparation. Two surface configurations were applied: (1) 'rough and loose' where the digging bucket of an excavator/loader is used to open small holes and generate mounds with the landscape, creating heterogeneity and micro-site conditions favourable to seed germination; and (2) 'track packing' which refers to the use of tracked equipment to create surface roughness and

is typically used to reduce soil erosion potential by enhancing surface stability, as well as providing micro-site conditions for seed germination.

A further field study in 2021 expanded the number of survey locations and reclamation trial sites (EDI, 2021b).

RESULTS

Test plot locations were revisited in 2021. There were no measurable changes in revegetation at the test plot locations, but some occurrences of small volunteer forbs and graminoids were noted. A key observation was that the surface preparations (i.e., rough-and-loose and track-packing) had been 'washed out' due to weathering and were no longer apparent at both trial sites.

TRENDS

Results of 2021 studies reinforce that natural revegetation patterns and processes are characteristically slow at Project sites.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to review locations for new test sites, with the intent to establish test plots across a range of landscapes intersected by the Project. If possible, medium scale sites may be reviewed where mine-disturbed areas are no longer required for operations and can be set aside for reclamation trials.

4.6.7 Freshwater Environment (PC Conditions 41 through 48a)

Nine (9) PC conditions (includes No. 48 and 48a) relate to the potential impacts of the Project on the freshwater environment, focused on fish and other freshwater biota. Several of the conditions recommend environmental protection measures, such as setbacks from watercourses and meeting blasting thresholds, or relate to meeting discharge requirements for effluents and runoff (the latter is evaluated in Section 4.6.5).

Inuit & Stakeholder Feedback

The Department of Fisheries and Oceans Canada (DFO) administers the fish and fish habitat sections of the *Fisheries Act* and is therefore the primary stakeholder with respect to freshwater biota. The Nunavut Water Board also regulates in-water structures such as bridges and culverts. The QIA in previous environmental reviews has also provided valuable feedback for freshwater biota. Community members have raised concerns regarding Arctic char abundance and health in the Milne Inlet and Eclipse Sound area generally, however, these comments have not identified any specific freshwater bodies that the Project interacts with (Appendix B). It is worth noting that the Project does not interact with freshwater bodies containing anadromous (sea run) Arctic char. For most stakeholders, the use of explosives near or in fish bearing waters was a key area of concern.

Monitoring Activities

Monitoring activities undertaken in relation to the freshwater environment include:

- Monitoring of fish habitat offsetting measures associated with the 2007 Authorization under the Fisheries Act for water crossings along the Tote Road (DFO, 2007);
- Monitoring of the freshwater environment as part of the Aquatic Effects Monitoring Program (AEMP), including water and sediment quality, phytoplankton, benthic invertebrates and fish, as well as sedimentation rates; and,
- Monitoring of the water quality at representative water crossings under the Tote Road Monitoring Program (TRMP) to assess the potential for project-related effects as a result of sedimentation and erosion.

The fish habitat monitoring associated with the Tote Road Fisheries Act Authorization identified that the fish use of the rustic fishway installed at BG-30 continued to be successful. In 2021, there was no in-stream construction works at crossings classified as Harmful Alteration, Disruption or Destruction (of Fish Habitat) (HADD), compensation, and Letters of Advice (LOA) crossings. 2021 surveys noted recurring perches and sedimentation issues at several crossings. Appropriate remedial measures are being identified and will be discussed with DFO and implemented to address these issues. The necessary permits will be obtained prior to executing the remedial works.

The AEMP encompasses several component studies, including the Core Receiving Environment Monitoring Program (CREMP). The results of the 2021 CREMP indicated some mine-related influences on water and sediment quality of a few of the mine primary receiver systems, but no ecologically significant, adverse, mine-related effects to biota were identified in any of the Mine Site waterbodies based on comparisons to applicable reference conditions or baseline data. This includes: Camp Lake and tributaries, Sheardown Lake and tributaries, and Mary River and Mary Lake.

Lake Sedimentation monitoring at the Sheardown Lake NW Mine Site indicate that sedimentation rates are generally consistent with baseline except in the shallow stations, while accumulation rates were well below the proposed low action threshold of 0.15 mm. Overall, the 2020 to 2021 results indicated no effects on Arctic char reproductive success were likely at Sheardown Lake NW as the result of sedimentation rates/accumulation over the 2020 to 2021

egg incubation/larval pre-emergence period and, based on these results, no further management response was triggered for future studies.

After further engagement with the MHTO regarding monitoring arctic char in freshwater bodies near Milne Inlet, Baffinland implemented a monitoring program in 2021 to survey the Tugaat, Qurluktuk and Ikaluit freshwater systems (Note Ikaluit was not accessed in 2021 due to weather limitations). Overall, the Milne Inlet Freshwater Fish Health Assessment demonstrated no adverse port-related effects on arctic char health and tissue chemistry within the Tugaat and Qurluktuk freshwater systems in 2021.

Table 4.17 provides an evaluation of the Project's impacts on the freshwater environment, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.17: Freshwater Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Freshwater Biota	Culvert replacements or extensions; sea container crossings were removed	Monitoring undertaken in accordance with the 2007 authorization under the <i>Fisheries Act</i> .	All compensation works are effective. Within FEIS predictions.
	Culvert perching	Monitoring undertaken in accordance with the 2007 authorization under the <i>Fisheries Act</i> .	Perching was identified at six (6) crossings. Appropriate remedial measures are being identified and will be discussed with DFO and implemented to address these issues. Effect within FEIS predictions
	Water withdrawals from lakes affecting nearshore fish habitat	Measure/monitor and report water usage in accordance with water licence limits	Water usage generally within water licence limits. Effect within FEIS predictions
	Fish impingements at camp and dust suppression water takes	No monitoring; appropriate screens are used on all intakes	Within FEIS predictions

Path Forward

Baffinland plans to continue the implementation of improvements outlined in the TREEP and the Hatch 2013 design throughout 2022 to improve surface water drainage along the Tote Road and address outstanding fish passage concerns. Baffinland will continue implementing the CREMP in 2022, and will again work with the MHTO to finalize the Milne Inlet Freshwater Fish Health Assessment and develop the scope of work for the 2022 program.

Project Certificate Condition No. 41

Category	Freshwater Aquatic Environment - Setbacks
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of runoff into freshwater aquatic habitat.
Term or Condition	Unless otherwise approved by regulatory authorities, the Proponent shall maintain a minimum 100-metre naturally-vegetated buffer between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching.
Relevant Baffinland Commitment	64, 65
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Borrow Pit and Quarry Management Plan (Baffinland, 2014c) Q1 Quarry Management Plan (Baffinland, 2020e) QMR2 Quarry Management Plan (Baffinland, 2021j) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.28

METHODS

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

RESULTS

No new quarries were developed in 2021. Existing quarries maintained the 100 metre buffer from the high water mark to any fish bearing water bodies. In 2021, there were no additional geochemical analyses completed for quarry sites at the Project, as there were no blasting activities conducted. All materials utilized from the Project quarries for construction in 2021 were blasted in 2019, therefore there was no borehole drilling and analysis of borehole samples. A discussion of geochemistry sampling of quarry rock and surface water runoff monitoring downstream of Project areas and quarries is provided in Section 9.5 and Section 7.4, respectively, of the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2021b).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

New quarry developments will continue to be tested for ARD and metal leaching using the Protocol for the Assessment for the Potential for Acid Rock Drainage (Borrow Pit and Quarry Management Plan, Appendix 2) and the 100 metre buffer from the high water mark to any fish bearing water bodies will be maintained.

As no additional sampling was completed in 2021 at Project quarries, further evaluation of the potential for Acid Rock Drainage and Metal Leaching (ARD/ML) was not completed. In 2022, Baffinland will continue to monitor and evaluate any new geochemical data collected at Project quarries should blasting activities resume, in an effort to refine and expand the available dataset and assess the potential for ARD/ML from Project quarries.

Project Certificate Condition No. 42

Category	Freshwater Aquatic Environment - Setbacks
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of runoff into freshwater aquatic habitat.
Term or Condition	The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Surface Water and Aquatic Ecosystems Management Plan (Baffinland, 2021e) Environmental Protection Plan (EPP; Baffinland, 2021d) Terrestrial Environmental Management and Monitoring Plan (TEMMP; Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland continues to perform regular inspections during construction activities to ensure all Project-related operations are at a distance greater than 31 metres from any water body, except where authorized under the Type 'A' Water License and DFO Letters of Advice. If infractions are discovered, responsible departments for development areas are actioned to remove materials or infrastructure, and to reclaim the developed area. New proposed development areas must be approved by the Baffinland Site Environment Department to ensure the area has a setback of 31 metres from the high water mark of natural water bodies, or is otherwise permitted to do so. Consultants preparing design drawings for new infrastructure are also made aware of the requirement. Baffinland conducts orientation training on the EPP for new contractors. The presentation provides an overview of key Project activities and the required natural vegetation buffers to any waterbodies.

RESULTS

No unapproved permanent or temporary Project-related operations were sited within 31 metre of a waterbody during 2021.

TRENDS

Project operations have maintained the 31 metre buffer between water bodies, except where authorized under the Type 'A' or 'B' Water License and DFO Letters of Advice, and the condition continues to be enforced.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland personnel continue to monitor all new Project developments to ensure the 31 metre buffer condition is adhered to, unless authorized under the Type 'A' Water License and DFO Letters of Advice. Baffinland will ensure all requirements and mitigation measures are clearly communicated to Baffinland staff and contractors.

Project Certificate Condition No. 43

Category	Freshwater Aquatic Environment - Drainage
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts of runoff into freshwater aquatic habitat.
Term or Condition	Prior to the start of construction, the Proponent must submit a Site Drainage and Silt Control Plan to the appropriate regulatory authorities for approval.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Drainage plans for Project sites and silt/sediment control measures used at the Project are outlined in the Project's Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e). A modification to the Type 'A' Water Licence for the implementation of the Milne Port Surface Water Management Plan was approved in 2018. A modification to the Type 'A' Water License for the implementation of the Mary River Long Term Water Management Plan was approved in 2021. These plans were developed to manage surface water at Milne Port and Mary River and reduce the volume of surface water in contact with project infrastructure by diverting surface flow using berms, ditching and culverts around and through developed areas of the Project and constructing surface water management ponds as required.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The SWAEMP will continue to be followed and enforced at the Project. Baffinland will continue to implement the approved Long Term Water Management Plan for the Mary River Mine Site, to address areas where sedimentation and erosion issues have been identified through Project monitoring.

Project Certificate Condition No. 44

Category	Freshwater Aquatic Environment - Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts of explosives on freshwater aquatic habitat.
Term or Condition	The Proponent shall meet or exceed the guidelines set by Fisheries and Oceans Canada for blasting thresholds and implement practical and effective measures to ensure that residue and by-products of blasting do not negatively affect fish and fish habitat.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) Environmental Protection Plan (EPP; Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland implements the management practices for blasting in or near water as outlined in Section 4.24 the EPP (BAF-PH1-830-P16-0008, Baffinland, 2021d).

RESULTS

No blasting occurred in 2021 within the required setback distances detailed in the DFO guidance document titled *"Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters"* (Wright and Hopky, 1998).

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 45

Category	Freshwater Aquatic Environment - General
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to freshwater aquatic habitat.
Term or Condition	The Proponent shall adhere to the No-Net-Loss principle at all phases of the Project to prevent or mitigate direct or indirect fish and fish habitat losses.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Department of Fisheries and Oceans
Reference	Fisheries Authorization No. NU-06-0084 (For Tote Road Water Crossings; DFO, 2007) Fisheries Authorization No. 18-HCAA-00160 (For Freight Dock; DFO, 2019) Fisheries Authorization No. 14-HCAA-00525 (For Ore Dock; DFO, 2014) Fisheries Authorization No. 14-HCAA-00525 – File Closed (DFO, 2021) No Net Loss and Monitoring Plan (Knight Piésold, 2007) 2020 Milne Ore Dock Fish Offset Monitoring Report (Golder, 2020a) 2021 Freight Dock Offset Monitoring Report (Golder, 2021a) Floating Freight Dock: Application for Fisheries Act Authorization (Baffinland, 2019b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.11

METHODS

Currently, there are two active *Fisheries Act* Authorizations (DFO, 2007; 2019) through which Baffinland is required to demonstrate adherence to the No-Net-Loss Principle. Annual monitoring programs of habitat offsetting works associated with Project fish bearing water crossings (i.e. culverts, bridges) and the Milne Port Freight Dock were undertaken in 2021 as described below. The last year of monitoring for the Ore Dock *Fisheries Act* Authorization (14-HCAA-00525) (DFO, 2014) was completed in 2020 (Golder, 2020a) and DFO determined that all the conditions of the Authorization have been satisfied and the file is closed (DFO, 2021). In 2021, no other in-water construction works requiring a *Fisheries Act Authorization* were completed.

2021 assessments of Project fish bearing water crossings were completed by a third-party Professional Fisheries Biologist in June and August 2021. The emphasis of the 2021 spring monitoring program was to assess the presence of fish, habitat quality, and upstream accessibility through installed culverts at fish-bearing sites and identify crossings requiring remediation to allow for fish passage. The objective of the fall monitoring program was to re-survey and design remediation measures at sites identified during the spring program that required remedial measures. The 2021 monitoring programs did not include the water crossings that were confirmed in 2020 as non-fish bearing.

Installation of the Freight Dock in Milne Port in 2019 resulted in unavoidable loss of fish habitat amounting to 26,449 m² (2,170 Habitat Equivalent Units; Baffinland, 2019b). To offset the loss of fish habitat, Baffinland installed coarse rock material around the perimeter of the Freight Dock to increase habitat complexity and hard substrate for attachment and growth of macroalgae and invertebrate taxa in 2019. DFO issued an authorization for the proposed works (DFO 2019), which included requirements for offsetting measures in addition to prescribed 10-year monitoring and reporting requirements for the Freight Dock offset habitat. The first year of monitoring (Year 1) occurred in 2020. Year 2 of offset habitat monitoring was undertaken during August 2021. As part of Year 2 monitoring, biophysical surveys were conducted in the Freight Dock offset habitat area and in a suitable Reference Area approximately 2.25 km northeast of the Freight Dock. Biophysical surveys comprised the following components:

- Visual assessment of Freight Dock during low tide to document intertidal offset habitat and inspect coarse substrate stability.
- Mapping of as-built Freight Dock offset habitat.
- Mapping of subtidal habitat in Reference Area for comparison with offset habitat.
- Subtidal dive transect/quadrat surveys to quantitatively evaluate macroalgae, sessile and motile invertebrates and fish occurrence within both the Freight Dock offset habitat area and Reference Area.
- Opportunistic observations of macroalgae, fish and motile/sessile invertebrates during habitat mapping.
- Subtidal assessment of stability of the coarse substrate along perimeter of the Freight Dock offset habitat.

RESULTS

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

During the 2021 assessments, fish use assessments were completed at thirty-seven (37) fish bearing crossings during both the spring and fall. During the spring survey fish were captured at twenty-eight (28) crossings, observed but not captured at eight (8) crossings, and neither observed nor captured at one (1) crossing. During the fall survey, fish were captured at twelve (12) crossings, observed but not captured at twenty-one (21) crossings, and neither observed nor captured at four (4) of the crossings. Fish presence at the Tote Road stream crossing areas and overall catch rates from spring 2021 were more abundant than 2020 surveys; however, were still lower compared with previous years. These differences are attributed to high velocity flows, and unsafe conditions to electrofish in (deep pools or uneven substrate). During the fall survey, fish bearing crossings were surveyed when stream temperatures reached 0 degrees and started to freeze, thus it likely that seasonal movements of juvenile char was limited at the time of the fall 2021 survey. It was also noted that the fish ladder installed at BG-30 remained successful in 2021.

No fish passage or habitat issues were documented at 25 of the 37 fish bearing water crossings. Potential issues with fish passage and/or habitat were observed at twelve (12) fish bearing crossings. To improve conditions at these sites, remediation actions are planned for 2022. Six of these crossings (CV-129, CV-114, CV-111, CV-106, CV-216, and BG-50) involved culverts that were identified as perched in spring 2021 and for which remediation measures were undertaken in 2019 or 2020. Four sites (CV-129, BG-50, CV-106 and CV-114) require repairs to the rocky ramps that were installed in 2019 or 2020 to restore full access (damage was caused during freshet 2021). At water crossing CV-129, the culvert is damaged and requires repair. The perch at CV-111 remains too high to effectively mitigate with a rocky ramp and additional/alternative works will be required. The spring 2021 survey identified that culverts at CV-057 continued to be buried by sediment, which is a recurring problem at this site. Baffinland is currently

planning culvert remediation works for 2022 and is working with DFO to establish a practical course of actions for the identified culverts.

During the 2022 open-water season, Baffinland will monitor turbidity upstream and downstream of this crossing and inspect the road embankment and upstream sections of the stream to identify and address potential sources of sedimentation with control measures if required. Additional efforts are planned in 2022 to address these outstanding concerns.

Milne Port Freight Dock (Fisheries Act Authorization No. 18-HCAA-00160)

Year 2 offset habitat monitoring objectives were achieved, including documenting macroalgae, sessile and motile invertebrate and fish occurrence, and qualitatively comparing productivity metrics (i.e., percent cover, density, diversity) of the coarse substrate habitat between the Freight Dock offset habitat area and the established Reference Area. Detailed results of Year 2 Freight Dock habitat offset monitoring are available in Golder (2022c), with a summary provided below.

Year 2 monitoring results indicated that macroalgae colonization was low to moderate in the Freight Dock offset habitat and, in general, the Reference Area showed relatively higher areal cover and taxa richness, as to be expected in Year 2 of a 10-year monitoring program. An overview of the macroalgae results of the Freight Dock offset habitat included: (1) trace occurrence of sugar kelp (*Laminaria saccharina* - understory kelp) in the shallow subtidal depth contour which was also recorded in the Reference Area, and (2) turf macroalgae in low to moderate cover consisting of two species of brown filamentous algae (cf. *Coelocladia arctica*, and *Desmarestia* spp.), and two species of green filamentous algae (cf. *Urospora neglecta* and an unidentified green filamentous). Taxa occurring exclusively in the Reference Area included one species of brown-bladed understory kelp, sea colander (*Agarum clathratum*), a brown filamentous turf algae (*Battersia* spp.), crustose coralline algae (Corallinales indet.), and two species of red foliose turf algae (*Coccotylus truncatus* and *Dilsea socialis*).

In both the Freight Dock offset habitat area and the Reference Area, sessile invertebrates occurred in low coverage in the upper and shallow subtidal zones and included an unidentified species of tunicate (Tunicata indet.). Other sessile invertebrates observed at Reference Area included tunicates, mussels, and wrinkled rock-borer clams (*Hiatella arctica*). Motile invertebrates were limited to the shallow subtidal zone in both the Freight Dock offset habitat area and the Reference Area, with slightly higher species densities observed in the Reference area. Species observed in the Freight Dock offset habitat area included green urchin (*Strongylocentrotus droebachiensis*) and brittle stars (Ophiuroidea indet.) in low densities. Species observed in the Reference Area included chitons (*Tonicella* spp.) and brittle stars. Taxa richness was similar in both areas. Fish density and taxa richness were similar between the Freight Dock and Reference Area. Shorthorn sculpin (*Myoxocephalus scorpius*) were recorded in both areas. Fourhorn sculpin (*Myoxocephalus quadricornis*) and Arctic char (*Salvelinus alpinus*) were recorded opportunistically during perimeter mapping of the Freight Dock habitat offset. In the Reference Area, two Atlantic lump sucker (*Eumicrotremus spinosus*) and one unidentified fish were opportunistically recorded. Overall, the Freight Dock offset habitat appears to be providing a suitable and stable substrate for continued colonization and growth of marine organisms. However, there are a few small and localised areas where the crushed rockfill foundation is exposed; these exposed areas may be vulnerable to erosion from seasonal abiotic processes (i.e., ice scour, wave action). The stability assessment planned for Year 5 (i.e., in 2024) will provide additional information on the physical stability of these areas and whether remedial work may be considered.

TRENDS

As noted in previous years, habitat compensation works completed at BG-30 remain successful. Current monitoring and assessment of project watercourses is sufficiently robust to identify fish passage issues. There have been recurring perches taking place at several culverts (CV-129, CV-114, CV-111, BG-50, CV-106 and CV-216), and recurring sedimentation issues at culvert CV-057, BG-01 and CV-186. Appropriate remedial measures are being identified and will be discussed with DFO and implemented to address these issues. The necessary permits will be obtained prior to executing the remedial works.

Baffinland implements a proactive approach to prevent the onset of reduced fish passage in watercourse crossing infrastructure by installing, inspecting, and maintaining crossings in adherence with the approved Hatch (2013) design and the Tote Road Earthworks Execution Plan (TREETP), and Design Report developed in April 2017 (Golder, 2017). Proactive measures that Baffinland follows include the following:

- Install at least one (1) culvert at each fish bearing crossing with an embedment depth in the streambed that is 10% of the culvert diameter (i.e. a 2000 mm diameter culvert requires an embedment depth of 200 mm);
- Install rip rap erosion protections at culvert outlets to prevent scour that can result in perched or hanging culverts;
- Inspect culverts to verify inlets and outlets are free of debris and sediment and there are no signs of erosion;
- Inspect culverts in fish bearing crossings to verify they are embedded in the streambed (i.e. not perched or hanging);
- Inspect culverts to verify they are free draining;
- Inspect culverts to verify they are in good structural condition (i.e. ends are not damaged, no buckling, etc.); and
- Complete mitigations at the first sign of potential for reductions in fish passage, in consultation with DFO personnel and in compliance with the interim code of practice for culvert maintenance (DFO, 2020).

Overall, Year 2 of habitat offset monitoring at the Freight Dock indicated that the three-dimensional structure of the introduced habitat is providing a suitable and stable substrate for colonization and growth of marine organisms, as evidenced by the presence of macroalgae, motile invertebrate, and fish taxa.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to routinely inspect fish bearing water crossings at the Project and address identified concerns. Remedying fish passage concerns at water crossings remains a top priority for Baffinland to ensure compliance with the Project's Tote Road Fisheries Act Authorization (NU-06-0084; DFO, 2007) and No Net Loss and Monitoring Plan (Knight Piésold, 2007). Assessments of fish bearing water crossings will be continued in 2022 as part of the Project's fish habitat monitoring program.

Future Tote Road remedial works/improvements/realignments required in support of on-going operations and future expansion projects will either follow the Code of Practice for culvert maintenance or a request for review will be submitted to DFO with the approved designs prepared by Hatch and Golder. Baffinland will continue to work with DFO to ensure planned modifications to fish bearing crossings are in compliance with the *Fisheries Act*.

Monitoring will continue in 2022 to assess fish passage at crossings on fish-bearing streams, to continue to assess the condition and performance of crossings, and to evaluate the effectiveness and performance of remediation works conducted.

There are a few small and localized areas where the crushed rockfill foundation associated with the Freight Dock has become exposed; these exposed areas are vulnerable to erosion and may potentially be impacted further by seasonal abiotic processes (i.e., ice scour, wave action). The stability assessment planned for Year 5 (summer 2024) will provide additional information on the physical stability of these areas and whether remedial work may be considered.

Project Certificate Condition No. 46

Category	Freshwater Aquatic Environment – Drainage
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate impacts to freshwater aquatic habitat.
Term or Condition	The Proponent shall ensure that runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities responsible for generating liquid effluent and runoff meet discharge requirements.
Relevant Baffinland Commitment	64
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fresh Water Supply, Sewage and Wastewater Management Plan (FWSSWMP; Baffinland, 2022e) Metals and Diamond Mining Effluent Regulations (MDMER; Minister of Justice, 2022) Metals and Diamond Mining Effluent Regulations Emergency Response Plan (MDMER ERp; Baffinland, 2020d) Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2022f) 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b) Dust Mitigation Action Plan (Golder, 2016a) Sedimentation Mitigation Action Plan (Golder, 2016b) Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e) Tote Road Earthworks Execution Plan (TREETP; Golder, 2017) 2021 Freshet Monitoring Report (Baffinland, 2022c) Tote Road Priority Item Action Schedule (Baffinland 2022h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.24 Appendix G.27

METHODS

The Tote Road Monitoring Program (TRMP) was developed to monitor the water quality of surface water flows at select water crossings (culverts, bridges) along the Tote Road, with a focus on monitoring upstream and downstream TSS concentrations and addressing any sedimentation concerns identified during the monitoring events. The objective of the program is to identify potential project-related impacts to surface water as a result of operation and maintenance of the Tote Road throughout freshet and the remainder of the flowing water season, by comparing upstream concentrations to downstream concentrations at defined distances and sampling intervals. In screening the data to determine if the Project infrastructure has resulted in a change to the surface water quality, a potential Project related change is defined as a greater than 50 Milligrams per Liter (mg/L) increase in TSS concentrations in

the downstream sample when upstream concentrations are less than 250 mg/L. When concentrations are greater than 250 mg/L in the upstream sample, a potential Project related change is defined as a greater than 20% increase in TSS concentrations in the downstream sample.

Water crossings monitored under the TRMP were selected to give a geographically representative sample set of water crossings for each watershed intersected by the Tote Road. In selecting the water crossings, factors such as key depositional habitats located downstream of the Tote Road (e.g. fish habitat), and areas historically prone to sediment events, were considered. The program includes weekly visual inspections and water quality sampling at designated water crossings during freshet, and subsequently continues monthly until the freeze-up of flows. During 2021, upstream and downstream water quality was monitored for pH, Total Suspended Solids (TSS), Total Dissolved Solids (TDS) and turbidity at twenty (20) locations along the Tote Road.

Methodology for effluent discharges in 2021 are discussed in the Project Certificate Condition No. 17.

RESULTS

During freshet 2021, Baffinland conducted water quality monitoring programs at the Mary River Mine Site, Milne Port, and along the Tote Road. The Mine Site freshet-monitoring program is performed every year to characterize the water quality of several Mine Site tributaries and drainages during the elevated snowmelt runoff flows of the freshet period. The program starts around mid-May when snowmelt causes elevated runoff flows and ends around the end of June after runoff flows have receded. Four (4) monitoring locations on the Mine Site are routinely monitored during the freshet period, including the Camp Lake Settling Ponds outlet (CLSP-OUT), the Camp Lake Tributary 1 outfall (CLT-OUT), Sheardown Lake Landfill Gate Tributary outfall (LDFG-OUT), and Sheardown Lake Tributary 1 outfall (SDLT-OUT). Water quality monitoring involves measuring water quality parameters in the field using a portable meter and collecting water samples to be sent to an external laboratory for analyses. Water quality parameters include TSS, TDS, pH, and turbidity. Intermittent monitoring is performed at additional locations along the tributary, upstream of the monitoring location, if elevated turbidity is identified at the monitoring location.

Several TSS exceedances at locations monitored under the Type 'A' Water Licence and unauthorized releases of sediment were reported to ECCC, CIRNAC, NWB and the NT-NU Spill Line, and are documented in NT-NU Spill Reports 21-146, 21-164 and 21-247. Further analysis and discussion of the sediment releases and TSS exceedances reported by Baffinland during freshet 2021, including mitigation and corrective actions taken and planned to address sedimentation concerns at the Project, is provided in the 2021 Freshet Monitoring Report (Baffinland, 2022c) and 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

The Milne Port freshet-monitoring program is conducted every year to characterize the water quality of tributaries and drainages during the elevated runoff freshet period. The program starts around mid-May when snowmelt causes elevated runoff flows and ends around the end of June after runoff flows have receded. Four (4) locations at Milne Port are monitored during active flows during freshet, including MP-C-B, MP-C-K, MP-C-H, and MP-C-J. Daily water quality monitoring involves measuring water quality parameters in the field using a portable meter and collecting water samples that are sent to an external laboratory for analyses. Water quality parameters include TSS, TDS, pH, and turbidity. The Milne Port water quality monitoring data is reported in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

During sampling conducted for the Tote Road Monitoring Program (TRMP) in 2021, there were six (6) sampling events when there was a greater than 50 mg/L increase in TSS concentrations between the downstream sample and the upstream sample. All of the sampling events that had a downstream TSS concentration greater than the

screening criteria occurred during the May 25 to June 15, 2021 period when freshet conditions resulted in elevated sediment loading into the affected watercourses over a short period of time, and suggest the potential for Project related change in water quality. Following this period, all results demonstrated that there were no Project related changes to water quality as a result of the operation of the Tote Road. Where required, Baffinland implemented mitigation measures consistent with the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026). The TRMP is part of the Roads Management Plan and water quality monitoring results are reported in the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

Results from effluent discharges in 2021 are discussed in the Project Certificate Condition No. 17.

TRENDS

Trends from effluent discharges in 2021 are discussed in the Project Certificate Condition No. 17.

RECOMMENDATIONS / LESSONS LEARNED

To improve the water quality of surface water drainage at the Project during freshet, Baffinland continues to implement the corrective actions and improvements outlined in the Sedimentation and Dust Mitigation Action Plans, the Tote Road Priority Item Action Schedule (Baffinland, 2022h) and Tote Road Earthworks Execution Plan (Golder, 2016a, 2016b, 2017), as well as the Hatch 2013 design for the Tote Road. A number of corrective actions were undertaken to address the sediment releases associated with freshet 2021 Spill Reports 21-146, 21-164 and 21-247. Consistent with Baffinland's Surface Water and Aquatic Ecosystem Management Plan (2021e), corrective and mitigation actions taken during freshet 2021 in response to reported sediment releases included one or more of the following:

- Installing and maintaining silt fences and runoff mitigation berms in strategic locations;
- Check dam and settling pond repairs, construction and operation;
- Armouring of ditches, banks, and road embankments near waterbodies;
- Clearing of excess snow at culvert inlets and outlets; and
- Diverting sediment-laden runoff away from fish habitat by means of ditches, swales, and active pumping.

Tote Road water crossing locations where the screening criteria was exceeded and the potential for Project related changes to water quality were identified will be reviewed as part of the freshet preparedness planning process, to ensure that previously identified issues can be addressed in a timely and effective manner during freshet 2022, and confirm if Project related changes persist at these locations. Baffinland is in the process of engaging DFO in preparing remedial plans for identified crossing locations that require reparations.

A Long-Term Water Management Plan (LTWMP) to manage water and control erosion and sediment at the Mine Site was approved by the NWB in 2021. The LTWMP identifies water management measures and actions including operational improvements, remedial measures, and new water management structures which will be implemented at the Project. The first phase of the LTWMP began construction in 2021, and is expected to be operational prior to freshet 2022.

Recommendations and lessons learned from effluent discharges in 2021 are discussed in the PC Condition No. 17.

Project Certificate Condition No. 47

Category	Freshwater Aquatic Environment – Watercourses
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent blockages or restrictions to fish passage.
Term or Condition	The Proponent shall ensure that all Project infrastructure in watercourses are designed and constructed in such a manner that they do not unduly prevent and limit the movement of water in fish bearing streams and rivers.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fish Habitat No Net Loss and Monitoring Plan (Knight Piésold, 2007) Fish Habitat Monitoring - 2021 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2021g) Fisheries Act Authorization No. NU-06-0084 (For Tote Road Crossings; DFO, 2007)
Ref. Document Link	Not applicable

METHODS

A fish habitat monitoring plan was developed by Baffinland to ensure that all measures and works specified in the No Net Loss and Monitoring Plan (Knight Piésold, 2007), as well as the *Fisheries Act* Authorization (NU-06-0084; DFO, 2007) and amendments, are implemented and are functioning as intended. Under Baffinland's Tote Road Fisheries Authorization, annual assessments of watercourse crossing infrastructure are conducted by qualified professionals at all fish bearing crossings with the objective of maintaining connectivity for fish species and verifying the functionality of all existing culverts. Findings and recommendations for mitigations are reported to DFO in annual reports and corrective actions are scheduled to mitigate perched or damaged culvert outlets, damaged culvert inlets, and erosion and sedimentation concerns. In 2021, monitoring was conducted at fish bearing water crossings at the Project. The methodology of the 2021 program is discussed in Project Certificate Condition No. 45.

RESULTS

2021 assessments of Project fish bearing water crossings were completed by a third-party Professional Fisheries Biologist in June and August 2021. Results of this assessment are discussed in Project Certificate Condition No. 45.

TRENDS

Trends are discussed in the Project Certificate Condition No. 45.

RECOMMENDATIONS / LESSONS LEARNED

Recommendations and lessons learned are discussed in Project Certificate Condition No. 45.

Project Certificate Condition No. 48

Category	Freshwater Aquatic Environment – Explosives
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Fisheries and Oceans Canada
Project Phase(s)	Construction, Operations
Objective	To mitigate impacts to freshwater aquatic habitat.
Term or Condition	The Proponent shall engage with Fisheries and Oceans Canada and the Qikiqtani Inuit Association in exploring possible Project specific thresholds for blasting that would exceed the requirements of Fisheries and Oceans Canada's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998).
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) Environmental Protection Plan (Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

To date there has been no requirement to undertake blasting in or near water, and as such, there has been no requirement to discuss blasting near water with Fisheries and Oceans Canada and the Qikiqtani Inuit Association. Baffinland implements the management practices for blasting in or near water as outlined in Section 4.24 the Environmental Protection Plan (BAF-PH1-830-P16-0008, Baffinland, 2021d).

RESULTS

No blasting occurred in 2021 within the required setback distances detailed in the DFO guidance document titled *"Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters"* (Wright and Hopky, 1998).

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 48 (a)

Category	Freshwater Aquatic Environment - Arctic char
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To determine presence and health of arctic char in freshwater aquatic habitat.
Term or Condition	The Proponent shall develop plans to conduct additional surveys for the presence of arctic char in freshwater bodies and ongoing monitoring of arctic char health where applicable, within watersheds proximal to the mine, tote road and Milne Inlet Port project development areas, including but not limited to, Phillips Creek, Tugaat and Qurluktuk. The Proponent shall consult with the MHTO regarding the design, timing, and location of proposed surveys and ongoing monitoring.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Fisheries and Oceans Canada (DFO), Nunavut Impact Review Board (NIRB), Nunavut Water Board (NWB), Qikiqtani Inuit Association (QIA)
Reference	Fish Habitat Monitoring - 2021 Annual Report - Early Revenue Phase - Tote Road Upgrades (Baffinland, 2021g) 2021 Milne Inlet Freshwater Fish Health Assessment – Preliminary Results (Minnow, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.22

METHODS

In addition to the annual fish use assessments completed near Project water crossings, as discussed in PC Condition No. 45 and 47, Baffinland conducts annual fish population assessments for arctic char in Camp Lake, Sheardown Lake, Mary Lake and Reference Lake 3 near the Mine Site as part of the Project's Core Receiving Environment Monitoring Program (CREMP). The CREMP is an aquatic monitoring program conducted annually that focuses on evaluating mine-related influences on water quality, sediment quality and/or biota, including Arctic char, within aquatic environments located near the Mine Site. Under the CREMP, condition of arctic char populations within monitored lakes are assessed using a non-lethal sampling program that involves capturing and assessing 100 Young-of-Year (YOY) arctic char from nearshore lake habitat via electrofishing and 100 adult arctic char from littoral/profundal lake habitat via gill netting in each monitored lake.

In 2021, Baffinland implemented a Milne Inlet Freshwater Fish Health Assessment program. This program was initiated following discussions with the Mittimatalik Hunters and Trappers Organization (MHTO) about the potential effects of the Milne Port facility operations on anadromous arctic char (*Salvelinus alpinus*) health and metal concentrations in tissues. The design for the study was developed following consultation with the MHTO from a teleconference meeting held during February 2021 in which the MHTO provided information regarding sampling locations, timing, and techniques for the study. Based on discussions from this meeting, arctic char from three river

systems that flow into Milne Inlet, including the Tugaat, Qurluktuk, and Ikaluit river systems, were to be targeted for sampling in mid- to late August 2021 following an approach comparable to that used for Environmental Effects Monitoring (EEM) under the Metal and Diamond Mining Effluent Regulations (MDMER) for evaluating effects on fish health.

The overall objective of the study was to evaluate the effects of the Project on anadromous arctic char health and tissue metal concentrations in freshwater systems located near the Milne Inlet. Given the timing suggested by the MHTO, the field study was conducted between August 12th and 19th, 2021. Due to unsafe helicopter travel conditions related to weather, the Ikaluit river system was not able to be accessed for sampling in 2021. The field crew included representatives from the MHTO/community of Pond Inlet, and the Qikiqtani Inuit Association (QIA). For the assessment; age, body length, body weight, reproductive organ weight, and liver weight measurements were collected from adult female and male arctic char collected at each freshwater system as the basis for assessing growth and condition in fish captured in 2021 compared to historical information, as well as the basis of future tracking changes in fish health over time. The historical data were collected at Tugaat Lake in 1992 and 1995, and at the Robertson River (Qurluktuk system) in 1979 by Department of Fisheries and Oceans (DFO), well prior to the commencement of Baffinland Milne Inlet port operations, and thus serve as a strong basis for evaluating potential changes in arctic char health since the operations were initiated. Assessment of metal concentrations in arctic char muscle and liver tissues sampled from the Tugaat and Qurluktuk river systems focussed on comparison of mercury concentrations to applicable consumption guidelines and iron concentrations to amounts recommended for daily dietary intake in humans.

RESULTS

In 2021, two (2) sites near Milne Inlet were surveyed; Tugaat Lake and Qurluktuk Lake, and a total of sixty-two (62) adult char were sampled. 35 adult char (11 female, 24 male) were captured from the Tugaat system and 20 adult char (13 female, 7 male) were captured from the Qurluktuk system for the health and tissue chemistry evaluation. Given the comparison of endpoints between 2021 and historical data, it is unlikely that the Milne Port operations have had negative effects on arctic char health from the Tugaat and Qurluktuk river systems. Arctic char growth (length-at-age) at Tugaat and Qurluktuk lakes in 2021 was either significantly greater or statistically similar to those sampled historically. Additionally, no significant difference in arctic char body condition was indicated between 2021 and historical data for males from the Tugaat system, whereas significantly greater condition was indicated for arctic char sampled from Qurluktuk Lake in 2021 compared to those sampled historically. The occurrence of similar or greater growth and condition of Arctic char within the Tugaat and Qurluktuk river systems in 2021 compared to historical data collected prior to initiation of Baffinland port operations indicated no adverse port-related effects on health of arctic char at each of these river systems in 2021. Overall, the Milne Inlet Freshwater Fish Health Assessment demonstrated no adverse port-related effects on arctic char health and tissue chemistry within the Tugaat and Qurluktuk freshwater systems in 2021. The 2021 Milne Inlet Freshwater Fish Assessment, which provides a complete analysis and discussion of 2021 monitoring results, is provided in Appendix G.22 (Minnow, 2022).

As documented in the 2021 CREMP Monitoring Report, monitoring data collected to date suggest no adverse mine-related effects on arctic char populations within monitored lakes under the CREMP. The 2021 CREMP Monitoring Report, which provides a complete analysis and discussion of 2021 monitoring results, is provided as an appendix to the 2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b).

TRENDS

No adverse mine-related effects on arctic char populations within monitored lakes under the CREMP have been observed to date. Similar to previous years (2015 to 2020), lower numbers of arctic char were captured in the littoral/profundal habitat of Reference Lake 3 in 2021 compared to the numbers captured at the other monitored lakes (e.g. Mary Lake, Camp Lake, Sheardown Lake). These results suggest lower fish abundance at the reference lake than at the other monitored lakes.

Trends are not applicable currently for the Milne Inlet Freshwater Fish Health Assessment program.

RECOMMENDATIONS / LESSONS LEARNED

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

Baffinland will schedule a meeting with the MHTO in Q2 2022 to discuss the monitoring report and scope of work for the 2022 program. The fish health monitoring study is planned for August 2022 to focus on the Ikaluit river system as field teams were unable to access this area due to weather in 2021.

4.6.8 Terrestrial Environment (PC Conditions 49 through 64)

Sixteen (16) PC conditions relate to the potential impacts of the Project on the terrestrial environment, focusing primarily on caribou, carnivores, and terrestrial wildlife habitat. Within these conditions, the importance of collaboration on regional wildlife monitoring and management initiatives was stressed by the NIRB, the GN, and other parties.

Inuit & Stakeholder Feedback

During the environmental review process for the FEIS and FEIS addendum, the potential for sensory disturbance on caribou resulting from the Project was a key issue. Concerns were related to potential sensory disturbance and the potential for mortalities due to collisions with trains on the south railway and truck traffic along the Milne Inlet Tote Road. Communities were initially very concerned that the railway would interrupt the typical northward movement of caribou into the North Baffin Region. Another concern identified was that caribou are particularly sensitive to disturbance at their current low abundance state within their natural population cycle. Effects to terrestrial wildlife, and in particular key issues such as the current low numbers of caribou in the area, potential impacts to calving areas, movement and migration, as well as potential effects of caribou eating vegetation with dust, continue to be expressed in 2021 consultation activities (Appendix B).

Monitoring

Baffinland completes several monitoring programs on the terrestrial environment, some of which are conducted in collaboration with government agencies. The TEWG members, consisting of government agencies, the QIA, technical experts, and the MHTO, provide recommendations and guidance on Baffinland's terrestrial monitoring programs. The TEWG provides review and comment on the Terrestrial Environment Annual Monitoring Report and provides comments and recommendations for future updates and revisions to the monitoring program.

Baffinland's terrestrial monitoring programs include the following components:

- Snow Track Surveys
- Snowbank Height Monitoring
- Height of Land Surveys
- Wildlife Monitoring via Remote Cameras
- Incidental Observations and Wildlife Interaction (Incidental Mortalities) Tracking
- Helicopter Overflight Compliance Tracking

The objectives of the terrestrial monitoring programs are to monitor for mitigations put in place to minimize effects of the Project (achieved vis-à-vis the Snowbank Height Monitoring and Helicopter Overflight Compliance tracking programs), and the residual effects of the Project after the application of mitigation (i.e. through implementation of the Snow Track Surveys, the newly introduced Wildlife Monitoring via Remote Camera and recording Incidental Observations and Wildlife Interactions). Additionally, effects on terrestrial wildlife are assessed by looking at effects of the Project on other components of the environment, including dust on vegetation, which could impact caribou forage, or noise impacts to understand potential disturbances wildlife may be exposed to as a result of the Project.

Table 4.18 provides an evaluation of the Project's impacts on the terrestrial environment, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.18: Terrestrial Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Habitat Loss	Direct habitat loss due to the Project footprint, and indirect habitat loss due to sensory disturbances	Height of Land monitoring; snow track and snow bank monitoring; incidental observations.	The regional caribou population is currently too low to confidently assess potential effects; assessment will gain confidence when the caribou population increases.
Restriction of Movement	Project infrastructure and the tote road act as a barrier to the movement of caribou		
Mortality	Mortality resulting from vehicle collisions or project-induced hunting	Incidental observations; biologists and other staff on-site: no mortalities observed	Within FEIS predictions

Path Forward

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

Project Certificate Condition No. 49

Category	Terrestrial Wildlife and Wildlife Habitat - Terrestrial Environment Working Group
Responsible Parties	The Proponent
Project Phase(s)	All phases
Objective	To provide environmental oversight.
Term or Condition	The Proponent shall establish a Terrestrial Environment Working Group (TEWG) which will act as an advisory group in connection with mitigation measures for the protection of the terrestrial environment and in connection with its Environmental Effects Monitoring Program, as it pertains to the terrestrial environment. Members may consider the draft terms of reference for the TEWG filed in the Final Hearing, but they are not bound by them. The role of the TEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.
Relevant Baffinland Commitment	46, 47, 49, 50
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	2021 TEWG Meeting Records Concordance to 2020 to 2021 Board Recommendations
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2 Appendix E

METHODS

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

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

- Baffinland to provide a Project update to the members (e.g., includes mining and shipping-related activities such as ore production, and vehicular and vessel traffic);
- Discussion of monitoring program planning including sampling approach (e.g., sampling variables, sites, and data collection methods) in advance of field programs to obtain feedback by MEWG members;
- Discussion of results of monitoring programs to obtain feedback by MEWG members; and
- Various research presentations (given by Baffinland, Baffinland technical consultants and other members).

The group typically schedules two (2) yearly in-person meetings, in addition to hosting two (2) interim teleconferences per year. In 2021, engagement with the TEWG was reduced to avoid consultation fatigue and overlap with scheduled engagements associated with the Phase 2 Proposal. COVID-19 travel restrictions also continued to act as a barrier to in person meetings.

Draft technical annual reports and other documentation are provided to the TEWG in advance of meetings to the extent possible and on an on-going basis to allow for review, comment and advice to be provided by all members. Baffinland reviews all comments received on draft reports, makes effort to provide meaningful responses to each comment, and in so doing, takes into consideration the suggestions for improvement of the report and advice provided by TEWG. This mechanism allows TEWG members to provide constructive feedback on annual reporting efforts.

RESULTS

In 2021, the TEWG met on June 30, 2021 via teleconference (Table 4.19). In-person meetings were not possible in 2021 due to COVID-19 restrictions.

Table 4.19: Terrestrial Environment Working Group Meetings in 2021

Date	Location	Topics Discussed
TEWG		
June 30, 2021	Teleconference	2021 Terrestrial Environment Monitoring Program Overview

As a result of inputs from the TEWG, numerous program modifications have been made since 2015. When suggestions have been made by working group members on specific programs, Baffinland has made the effort in considering these requests in the most expedited and feasible manner. When a change is not implemented, Baffinland has provided rationale as to why the modification cannot immediately be implemented and/or that additional information is required before it can make an informed decision and/or has provided its reasoning for not pursuing specific requests and requesting that alternative methods be suggested.

Many of the members that participate in the Working Groups also represent regulatory bodies that have the ability to issue directions to Baffinland in accordance with their jurisdiction, mandate or issued permits. As has always been the intention of the Working Groups, they should not duplicate or fetter regulatory obligations, and rather remain focused on the enhancement of Baffinland's monitoring programs and providing advice on best practices or new research they are aware of to inform the ongoing development and implementation of Baffinland's comprehensive environmental management system.

TRENDS

As the NIRB has previously been made aware, from time to time Baffinland has struggled to reconcile recommendations from the Working Groups that do not properly appreciate or weight health and safety concerns and limitations or operational constraints. Costs or logistics of implementing recommendations are rarely taken into account, despite this reasonably needing to be a consideration when weighing the feasibility of a proposed program or activity. In many cases, despite Baffinland's efforts to specifically and clearly communicate these considerations to the Working Groups, members continue to advocate for research studies that are not feasible (i.e. collecting dust at far sites in winter months). In all cases, it is important to distinguish between initiatives that may be of personal interest or curiosity to individual Working Group members, and those that have a reasonable link to the Mary River Project's activities.

While recommendations brought forward within these Working Groups must be subject to appropriate consideration and discussions taking into consideration IQ and western science, they must also be weighed against the practical operationalization of the recommendation along with a fulsome cost benefit analysis, which no other

party is suited to do outside of Baffinland. To be clear, Baffinland accepts that some Working Group members wish to see a process inserted into the Terms of Reference to generate and record consensus-based recommendations and this has been reflected in the most recent drafts, however, Baffinland must stress the need to retain ultimate authority to reject recommendations that don't meet reasonable criteria for implementation, and to provide explicit rationale to this effect.

RECOMMENDATIONS / LESSONS LEARNED

In its most recent draft Terms of Reference (ToR) for the Working Groups Baffinland presented a reasonable path forward that would result in meaningful changes to the Groups current structure, operational schedule, and ability to influence the Project. It is expected that this should improve Members' expectations, communication within the Group and outcomes. Baffinland will continue to engage with the Working Groups on the development of a revised Terms of Reference throughout 2022 in hopes of resolving any outstanding concerns raised by members to date. See also responses provided to Board Recommendations in Appendix E.

Project Certificate Condition No. 50

Category	Terrestrial Wildlife and Habitat – General
Responsible Parties	The Proponent and other Parties as appropriate
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure appropriate and responsive adaptive management.
Term or Condition	The Proponent shall continue to develop and implement Project-specific monitoring for the terrestrial environment, and will demonstrate appropriate refinements to design, incorporation of analytical methods and elaboration of methodologies. The monitoring plan shall contain clear thresholds to allow for the assessment of long-term trends and cumulative effects where Project interactions are identified. Coordination and cooperation will be required where data collection, analysis and interpretation, or responsibility for mitigation and management requires the efforts of multiple parties (e.g., government, Qikiqtani Inuit Association, communities).
Relevant Baffinland Commitments	40, 70
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

The TEMMP outlines Baffinland’s monitoring programs for terrestrial wildlife and habitat. Terrestrial environment monitoring programs are reviewed regularly during TEWG meetings to refine methodologies. Cumulative effects and long-term trends assessments are incorporated into various aspects of the monitoring programs outlined in the TEMMP.

The TEMMP is supplemented by Baffinland’s contributions to information gathered from region-wide monitoring for caribou conducted by the Government of Nunavut, PRISM plot surveys, and seabird research by ECCC, and research on cliff-nesting raptor ecology by ArcticRaptors Inc.

RESULTS

Terrestrial environment monitoring has been ongoing since 2012, following methods outlined in the TEMMP. Updates to the TEMMP are developed on an as-needed basis, although adjustments to the monitoring program are not always formally updated yearly in the management plan itself. The updates are based on a statistical analysis of data and adjustments necessary to improve robustness of survey design and methods and as a result of discussion with the TEWG. The TEWG is engaged regularly to discuss annual monitoring programs for the terrestrial

environment. Feedback received from TEWG members is incorporated into annual monitoring reports and updates to the TEMMP where relevant.

Select examples of updates that have been made to methodologies over time as a result of input, including the selections of indicators and thresholds is as follows. Detailed summaries are provided in the Draft 2021 TEAMR (EDI, 2022):

Helicopter Overflights

The helicopter overflight analysis initially reported on compliance based on the elevation above the ground of points from the helicopter flight logs. Starting in 2017, pilot rationale for low-level flights were recorded on the pilots' daily timesheets and used to assess compliance. During 2020 TEWG meetings, additional reporting on helicopter pilot rationale and flight time was requested (Baffinland Iron Mines Corporation 2020). The helicopter flight database used for assessing compliance was re-analyzed from 2017 to 2019 and incorporated into the 2020 analysis to address this request. The 2017 to 2019 re-analysis results were previously presented in Appendix D of the 2020 Terrestrial Environment Annual Monitoring Report (TEAMR) (EDI, 2021a).

In its responses to the NIRBs request for comments on Baffinland's 2020 Annual Monitoring Report, the GN provided a comment requesting Baffinland to re-analyze the 2015 and 2016 helicopter overflight data using the newer methods (2017 onwards) as no analysis was conducted at the time using pilot rationale because rationale data were not collected in 2015 and 2016. The monthly breakdown of the number of transits flown, flight hours, and flight hours of cruising altitude compliance for 2015 and 2016 is presented in Appendix Table B-1 to Appendix Table B-8, and the inter-annual comparison is presented in Section 5.3 of the Draft 2021 TEAMR (EDI, 2022).

Dustfall

Over time, changes have been made to the dustfall monitoring program based on data analysis, interpretation, and input from the Terrestrial Environment Working Group (TEWG). The following summarizes key milestones and responses to TEWG comments, leading to the 2021 Dustfall Monitoring:

2013 — The dustfall monitoring program was initiated in August 2013. A total of 26 monitoring stations were established near Project infrastructure at the Mine Site, Milne Port, along the Tote Road, and reference sites (located 14 Km from the Project).

2014 — First full year of monitoring, which includes Project activities during the Construction Phase. Based on preliminary analysis, the program was expanded in September 2014 to increase the number of monitoring stations at the Mine Site and Milne Port. Additional stations were intended to improve understanding of 'how dustfall pattern may change with distance from Project infrastructure'.

2015 — First full year of monitoring during Mine Operations. One additional monitoring site was added at the Mine Site to address a gap in the program.

2019 — Data collection at 1,000 m distant from the Tote Road was increased in response to a request from the Qikiqtani Inuit Organization (QIA) and the Mittimatalik Hunters and Trappers Organization (MHTO). Six additional dustfall monitors were installed (three paired monitoring stations, one of each on the east and west sides of the Tote Road at KM 25, KM 56, and KM 75). Additionally, dustfall data collection at other 1,000 m distant sites was changed to year-round, where data were only collected during the summer months from 2013 to 2018. This brought the total number of dustfall monitors at the 1,000 m Potential Development Area (PDA) boundary to 12.

A monitor at Milne Port (DF-P-01) was relocated and was renamed (DF-P-08) to allow for the expansion of an ore stockpile.

2020 — Satellite imagery analysis of dustfall extent was conducted to address concerns from the MTHO that the past dustfall monitoring data and analyses did not reflect what hunters saw on the ground. The analysis included Landsat and Sentinel-2 imagery from 2004 to 2020 between March 15 and May 15.

2021 — Reported quantitative measurements from the dustfall satellite imagery analysis as requested from the NIRB, including dustfall concentrations and area using the Snow Darkening Index, a measure of mineral dust on snow. Included data from Steensby Inlet as a reference area for comparison.

2021 — A total of 14 new dustfall monitoring stations were installed, including:

- a. four additional monitors at Milne Port to better characterize dustfall moving off the Milne Port site;
- b. four new monitors along the section of Phase 2 railway that departs the Tote Road right-of-way (ROW). These monitors are to define baseline conditions; and,
- c. six dustfall monitors installed to collect dust at a height of 0.5 m. These ‘short’ monitors are part of a pilot study to investigate the variability between dustfall sampling at the standardized height of 2.0 m and closer to ground level. This program was implemented in response to specific requests from the QIA.

As of the end-of-year 2021, a total of 53 dustfall monitors (including the six ‘short’ monitors as part of the trial) have been installed at defined/pre-existing monitoring locations.

Vegetation

Procedures for the vegetation and soil base metals monitoring program have been adapted over time due to Project circumstances, investigative outcomes, and recommendations from the Terrestrial Environment Working Group (TEWG).

- a. Pre-construction baseline data on vegetation and soil base metal concentrations were first collected for the Project in 2008; however, these data were not used due to sampling and analytical discrepancies. Additionally, collection methods were not effectively documented and did not facilitate data continuity or comparability.
- b. Additional baseline sampling was conducted within the Regional Study Area in 2012 and 2013. Vegetation sampling targeted three focal groups: lichen (*Flavocetraria cucullata*, *F. nivalis*, *Cladonia arbuscula*, and *C. rangiferina*), willow (*Salix* spp.), and blueberry (*Vaccinium uliginosum*). The analysis focused on seven metals/metalloids deemed to be contaminants of potential concern (CoPC): aluminum (Al), arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), selenium (Se), and zinc (Zn) (EDI, 2014). Standardized sampling procedures and soil quality guidelines from the Canadian Council of Ministers of the Environment (CCME) were used as threshold values for soil. Peer-reviewed literature sources were used in the absence of explicit quality guidelines for lichen. Monitoring design and key findings are presented in the 2013 Terrestrial Environment Annual Monitoring Report (EDI, 2014).
- c. Sampling design and intensity were increased in 2014 to improve data capture and analysis. Lichen—recognized as an indicator of environmental conditions and accumulator of atmospheric pollutants (Neath and Wilkinson, 2008, Aslan et. al., 2011)—was selected as the key indicator and focal group for metals uptake. Blueberry and willow were removed as assessment targets due to their limited abundance or lack of

reference guidelines (EDI, 2015). Aluminum was removed as a CoPC due to its high variability, ubiquitous nature, and lack of CCME and US Environment Protection Agency (US EPA) soil quality guidelines to protect environmental and human health.

- d. In its 2014 to 2015 Annual Monitoring Report for the Mary River Project, in consideration of comments provided by the GN, issued recommendations for Baffinland to further modify the vegetation and soil base metals monitoring program. Before implementing any modifications, Baffinland Iron Mines Corporation (Baffinland) evaluated the program's experimental design—especially concerning statistical power and the ability to detect Project-related effects—to optimize sampling intensity and distribution. Ultimately, the study design was expanded to facilitate 'Near', 'Far', and 'Reference' locations; the procedures were then aligned with the dustfall monitoring program where feasible. Monitoring design and key findings are presented in the 2017 and 2018 Terrestrial Environment Annual Monitoring Reports (EDI, 2018, 2019b).
- e. The vegetation and soil base metals monitoring program was formalized in 2019 (using present methodology) with considerations and inclusions per the NIRB and GN recommendations (EDI, 2017). The analysis focused on six CoPCs in soil and lichen: As, Cd, Cu, Pb, Se, and Zn. Soil and lichen CoPC concentrations were compared between the 'Before' and 'After' periods and the distance from the Potential Development Area (PDA).
- f. Ten additional sample sites were added in 2020 to the Far distance category. Since most Project-emitted dust is deposited within 1,000 m of the PDA, increasing sample size in this range is expected to improve statistical ability to detect and quantify changes in metal concentrations associated with this distance. This modification to the study design was implemented in response to TEWG reviewer comments in 2019.

At present, the 2021 vegetation and soil base metals monitoring program is directly comparable with assessments from 2016 to 2019. Where possible, modifications to the methods have incorporated input from the TEWG and NIRB to improve and further refine data capture and baseline comparisons. Baseline data for the vegetation and soil base metals monitoring program includes sampling from 2012 to 2016.

Height-of-land

In 2016, viewshed modelling and mapping were completed to determine the amount of viewable area at each HOL survey station. A total of 227 km² were surveyed within the viewshed area, with viewshed ranging from 5 to 22 km² at each HOL station (Map 9-2). Refer to Section 4.3.1 of the 2016 Annual Monitoring Report for a detailed description of viewshed modelling and mapping (EDI, 2017).

During the June 2019 TEWG meeting, the MHTO suggested that HOL station locations should be re-evaluated to incorporate historic migration and calving patterns and any new information relevant to HOL goals and methodologies. In 2020 and 2021, the survey intensity was increased (as it is presently) by conducting a minimum of two (2) station visits and increasing survey observations from 20 to 40 minutes. To date, Baffinland has not been able to confirm with the MHTO alternate locations for the HOL stations, but will continue to consult with MHTO representatives on the program via the TEWG and other engagement methods. It is expected that further consultation can occur in 2022 assuming COVID-19 restrictions are lifted across the territory (i.e. to ease in-field engagement). As an interim solution, the remote camera monitoring program was implemented in 2021 to address comments from the MHTO that caribou were being 'missed' during the HOL surveys (see Section 9.4 – Remote Cameras).

TRENDS

Baffinland continues to make refinements to the monitoring programs design, methodologies, indicators and thresholds over time in response to input from the TEWG.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 51

Category	Terrestrial Wildlife and Habitat – General
Responsible Parties	The Proponent and/or TWEG
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote coordination of monitoring efforts.
Term or Condition	The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating Project-induced impacts. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions.
Relevant Baffinland Commitments	58
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2021 TEWG Meeting Records Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) Caribou Monitoring – Triggers and Recommendations (EDI, 2022a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2 Appendix G.23

METHODS

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

Baffinland also presented options for larger-scale caribou surveys to the TEWG during the June 2021 meeting, including aerial surveys and a remote collaring program as monitoring options, ideally collaborating with GN. Those presentations were intended to seek input from the TEWG on potential options, objectives, and methods for monitoring Project effects on the North Baffin Island caribou herd.

RESULTS

In 2018, Baffinland provided financial and logistical support for the North Baffin Island spring caribou population survey. The GN executed no regional caribou population surveys in 2019 or 2020; in 2021 the GN undertook a collaring program, and completed composition surveys. No requests for support from Baffinland were made by the GN, likely because of the need to maintain separation between Nunavummiut and site-based employees due to COVID-19. In addition, the GN continued their collaborative research program with the MHTO and Northern

Contaminants Program to understand metals composition in caribou tissues. Baffinland is a Party to the agreement with the Northern Contaminants Program and has provided financial resources for this work. Baffinland has regularly engaged with several Federal, Territorial, and Non- Government Organizations, including the Mittimatalik Hunters and Trapper's Organization, through TEWG meetings.

During the 2021 TEWG meeting, details surrounding a potential aerial survey program were discussed for monitoring Project effects on caribou. Details of required caribou density and the optimal number of collared caribou to reliably detect Project effects in the Regional Study Area were discussed with the group and a report summarizing this analysis was provided (EDI, 2022a). A collaring program would not be effective until ~350 caribou per study area (northern and southern halves of the terrestrial Regional Study Area) are present, with a minimum of 30 to 35 collared caribou per study area. Aerial surveys of the RSA would be required to monitor caribou density and identify if and when 350 caribou has been reached. Ideally, this program would run concurrently with GN-led regional caribou surveys to better understand caribou distribution and behaviour in the Mary River stratum compared to the larger regional scale.

Ultimately, after having the opportunity to discuss our permit application with in August, 2021, Baffinland informed the TEWG on September 2 of its decision to postpone the fall caribou aerial survey. The following rationale was provided to the TEWG.

1. Recognizing that results of the GNs composition N/ Baffin composition survey will be available in 2022, and that collaring data is still being processed, Baffinland and the TEWG would benefit from a review of the composition survey data and to some extent collaring data before finalizing aerial survey objectives and timing
2. Conversations during the June TEWG meeting suggested there was a need for the TEWG to better understand 2020/21/22 monitoring undertaken and planned by the GN, and further input from the MHTO before an aerial survey can be completed with support of the TEWG
3. Efforts during the summer to discuss the survey objectives and design with the MHTO on the survey were unsuccessful, but we are pleased to hear with additional time we will be able to further engage
4. To allow time for the work above to be completed, Baffinland will benchmark budget set out for a 2021 survey, and engage with the TEWG (and MHTO through that forum or other alternatives as needed) before proceeding. Baffinland will plan to resubmit permit application to complete this program in Fall 2022 as an alternative.

Furthermore, as outlined in the Summary for Term and Condition No. 35, during an August 2021 call with the GN Regional Wildlife Biologist Caribou Health Monitoring, it was confirmed by both Parties that Baffinland conducting this in parallel to the GN led program would create a potential conflict. In light of that consideration, it was agreed that the best approach was to defer to data made publically available through the NCP to meet our requirements for PC Condition No. 35. Once the GN program is complete, and depending on the results, Baffinland may put in a separate permit application to extend this type of research.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

In 2016, the MHTO became a member of the TEWG, adding a regional and community perspective to decisions and discussions within the group. In anticipation of a potential approval on the Phase 2 Proposal, Baffinland is working with the GN to finalize an agreement for the ongoing support of regional monitoring projects carried out by the GN, with relevance to the Project.

Project Certificate Condition No. 52

Category	Terrestrial Wildlife and Habitat – Caribou
Responsible Parties	The Proponent, TEWG
Project Phase(s)	Construction
Objective	To ensure best practices are used for caribou protection.
Term or Condition	Within 3 months of issuance of the Project Certificate, the Proponent shall initiate design, and develop the timeline to test and implement means of deterring caribou from pits and other hazardous areas. A review of best practices and techniques will be undertaken at other Northern mines where interactions with caribou occur. Considerations should include temporary ribbon placement, Inuksuk's, or fencing and subsequent monitoring for effectiveness. These activities shall be reported back to the Terrestrial Environment Working Group.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister; results to be reported back to the Terrestrial Environment Working Group.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2021 TEWG Meeting Records Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

The issues of caribou protection measures and caribou deterrents were discussed with the TEWG in December 2013. Several techniques were considered, including Inuksuk's, electric fences, wildlife fencing, and berms. It was suggested within the TEWG that caribou deterrents be considered "step-wise" mitigation to be addressed if a conflict between caribou and pit or other hazardous areas ever occurs or is likely to occur based on regional caribou abundance. Given the low regional population numbers of the North Baffin caribou herd, there has not yet been a need to implement caribou deterrent measures from hazardous areas.

As a preventative caribou protection measure, Baffinland requires all employees to adhere to a stop-work policy when wildlife is at risk of injury or death within the PDA, which reduces hazardous conditions. Baffinland has created guidelines (the Caribou Decision Tree; Figure 3-2 in the TEMMP) for driver response to caribou near roads based on distance and behaviour to reduce hazardous conditions further.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Currently, caribou abundance is relatively low on Baffin Island, and only a few incidental sightings of caribou have been made (see Section 9.5 in the Draft 2021 Terrestrial Environment Annual Monitoring Report). Baffinland will continue to monitor caribou within the Project sites and RSA, support regional caribou monitoring conducted by the GN, and identify appropriate caribou deterrents from Deposit No. 1 and hazardous areas in conjunction with the TEWG as necessary.

Project Certificate Condition No. 53

Category	Terrestrial Wildlife and Habitat – Caribou
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to caribou from Project-related traffic.
Term or Condition	<p>The Proponent shall demonstrate consideration for the following:</p> <ol style="list-style-type: none"> Steps taken to prevent caribou mortality and injury as a result of train and vehicular traffic, including operational measures meant to maximize the potential for safe traffic relative to operations on the railway, Milne Inlet Tote Road and associated access roads. <ol style="list-style-type: none"> 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. 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. Evaluation of the effectiveness of proposed caribou crossings over the railway, Milne Inlet Tote Road and access roads as well as the appropriate number. 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. Protocols for documentation and reporting of all caribou collisions and mortalities, as well as mechanisms for adaptive management responses designed to prevent further such interactions.
Relevant Baffinland Commitments	15, 71, 73
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	<p>Milne Inlet Tote Road – Active</p> <p>Steensby Rail Corridor – Not Active</p>
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	<p>Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)</p> <p>2021 TEWG Meeting Records</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

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

- The Caribou Decision Tree presented in the TEMMP (Figure 3-2 in the TEMMP) directs driver responses when caribou are near or crossing the Tote Road to minimize the chance of collision or disturbance;

- Snowbank heights and slopes were managed throughout the winter season to decrease potential barriers to caribou movement across the Tote Road, and compliance of snow management to a 1 m height limit was monitored at least once per month during winter months by Baffinland Site Environment staff (frequency increased to two to three times per month following multiple caribou sightings from the Tote Road in January 2020); and
- Snow track surveys were used to monitor caribou interaction with the Tote Road to determine if they cross the road or deflect their paths of movement away from the road, and were conducted at least twice in late winter when snow and daylight conditions allowed.

Detailed methods are identified in the TEMMP (Sections 3.3.3 and 4.5.2, and Figure 3-2) and the Draft 2021 Terrestrial Environment Annual Monitoring Report (Sections 9.1 and 9.2; EDI, 2022), which has been released to the Working Group for review and comment.

b. Monitoring and Mitigation Measures

In 2021, all twenty-four (24) Height of Land survey stations were visited twice during the caribou calving period annually to monitor caribou distribution, abundance, and behaviour.

Each site was visited for an average of 42 minutes, and the landscape was scanned using binoculars and a spotting scope to detect caribou presence and their proximity to Project infrastructure. If caribou were observed, a detailed survey would commence tracking caribou behaviour and interaction with Project infrastructure and vehicles. This monitoring data can then be used to inform mitigation measures.

Detailed methods are identified in the TEMMP (Section 4.5, Appendix 4-8) and the Draft 2021 Terrestrial Environment Annual Monitoring Report (Section 9.3), which has been released to the Working Group for review and comment.

In 2020, Baffinland explored numerous options for larger-scale caribou monitoring with input from the TEWG during 2020 meetings. This was done in response to TEWG concerns that Height of Land surveys are too local in focus to detect effects to caribou at greater distances from the Project. Aerial surveys, Global Positioning System (GPS) collaring, and remote camera monitoring were discussed as potential methods for monitoring caribou distribution, movement, and behaviour at the RSA scale, including in calving areas, with a focus on the Tote Road and proposed railway acting as barriers to movement. Remote cameras were deployed in 2021 at some of the Height of Land (HOL) sites to expand caribou detection efforts and during the 2021 TEWG meeting, details surrounding a potential aerial survey program were discussed for monitoring Project effects on caribou. See also Summary for Term and Condition No. 51.

c. Evaluation of Effectiveness of Caribou Crossings

Snow track surveys were used to collect data on caribou response to Project activities based on movement patterns. The surveys were conducted by driving slowly (30 Km/hr) from the Mine Site to Milne Port on the Tote Road in late winter. When wildlife tracks were observed, surveyors stopped and walked to the tracks to confirm species and then followed the tracks to observe behaviour, habitat use, and possible divergence of travel paths. When tracks were near or intersected the Tote Road, surveyors recorded the location, species that produced the tracks, number of sets of tracks counted (i.e., group size), travel path in relation to the road (e.g., deflected, travelled along, or crossing the Tote Road) and the height of the snowbank measured at either the crossing point or likely point of deflection.

Detailed methods are identified in the TEMMP (Sections 4.5.2, Appendix 4-9) and the Draft 2021 Terrestrial Environment Annual Monitoring Report (Section 9.1), which has been released to the Working Group for review and comment.

In 2021, snow track surveys were conducted in February, March, April, October and November by two or three Baffinland Site Environment employees using the methods described above.

Due to low embankments and existing low profile road conditions, there are no caribou crossings required for the Tote Road. Monitoring to date has focused on managing snowbank heights to minimize barriers to movement.

The RSA-scale caribou monitoring methods discussed with the TEWG during 2020 and 2021 meetings (i.e. aerial surveys, GPS collaring, and remote camera monitoring), if implemented, can be used to evaluate caribou movement in response to the Tote Road and proposed railway at a larger scale than snow track surveys to assess potential population-level effects.

d. Surveillance System

Not applicable in 2020 as the railway has not yet been constructed. The TEMMP (Sections 3.3.1, 3.3.2, 3.3.3, and 4.5.2) will include an updated surveillance system once the railway becomes a viable option.

e. Documentation and Reporting

The TEMMP (Sections 3.3.3 and 3.3.4) details the protocol for documenting and reporting caribou collisions and mortalities. Although caribou numbers are very low and the risks of having a vehicle-caribou collision are low, ongoing mitigation such as the use of the Caribou Decision Tree is occurring to prevent caribou mortalities.

RESULTS

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

- Caribou numbers remained low in 2021, and therefore interactions with the Tote Road and vehicles have not occurred;
 - A total of 104 caribou were reported as incidental observations in 2021, all of which were outside the PDA.
- A stop-work policy is implemented when wildlife in the area could be endangered by work being conducted, including truck driver responses when caribou are near or crossing the Tote Road using the Caribou Decision Tree;
- Continued snowbank height management in 2021 resulted in 90% compliance to the 1 m height limit, ensuring the barrier-free movement of caribou; and
- Snow tracking surveys did not observe caribou tracks in 2021, consistent with the low regional caribou numbers.

b. Monitoring and Mitigation Measures

- A total of 33 hours and 45 minutes of survey effort was conducted during the calving period in 2021;
- No caribou were detected on the landscape during 2021 snow track or Height of Land surveys; and
- Details of previous surveys dating back to 2013 are provided in the previous annual reports.

- A total of 104 caribou from 33 groups were reported from incidental observations in 2021. All of the caribou were observed outside of the PDA, with most in exploration areas southeast of the Project in summer.
- Remote Wildlife Camera Monitoring also did not identify any caribou, supporting findings of HOL data that has been collected to date.

c. Evaluation of Effectiveness of Caribou Crossings

Results were inconclusive as of 2021, as caribou have only been incidentally and sporadically detected in or near the PDA since 2013 (see the Draft 2021 Terrestrial Environment Annual Monitoring Report). However, ongoing snowbank height management and wildlife response monitoring continues. In 2020, caribou were confirmed to have crossed the Tote Road in three of the four incidental observations in January, suggesting that the road did not act as a barrier to movement in those instances.

d. Surveillance System

Not applicable in 2020 as the south railway was not constructed.

e. Documentation and Reporting

All documentation and reporting protocols have been developed. Baffinland maintains records of all wildlife interactions and mortalities via mandatory reporting protocols. Neither caribou collisions nor caribou mortalities occurred in 2020, nor any other year of Project operation.

TRENDS

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

Caribou interactions with the Tote Road and vehicles have not occurred; however, training on using the Caribou Decision Tree, snowbank height management, and snow tracking surveys continue. No interaction with vehicles occurred.

Annual monitoring of snowbank heights along the Tote Road since 2014 indicates a rate of compliance between 66% and 97% (Figure 4.3), with the highest level of compliance achieved in 2019.

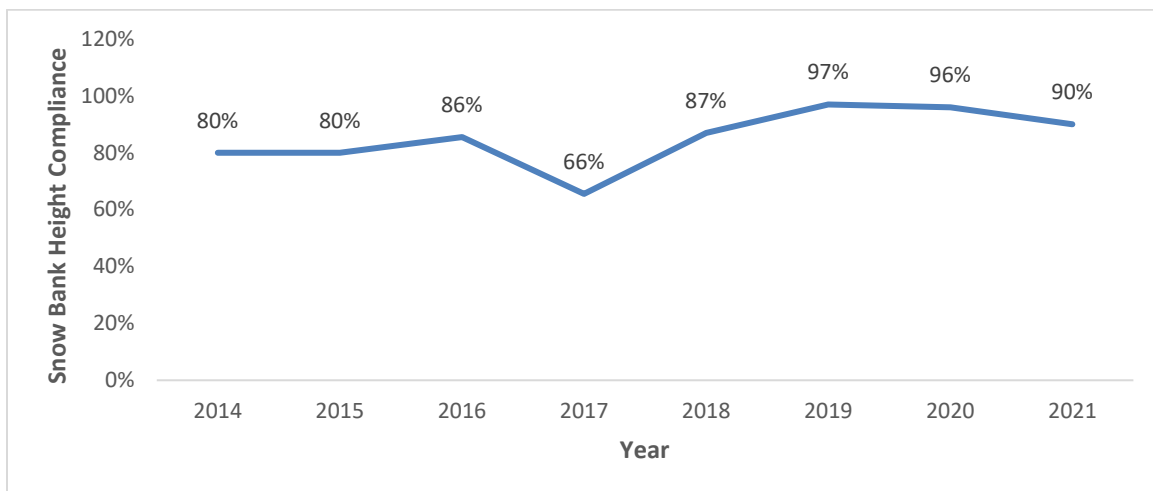


Figure 4.3: Snowbank Height Compliance Monitoring Results from 2014 to 2021 on the Tote Road

b. Monitoring and Mitigation Measures

Based on caribou observed per hours of survey effort, there was a decrease in caribou observations during Height of Land surveys from 2013, when the surveys began (Figure 4.4). These data reflect the low regional caribou numbers of the North Baffin Island herd.

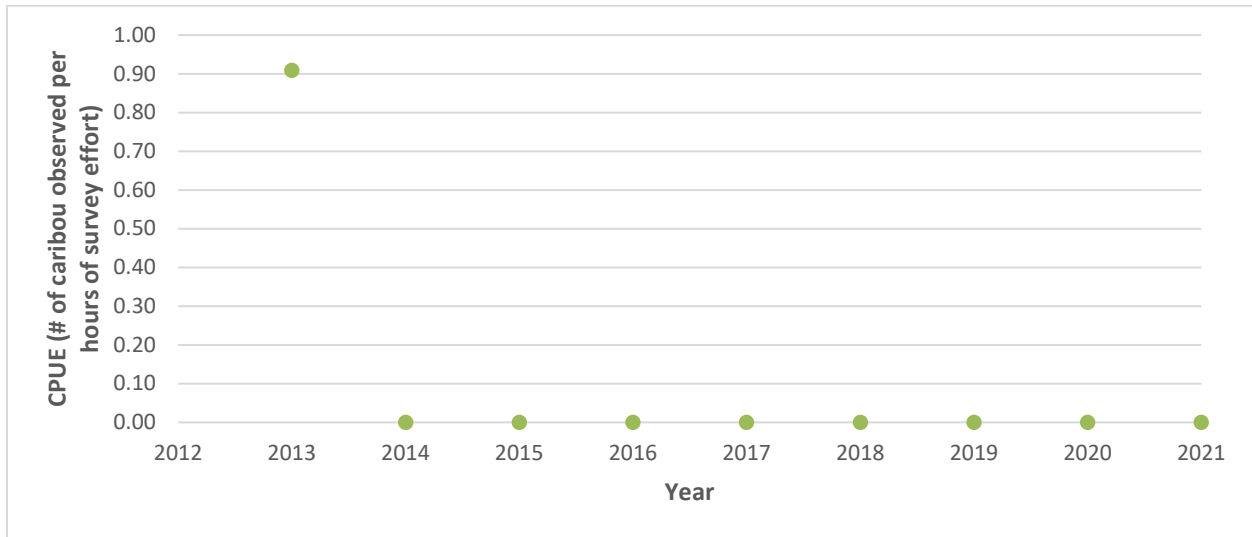


Figure 4.4: Caribou Observations from Height of Land Surveys from 2013 to 2021

c. Evaluation of Effectiveness of Caribou Crossings

No caribou or wolf tracks have been detected during snow tracking surveys along the Tote Road between 2014 and 2021. However, Arctic fox and snowshoe hare tracks were observed during all survey years (Figure 4.5).

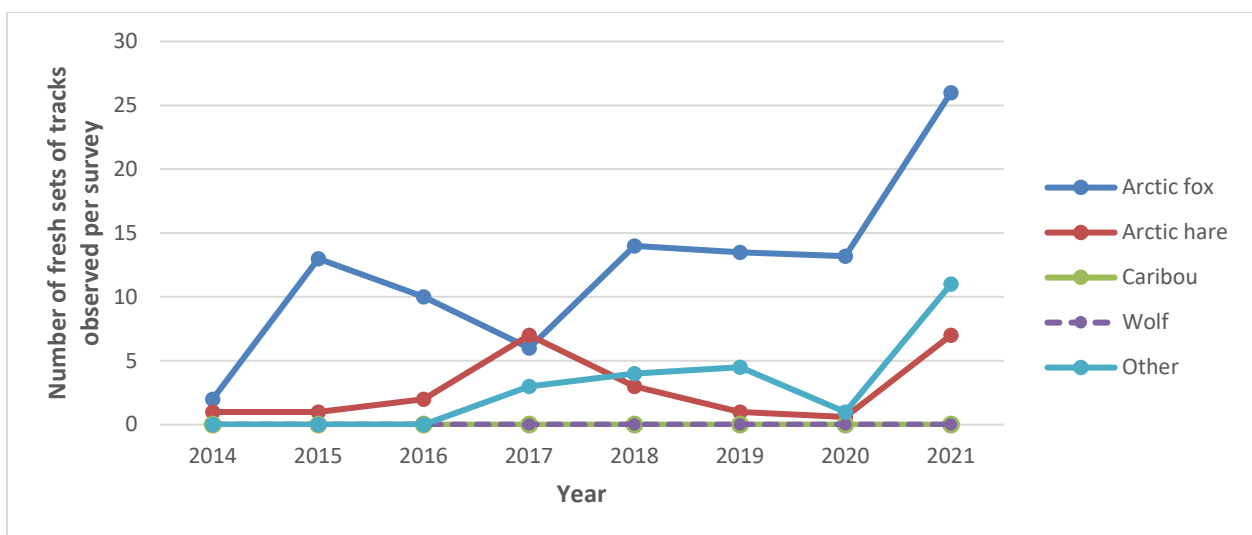


Figure 4.5: Snow Track Survey Trends from 2014 to 2021

RECOMMENDATIONS / LESSONS LEARNED

Snowbank height, snow track, and Height of Land surveys will continue annually to evaluate potential Project effects on caribou and terrestrial wildlife. The use of remote wildlife cameras will also be evaluated with the TEWG for implementation again in 2022. As regional caribou numbers increase and interact more frequently on or near the Tote Road, the Caribou Decision Tree will be reviewed for effectiveness. Seasonal migrations of caribou and their interaction with the Tote Road will be considered, and snow track surveys can occur more often by on-site staff. Baffinland will continue to explore options for regional-scale caribou monitoring with the TEWG.

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

Project Certificate Condition No. 54

Category	Terrestrial Wildlife and Habitat – Caribou
Responsible Parties	The Proponent
Project Phase(s)	Construction - within six (6) months of issuance of Project Certificate
Objective	To Update the Terrestrial Environmental Management and Monitoring Plan.
Term or Condition	<p>The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include, but not be limited to the following:</p> <ul style="list-style-type: none"> a. Details of the methods and rationale for conducting monitoring prior to the commencement of construction; b. Monitoring for caribou presence and behaviour during railway and Tote Road construction; c. Description and justification of statistical design or other means of determining effect and proposed analyses to support the conclusions drawn from monitoring impacts of the mine and related infrastructure on wildlife; d. Details of monitoring and mitigation activities, which should be established in collaboration with the Terrestrial Environment Working Group and are expected to include: <ul style="list-style-type: none"> iv. Dustfall (fugitive and Total Suspended Particulates), that addresses methods to reduce risk to caribou forage from dustfall; v. 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. vi. Details of monitoring thresholds related to level of mitigation and management; and vii. Details of a comprehensive hunter harvest survey to determine the effect on caribou populations and potential effects on caribou behaviour resulting from increased human access caused by upgrades to the Milne Inlet tote road (and any other roads if they are shifted from private to public use) and increase local knowledge of the mine site, including establishing pre-construction baseline harvesting data.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	Plan to be submitted to the NIRB and the TEWG within 6 months of issuance of a Project Certificate.
Status of PC Condition	Milne Inlet Tote Road – Active Steensby Rail Corridor – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Nunavut Impact Review Board
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

The TEMMP directly addresses PC Condition No. 54. The TEMMP outlines a detailed rationale and methodology for Baffinland's monitoring and mitigation programs. It is reviewed and updated as needed periodically. However, changes may be implemented in advance of formal updates as the need arises. Regarding PC Condition No. 54c, the programs are revised based on statistical analyses of annual data, as reported in the annual reports.

RESULTS

Specific items outlined in this Project Condition can be found in the following sections in the TEMMP:

PC Condition No. 54a.

- Section 4 – Monitoring Framework

PC Condition No. 54b.

- Section 4.5.1 – Caribou Habitat Monitoring
- Section 4.5.2 – Caribou Movement

PC Condition No. 54c.

- Appendix B – Monitoring Methods and Details

PC Condition No. 54d.i.

- Section 3.1 – Mitigation Measures: Vegetation
- Appendix B, Section 4-2 – Vegetation Monitoring: Vegetation Health
- Appendix B, Section 4-3 – Vegetation Monitoring: Dustfall

PC Condition No. 54d.ii.

- Section 4.5.2 – Caribou Movement
 - This section outlines Baffinland's plan to use remote motion-sensing cameras to observe caribou behaviour at crossing points along the Tote Road and railway. Currently, caribou population density is too low for this method to be effective. This program will be revisited when caribou population density increases to a level that allows robust experimental design and statistical analysis.
- Appendix B, Section 4-9 – Caribou Monitoring: Movement

PC Condition No. 54e.

- Thresholds are described throughout Section 4 – Monitoring Framework and Appendix B – Monitoring Methods and Details

PC Condition 54f.

- Section 4.5.3 – Caribou Mortality
- Section 4.5.4 – Caribou Health

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Regarding PC Condition No. 54b, Baffinland discussed additional caribou monitoring methods with the TEWG during 2021 meetings (i.e., aerial surveys, GPS collars, and remote camera monitoring). These methods can be used to evaluate caribou movement in response to the Tote Road and proposed rail line at the RSA scale to assess potential population-level effects when caribou population density increases. Remote camera monitoring was piloted in 2021, and ongoing implementation of this program will be discussed with the TEWG for 2022. When study design details for these programs are finalized, these methods and details will be added to the TEMMP.

Project Certificate Condition No. 55

Category	Terrestrial Wildlife and Habitat – Wolves
Responsible Parties	The Proponent, Government of Nunavut Department of Environment
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate potential impacts to wolves.
Term or Condition	<p>The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut- Department of Environment (GN-DOE) to ensure compliance with the <i>Nunavut Wildlife Act</i>. Consideration must be given to the following:</p> <ul style="list-style-type: none"> a. Monitoring for active wolf dens within a 10 Km radius from the mine site, under the direction and prior approval of the GN DOE, and reporting the results through NIRB's Annual Reports on terrestrial wildlife in the Project Development Area (PDA); b. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive; c. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; and d. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the PDA over time.
Relevant Baffinland Commitments	57, 74
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	Not applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	<p>Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>2021 TEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix C.2

METHODS

As a result of low caribou numbers, wolf numbers in the region have also declined (i.e., no wolves incidentally observed in or around the PDA throughout 2021). Wolf monitoring programs will be re-initiated when wolves and/or caribou are consistently observed near the Project area (e.g., based on trends observed from the Height of Land monitoring data or incidental monitoring data) or on observations of local harvesters and as reported to Baffinland or the TEWG. Monitoring of carnivore dens will continue to be discussed within the TEWG based on discussions within the group. When deemed necessary, Baffinland will re-initiate carnivore den monitoring.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 56

Category	Terrestrial Wildlife and Habitat - Wildlife Habitat
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure progressive reclamation of disturbed wildlife habitat.
Term or Condition	The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the 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.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Indigenous and Northern Affairs Canada
Reference	Interim Closure and Reclamation Plan (Baffinland, 2018a) Revegetation Survey & Preliminary Reclamation Trial (EDI, 2021b) Implications for Reclamation Practices & Trials at the Mary River Project (EDI, 2019a) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

As described in the ICRP, a Reclamation Research program was proposed to identify best practices for promoting natural revegetation that will inform the progressive revegetation program for disturbed areas no longer required for operations. The objective is to achieve both sustainable vegetation cover, and enhance physical stability and achieve the desired aesthetic conditions for the Project site at closure.

Refer to Summary for Term and Condition No. 39 for further details.

RESULTS

Not applicable

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The results of the reclamation study conducted to-date will be shared with Stakeholders through a Mine Closure Working Group, which may begin convening as early as 2022. Updates on the outcome of the ongoing reclamation research study and activities of the Mine Closure Working Group will be provided to the NIRB as they are available.

Project Certificate Condition No. 57

Category	Terrestrial Wildlife and Habitat – Reporting
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate and monitor for impacts to wildlife.
Term or Condition	<p>The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information:</p> <ul style="list-style-type: none"> a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	<p>Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>2021 TEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix C.2

METHODS AND RESULTS

The TEMMP is the primary guidance document for mitigation and monitoring at the Mary River Mine; the Terrestrial Environment Annual Monitoring Report (TEAMR) is the primary source for terrestrial environment summary reporting. For brevity, the following responses highlight summary findings and notable outcomes from the TEMMP and TEAMR concerning PC Conditions. Refer to the TEMMP and TEAMR for comprehensive descriptions of study design, data capture, analytical methods (including assessment limitations and assumptions), and annual monitoring results.

- a. Updates to and descriptions of all baseline data are summarized annually in the TEAMR.
- b. Baffinland regards engagement and consultation with Inuit and incorporation of Inuit in field monitoring as an important aspect of the programs. Inuit have been involved in various components of the terrestrial environment monitoring program, including: hiring and training Inuit to work on terrestrial monitoring programs; supporting the participation of the MHTO in the TEWG; funding for two full-time on-site Environmental Monitors that are appointed and solely employed by QIA but fully integrated into the Site Environment team; and the implementation of a community-based monitoring program through the Mary River IIBA. Inuit are involved in all terrestrial environment annual monitoring programs conducted by Baffinland's consultant when possible. This has included participation in snow track surveys, Height of Land surveys, vegetation monitoring, and raptor monitoring.
- c. In 2021, the COVID-19 Pandemic continued to impose health and safety restrictions on Inuit engagement. Inuit involvement as research assistants in the terrestrial environment monitoring program decreased compared with previous field assessment seasons.
- d. Where relevant, the TEAMR discusses near-site wildlife observations concerning available knowledge about regional populations. It compares measured wildlife data (e.g., vegetation abundance data, cliff-nesting raptor data, caribou observations) to previous years' data and baseline data as an indicator of natural variability. Bird monitoring survey data that derived density estimates were compared to regionally available density values. The low numbers of caribou and wolf observations near site reflect low numbers reported throughout the North Baffin Island region by the GN.
- e. A total of 104 caribou from 33 groups were reported from incidental observations in 2021. The caribou were observed outside of the PDA, with most in exploration areas southeast of the Project in summer. No caribou were identified during the Height of Land surveys. Caribou have not been observed directly in the PDA during Height of Land surveys between 2014 and 2021. Caribou abundance surveys conducted in 2014 and 2018 by the Government of Nunavut also reported low abundance throughout Baffin Island.
- f. Project Certificate Condition No. 57(d) is addressed in the TEAMR by reporting the results of the Height of Land surveys, snow tracking surveys, incidental observation logs, wildlife mortalities log, and reference to regional conditions from other publications and documents.
- g. All results of the monitoring programs, including methods and approaches to statistics, are included in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022), which has been released to the Working Group for review and comment.
- h. In 2021, roughly 5.8 Mt of iron ore was hauled from the Mine to the Milne Port stockpile, and 5.6 Mt of iron ore was shipped out of Milne Port. Construction in 2021 was limited; continued development and construction of infrastructure and laydowns required at Milne Port and Mary River Mine Site to support operations for additional supplies and equipment occurred, and additional water management infrastructure was built at Deposit No. 1. At the end of 2021, the total project footprint was 587 ha.
- i. The Draft 2021 TEAMR (EDI, 2022) summarizes mine traffic activity as it correlates to dustfall monitoring. All non-haul vehicle traffic on the Tote Road is recorded by Baffinland security. This type of vehicle traffic includes road maintenance mobile equipment, mechanical maintenance/fueling trucks, pick-up trucks, etc. Mine Operations Dispatch tracks the number of trucks hauling ore on the Tote Road each day.

- j. The average number of ore haul transits per day in 2021 was 255.8; this represents a slight increase in the average daily number of ore haul transits in 2021 compared with 2020 (243.3 ore haul transits per day), and a continuation of an increasing trend in ore haul transits since operations began. As seen in previous years, there were periodic full or partial closures of the Tote Road associated with adverse weather conditions (freeze/thaw, poor visibility, etc.). However, these closures and corresponding decreases in ore haul transits were short-lived. The average daily number of transits was steady through the 2021 calendar year. Other non-haul truck traffic had an annual average of 28.6 vehicle transits per day, which was slightly higher than 2020 but lower than the three years before 2020, ranging from 32.3 to 43.0 transits per day. The average daily total vehicle transits (haul and other) on the Tote Road in 2021 was 255.8 vehicle transits per day, slightly below the 2020 average of 271.7 transits per day. Ore haul transits are depicted below in Figure 4.6.
- k. A summary of annual weather conditions is included in the Draft 2021 Terrestrial Environment Annual Monitoring Report, which has been released to the Working Group for review and comment. In 2021, mean monthly air temperatures at the Mine Site rose above zero in June, reached an annual monthly high of 7°C in July, and fell back to zero in September. Mean monthly air temperatures at Milne Port rose above zero in June, reached the annual monthly high of 5.9°C in July, and then fell below zero once again in September. The timing and magnitude of mean monthly air temperatures at Mine Site and Milne Port were fairly consistent with baseline and post-baseline periods. Both the Mine Site and Milne Port experienced precipitation equipment malfunctions which made comparisons to previous years difficult. Wind speed and direction at the Mine Site were consistent with past years (generally a southeast wind). Milne Port generally experienced north-northeast winds off of Milne Inlet, and southeast winds.
- l. The TEMMP addresses PC Condition No. 57(h). All versions of the TEMMP have been included in the revision table contained within the document. Ongoing updates and changes to monitoring programs are also discussed in the Terrestrial Environment Annual Monitoring Reports and TEWG meetings.

TRENDS

- a. Annual monitoring programs continue to increase knowledge of the terrestrial environment, in addition to knowledge gathered vis-à-vis support to regional monitoring programs.
- b. Inuit participants in the terrestrial monitoring programs continue to provide valuable knowledge and skill sets to the implementation of the program. Under the assumption COVID-19 restrictions will be lifted in 2022, it is Baffinland's expectation that local Inuit will continue to play an important role in the terrestrial monitoring programs at site. Additionally, Baffinland will continue to provide support for community-based monitoring programs through IIBA requirements, and/or other collaborative opportunities should they arise in the future.
- c. Overall, monitoring conducted for the terrestrial environment is consistent with FEIS predictions, with the exception of dustfall data, which has remained stable (or trending slightly downwards) since 2016.
- d. Wolf and caribou observations on-site follow the trends of regional observations; very low abundance. Sightings of other terrestrial animals (i.e. arctic hare) have remained consistent with previous years.
- e. Overall, monitoring conducted for the terrestrial environment is consistent with FEIS predictions, with the exception of dustfall data, which has remained stable (or trending slightly downwards) since 2016.

- f. Production levels, and the transportation of ore have remained relatively consistent since 2018 when the Production Increase Proposal was initially approved by the NIRB. Results of monitoring to-date do not indicate that effects of the Project on the terrestrial environment increased significantly, or in parallel with the increase in operations from 4.2 to 6 Mtpa (Figure 4.7).
- g. Baseline (2005 to 2010) and post-baseline (2013 to 2020) wind directions and speeds were consistent with 2021 data. Both had primarily north-north-easterly and southeasterly winds, with the strongest winds from the southeast. Milne Port is consistently cooler and drier than the Mine Site. In 2021, temperatures recorded at Milne Port were, on average, 0.6°C cooler than the Mine Site throughout the year. This difference is smaller than normal; since the start of the baseline recording, Milne Port has averaged 2.2°C cooler than simultaneous measurements from the mine site (Figure 4.8 and Figure 4.9).

RECOMMENDATIONS / LESSONS LEARNED

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

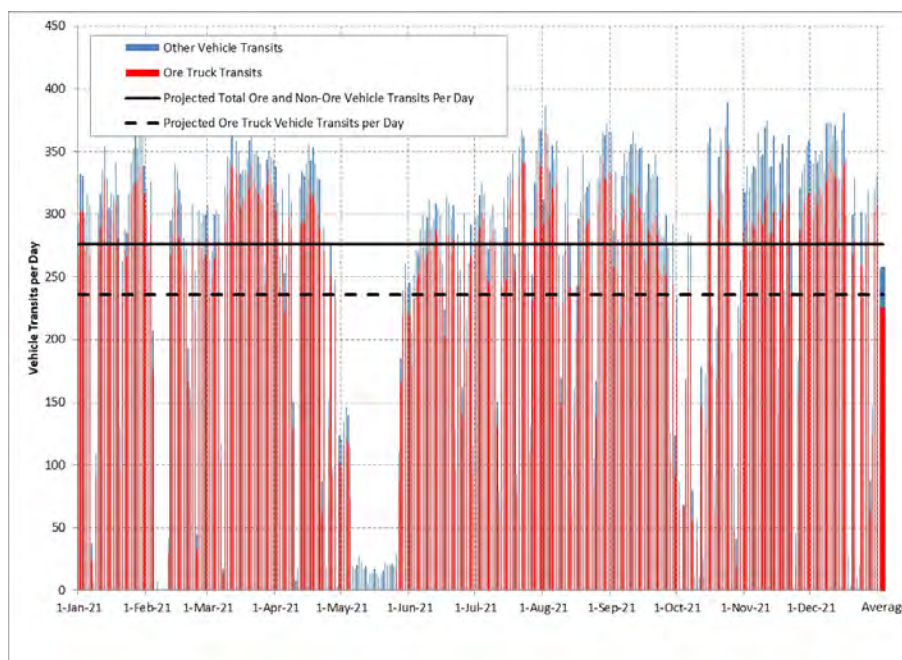


Figure 4.6: Daily Vehicle Transits on the Tote Road in 2021

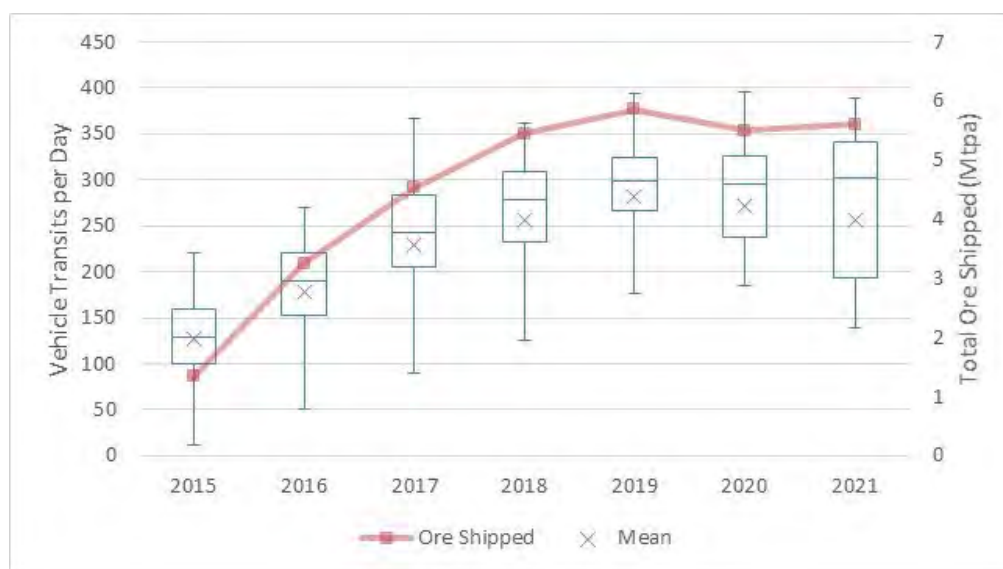


Figure 4.7: Trends in Vehicle Transits on the Tote Road from 2015 to 2021

Notes:

1. Includes ore haul traffic and other traffic combined.
2. The 'x' in the centre of each box marks the annual mean value, the box displays median, 25th and 75th quartiles, and the whiskers represent the minimum and maximum values.
3. The red line indicates the total annual amount of ore shipped.

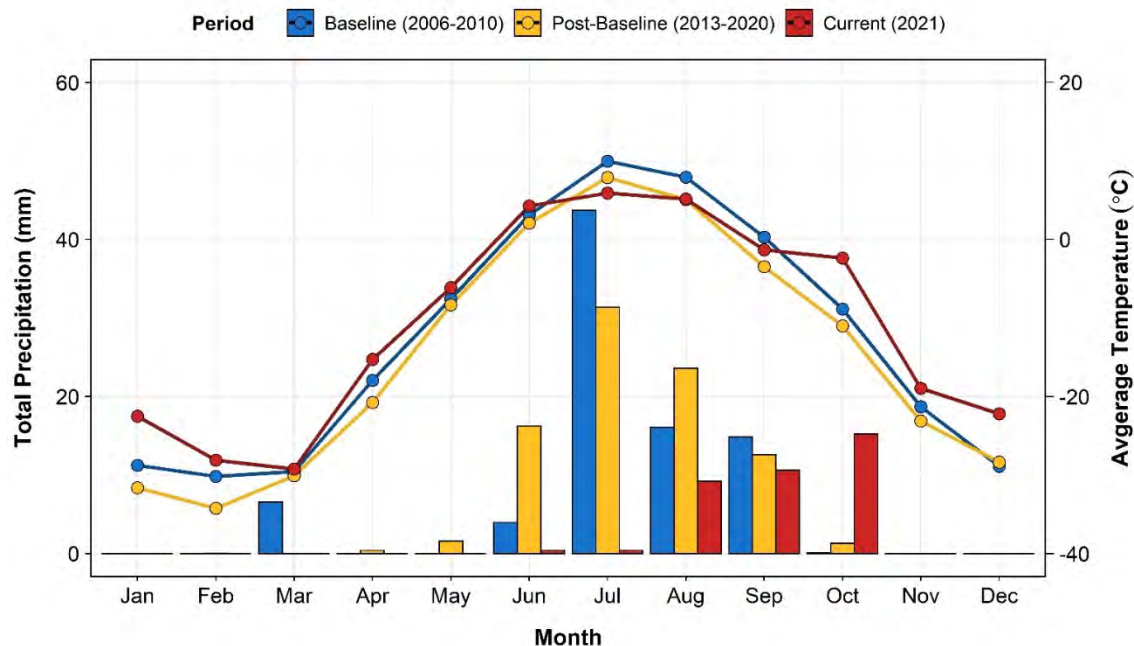


Figure 4.8: Mine Site Monthly Average Air temperatures* (lines, °C) and Total Precipitation* (bars, mm) During The Current (2021), Post-Baseline (2013 to 2020), and Baseline (2005 to 2010) Periods

Notes:

*Precipitation results for 2021 may be erroneous and should be interpreted with caution.

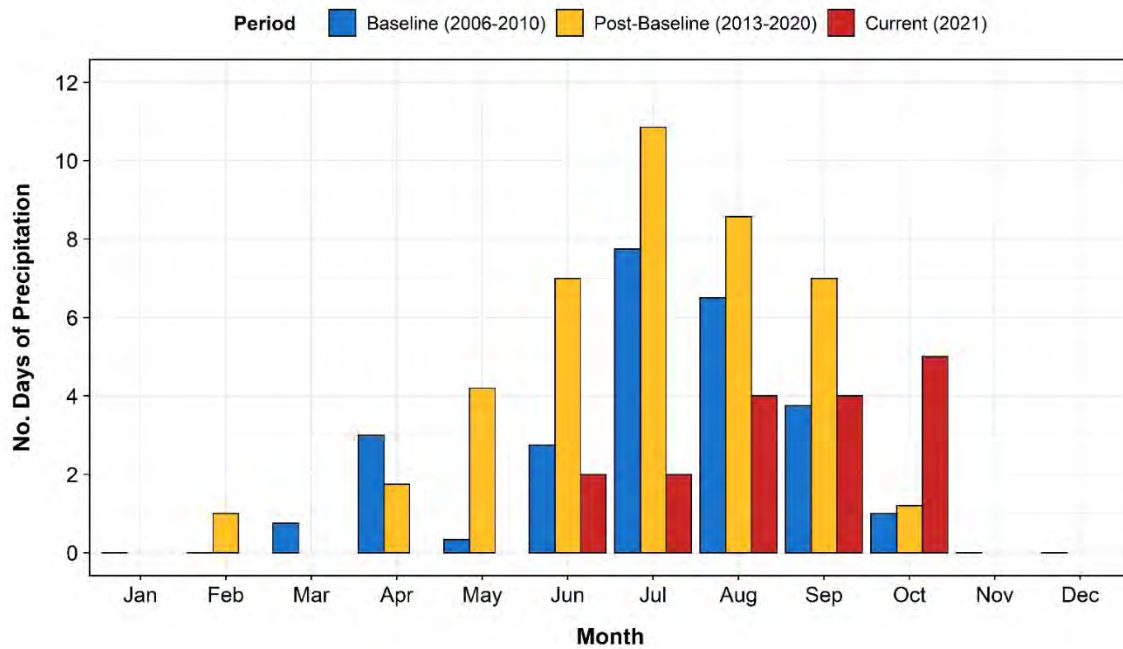


Figure 4.9: Milne Port Monthly Average Air Temperatures (lines, °C) and Total Precipitation (bars, mm) During The Current (2021), Post-Baseline (2013 to 2020), and Baseline (2005 to 2010) Periods

Project Certificate Condition No. 58

Category	Terrestrial Wildlife and Habitat – Reporting
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate and monitor for impacts to wildlife.
Term or Condition	<p>Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:</p> <ul style="list-style-type: none"> a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails; c. A description of the extent of dustfall based on measured levels of dustfall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets; d. A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and dustfall contribute to cumulative effects of the Project; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available.
Relevant Baffinland Commitments	60, 71
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Milne Inlet Tote Road – Active Steensby Rail Corridor – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	<p>Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>2021 TEWG Meeting Records</p> <p>2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a)</p> <p>Air Quality Memo (Stantec, 2022)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2 Appendix G.29

METHODS AND RESULTS

The TEMMP is the primary guidance document for environmental mitigation and monitoring at the Mary River Mine; the TEAMR is the primary source for terrestrial environment summary reporting. For brevity, the following are references to related PC Conditions that address the subcomponents (a-f) of PC Condition No. 58. Not that the TEMMP and TEAMR should also be referenced for comprehensive descriptions of study design, data capture, analytical methods (including assessment limitations and assumptions), and monitoring results.

- a. Refer to Summary for Term and Condition No. 57
- b. Refer to Summary for Term and Condition No. 53, 54 and 57.
- c. Refer to Summary for Term and Condition No. 10, 34, and 54.
- d. Refer to Summary for Term and Condition No. 57.
- e. Refer to Summary for Term and Condition No. 10, 34, 50, 54 and 57
- f. There is no new information on caribou migration trails since the data collection was summarized for the FEIS baseline report completed in 2012. By the end of 2021, there had been no new collar data collected. These results are reviewed with the TEWG, within which the QIA participates.

Caribou have not been observed directly in the PDA during Height of Land surveys between 2014 and 2021. Caribou abundance surveys conducted in 2014 and 2018 by the Government of Nunavut also reported low abundance throughout Baffin Island.

In 2021, Baffinland explored options for regional-scale caribou monitoring. Aerial surveys, GPS collaring, and remote camera monitoring were discussed as potential methods for monitoring caribou distribution, movement, and behaviour at the RSA scale, including in calving areas, with a focus on the Tote Road and proposed railway acting as barriers to movement. Collectively, these data would further contribute to identifying caribou migration patterns and trails. Remote camera monitoring was conducted in 2021, but consistent with the results of the Height of Land (HOL) surveys, no caribou were detected using this method. Baffinland will evaluate with the TEWG the value in reinstituting this program in 2022.

TRENDS

Refer to PC Condition No. 53 for trends related to wildlife response (as indicated by outcomes from HOL surveys, snow track surveys, and incidental observations).

Refer to PC Condition No. 34 for trends related to vegetation and soil base metals monitoring.

Trends for dustfall:

- From 2014 to 2016, dustfall across the PDA increased commensurately with mine production. From 2016 to 2020, dustfall generally plateaued with only modest increases in some Project areas. Trends at each Project site are summarized below and are presented in Figure 4.10.
 - Mine Site (DF-M Monitors) — There was a modest increase in dustfall at the Mine Site dustfall monitoring sites, largely driven by an increase in DF-M-01, which is located nearest to the air strip.
 - Milne Port (DF-P Monitors) — Following some modest increases in 2017, dustfall has remained constant at the Milne Port Sites.

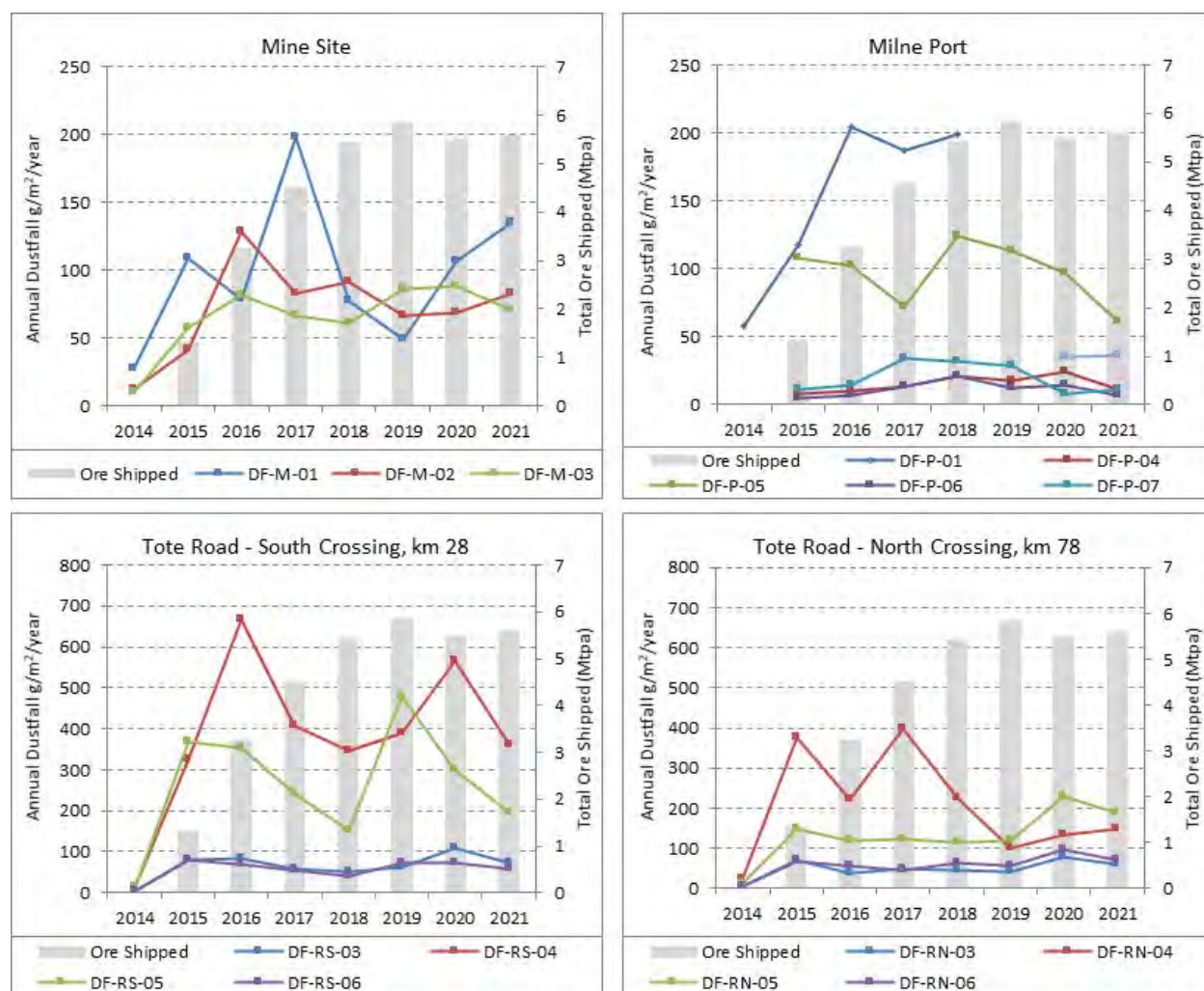


Figure 4.10: Annual Dustfall and Ore Shipping Trends from 2014 to 2021

- Tote Road North (DF-RN Monitors) — There was a modest decrease at most annual monitoring stations in 2021, likely as a result of applications of DustStop along the Tote Road.
- Tote Road South (DF-RS Monitors) — After decreasing from 2016 through 2018, dustfall deposition at the sites closest to the Tote Road have decreased since 2020.
- Analysis of satellite imagery compared dustfall extents from 2014 to 2021. Trends generally aligned with or confirmed the outcomes from the dustfall field monitoring program.
 - The dustfall extent around the Mine Site showed a similar pattern to the 2020 extent, but dust extended further than it did in 2020 to the south and the northwest. The 2021 dustfall concentration was higher in localized spots than in previous years. The dustfall to the south on the surrounding terrain extended beyond the modelled isopleths, as it did in 2019

- Dustfall extent around the Tote Road in 2021 were larger than the 2020 extents, and similar to the 2019 extents. The 2021 dustfall concentrations from both datasets were higher along the Tote Road and in the surrounding terrain than the previous years
- Dustfall extent around Milne Port decreased from 2019 to 2021 in both datasets and may reflect the application of DusTreat on the ore stockpiles. Before 2021, the dustfall extent along Milne Inlet followed a similar pattern to the amount of ore shipped, with increases from 2014 to 2019 and a slight decrease in 2020 similar to 2018.

RECOMMENDATIONS / LESSONS LEARNED

Refer to PC Condition No. 53 for recommendations related to wildlife response (as indicated by outcomes from Height of Land surveys, snow track surveys, and incidental observations).

Refer to PC Condition No. 34 for recommendations related to vegetation and soil base metals monitoring.

- Recommendations for dustfall:
 - Dustfall currently presents a low risk to environmental and human health and safety.
 - The TEWG and land users have raised concerns about dustfall. To address this, more in-depth data analyses were applied (including spatio-temporal and inter-annual comparisons) to tease out potential trends and tendencies; analyses of satellite imagery were also completed to define spatial extents of dustfall further.
 - Baffinland is committed to mitigating the generation of dust at the Project by improving and refining its approaches to dust suppression, including the application of dust suppressants on the Tote Road, Air Strip Milne Port Stockpile throughout 2021.

Project Certificate Condition No. 59

Category	Terrestrial Wildlife and Habitat – Aircraft Disturbances
Responsible Parties	The Proponent
Project Phase(s)	Construction, Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to wildlife and Inuit harvesting.
Term or Condition	The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point to point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance. The Proponent, in collaboration with the Terrestrial Environment Working Group shall develop a program or specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around Project areas.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records 2020 Terrestrial Environment Annual Monitoring Report (EDI, 2021a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix C.2

METHODS

There is a discrepancy between Project Condition No. 59 and 71, Project Condition No. 59, suggesting that minimum flight height should be 610 metres above ground level (magl) in all areas, while Project Condition No. 71 prescribes a minimum flight height of 650 magl. Considering that most, if not all, areas where Baffinland operated in June through September were likely to have migratory birds, the default minimum altitude for helicopter overflights was the more conservative 650 magl (during point-to-point travel).

In consultation with the TEWG, Baffinland implemented a requirement for all helicopter pilots to complete a daily pilot timesheet to track flight data, the reason for flight and rationale for lower flight altitudes, when required. Descriptions of the rationales recorded in the daily pilot timesheets are listed in Table 4.20. Pilots were also given the spatial boundaries of any identified concentrations of migratory birds, buffered by the required 1,500 m horizontal avoidance distance. Pilots were then asked to avoid flying in these areas.

Table 4.20: Descriptions of Pilot Rationales Given for Low-Level Flights

Rationale	Description
Drop off/pick up	The distance between take-off and landing sites does not allow enough time to gain 650 magl; the topography between sites, particularly around the drill locations, has large elevation changes over a short distance that does not allow the helicopter to reach 650 magl, or it is not practical for the helicopter to climb to 650 magl (e.g., when descending from Nuluujaak Mountain).
Survey	Surveys can involve short duration flights between survey points that do not allow enough time to gain 650 magl; some surveys require low level flying as part of the survey methodology such as flying a low-level grid pattern for a geotechnical survey, keeping a sensor at a constant elevation relative to the ground.
Slings	Helicopters slinging heavy loads fly low for safety purposes; if necessary, the load can be quickly lowered to the ground in a controlled manner or dropped and maintain visual reference of the landing location.
Short distance	The short distance between take-off and landing sites does not allow enough time to gain 650 magl.
Sampling	Sampling can involve short duration flights between sampling points that does not allow enough time to gain 650 magl.
Staking	Very low-level flying is required while staking out a grid as stakes are deployed from the helicopter during transit and crew members are in and out of the helicopter at grid corners.
Weather	Poor visibility associated with low cloud restricts pilots to flying below the cloud line, which is under 650 magl; high winds and/or flat light conditions (reduces a pilot's depth-of-field causing poor ground reference) can make it difficult to maintain a consistent 650 magl flight height.
Mobilization/ Demobilization	Ferrying of the aircraft to and from the Project where operational constraints (e.g., fuel capacity and flight range) are a factor.
Wildlife Safety Sweeps	Low-level flying required to visually scan the work site for potential predators.
Other	The nature of the flight requires low-level flying or short distances/durations (e.g., tours, maintenance flights, evacuations, and search and rescue).

Canadian Helicopters provided flight tracklog data (GPS points along the flight path). Baffinland provided a compliance database using daily pilot timesheets (with flight details) from May to September 2021, when the helicopters were active and on-site, for analysis. This analysis included all travel related to Baffinland, including Ege Bay Exploration. The methods used to calculate flight altitudes above ground level are described in detail in the TEAMR.

Data were split into two categories: 1) those data within the Snow Goose area during the 2021 moulting season (July and August) related to the 1,100 magl elevation requirement and 2) those data outside the Snow Goose area during the 2021 moulting season and in all areas in all other months related to 650 magl elevation requirement. The data sets were then analyzed separately to assess specific flight height allowances using the different areas and elevation values. Using the pilot rationale, any flight data with justifications for flying at lower elevations than required was considered compliant with rationale. When no justification was provided, entries defaulted to non-compliant. For

this reason, the proportion of compliant flights was considered conservative. Based on this analysis, flight data were organized into the following six categories:

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

Additional details concerning helicopter pilot rationale and flight time were requested during 2020 TEWG meetings. The 2021 analysis was based on helicopter flight time, not the number of points as was previously done to address these requests. Compliant and compliant with rationale categories were reported separately, and flight time was reported for each pilot rationale in the compliance database.

RESULTS

There were no identified “observed concentrations of migratory birds” in 2021 or areas prescribed explicitly by the TEWG to avoid migratory birds outside the established Snow Goose area. Pilots made efforts to avoid the Snow Goose area during the moulting season when possible in 2021. Out of 2,560 transits flown from May to September, 261 (10%) intersected the Snow Goose area during moulting season, and only 42 hours (3%) of a total flight time of 1,441 hours were flown within the Snow Goose area during moulting season. Most transits over the Snow Goose area also appeared to be direct flights between the Project and Steensby Port, which only skirted the eastern edge of the Snow Goose area boundary. Most flights near the boundary were within a well-defined track, away from the core of the Snow Goose area identified as having higher concentrations of geese.

After considering pilot rationale in 2021, compliance for flight time within the Snow Goose area during the moulting season was 72%, with 20% compliant and 52% compliant with rationale. Compliance outside the Snow Goose area during the moulting season and in all areas in all other months was 92%, with 34% compliant and 58% compliant with rationale.

2021 was the fifth consecutive year that flight height data were cross-referenced with compliance data from daily pilot timesheets. For analytical purposes, flight line segments and the associated flight time were designated “compliant” when elevation requirements were followed, “compliant with rationale” where elevation requirements were not met, but pilot’s discretionary rationale for deviating from flight heights was provided, and “non-compliant”,

if they did not meet elevation requirements and no explanation, was provided. A summary of 2021 low-level flights and rationale is provided in Table 4.21.

Table 4.21: Helicopter Flight Hours Summarized According to the Pilot Rationale for Flights Within The $\geq 1,100$ magl and ≥ 650 magl Flight Height Requirements, May 1 – September 30, 2021

Rationale	Flight Hours	% of Total Flight Hours	$\geq 1,100$ magl Flight Height Requirement		≥ 650 magl Flight Height Requirement	
			Flight Hours	% of Total Flight Hours	Flight Hours	% of Total Flight Hours
Slings	567.58	39.40	0.94	0.07	566.63	39.33
Weather	96.84	6.72	6.73	0.47	90.11	6.25
Drop off/Pick up	73.30	5.09	0.17	0.01	73.13	5.08
Sampling	34.56	2.40	0.99	0.07	33.57	2.33
Survey	33.12	2.30	2.13	0.15	30.99	2.15
Short Flight Distance	27.13	1.88	0.34	0.02	26.79	1.86
Other	4.77	0.33	0.17	0.01	4.60	0.32
Wildlife Safety Sweep	2.10	0.15	0.00	0.00	2.10	0.15
Demobilization	0.27	0.02	0.00	0.00	0.27	0.02
Total	839.67	58.29	11.48	0.80	828.19	57.49

Results showed that most low-level flight line segments were compliant when considering the rationale provided by pilots for low-level flying. Within the Snow Goose area during moulting season, where the flight height requirement is $\geq 1,100$ magl, the percentage of fully compliant flight hours dropped slightly from 20.01% in 2020 to 19.95% in 2021. The total number of hours flown below the 1,100 magl flight height requirement increased from 15 hours in 2020 to 22 hours in 2021, signifying a slight increase in total flight time. Compliance for the ≥ 650 magl flight height compliance followed the same pattern as the overall compliance. The increase in flight hours across the two flight height requirements is representative of the total increase in flight hours for 2021 compared to 2020 and is more in line with the totals recorded in 2019. Low-level flights with rationale will likely continue in future years as most helicopter work conducted at the Project requires either low-level flying for safety/operational reasons (e.g., slings, surveys), or involves multiple short-distance flights whereby helicopters cannot reach the required elevations between take-off and landing sites (e.g., staking, sampling, drop-offs/pickups). In 2021, the most common reasons stated by pilots for flying below the elevation requirements were slings, drop off/pick up, and weather.

Additional details and analysis concerning pilot rationale and flight time are included in the Draft 2021 Terrestrial Annual Report, along with a reanalysis of the 2017, 2018, and 2019 data from the 2020 Terrestrial Annual Report (EDI, 2021a).

TRENDS

During the moulting period, flights inside the Snow Goose area have decreased over the last five years, from 15% of transits and 5% of flight hours in 2017 down to 7% of transits and 1.5% of flight hours in 2021. Helicopter flight height compliance inside the Snow Goose area during moulting period was 68% in 2021, which was higher than 2015 (55%)

and 2016 (10%), but still below compliance seen between 2017 and 2020, which ranged from 82% to 93% compliance (Figure 4.11). Helicopter flight height compliance outside the Snow Goose area during moulting season and in all areas in all other months for 2021 (89%) was similar to 2019 (93%) with 2018 (96%) marking the highest compliance year.

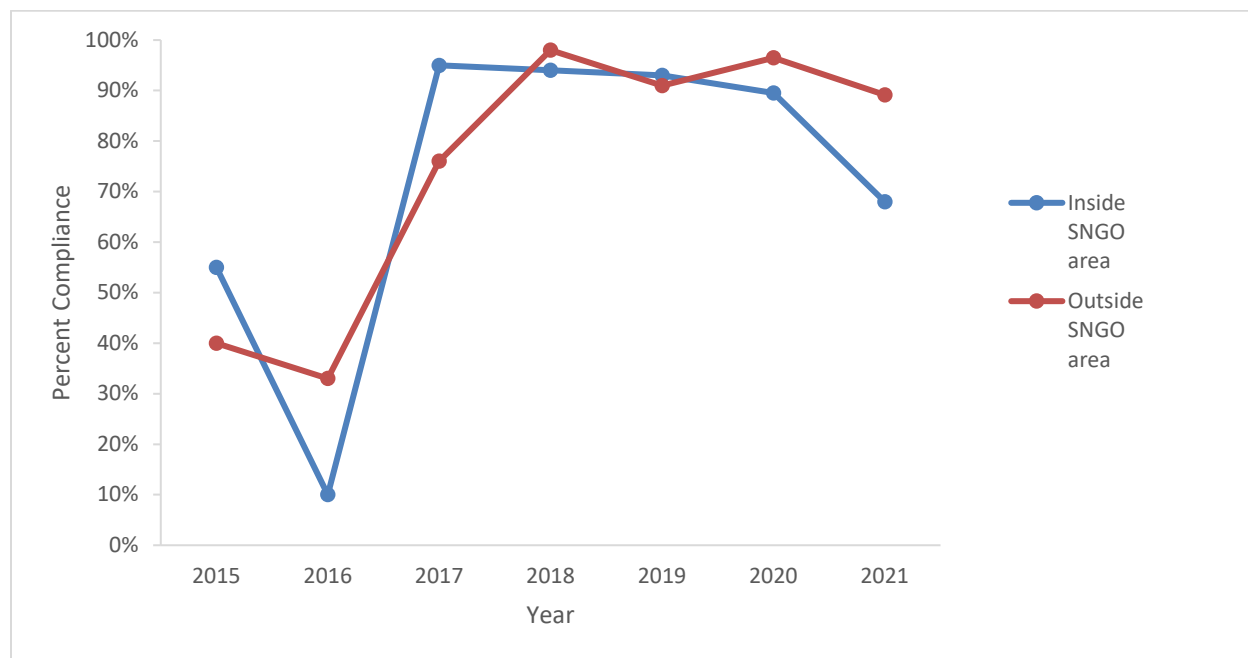


Figure 4.11: Percent (%) Compliance (Compliant and Compliant with Rationale) of Flights Inside the Snow Goose (SNGO) Area During the Moulting Season and Outside the Snow Goose Area During the Moulting Season and in all Areas in all Other Months (2015 to 2021)

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with their helicopter provider to improve flight height compliance by communicating elevation requirements and improving the rationale for not meeting the requirements. Helicopter flight height analysis based on flight line segments and flight time, including rationale from pilot timesheets, will continue in 2022.

Project Certificate Condition No. 60

Category	Terrestrial Wildlife and Habitat – Explosives
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate impacts to wildlife from explosives.
Term or Condition	Prior to construction, the Proponent shall develop a detailed blasting program to minimize the effects of blasting on terrestrial wildlife that includes, but is not limited to the restriction of blasting when migrating caribou, sensitive local carnivores or birds may be negatively affected.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Quarry Blasting Operations Management Plan (Baffinland, 2013b) Borrow Pit and Quarry Management Plan (Baffinland, 2014c) Environmental Protection Plan (Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

RESULTS

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

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 61

Category	Terrestrial Wildlife and Habitat - Operations (General)
Responsible Parties	The Proponent, TEWG
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate Project impacts to wildlife.
Term or Condition	Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered by the work being carried out. An operational definition of 'endangered' shall be provided by the Terrestrial Environment Working Group.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2021d) Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

The Environmental Protection Plan outlines the 'stop work' procedure when wildlife are in the area.

RESULTS

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

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

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 62

Category	Terrestrial Wildlife and Habitat - Operations (General)
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent increased harvesting pressure on wildlife.
Term or Condition	The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Weapons on Site Policy (Baffinland, 2019c) Hunting and Fishing Policy (Baffinland, 2013c)
Ref. Document Link	Not applicable

METHODS

Baffinland implements its Weapons on Site Policy (Baffinland, 2019c) which prohibits employees from transporting firearms to site. Site orientation includes cultural awareness and reviews the policies outlined in the Hunting and Fishing (Harvesting) Policy (Baffinland, 2013c). Baffinland does not interfere with rights of public hunting or fishing near or within the PDA. All visitors that check in with Site Security and reported visitor activities are tracked through a Hunter and Visitor log, provided in the terrestrial annual monitoring reports.

RESULTS

No incidences of Project personnel hunting or fishing within the Impact Area leased to Baffinland and/or PDA occurred in 2021.

TRENDS

No Project personnel have participated in hunting or fishing on the PDA unless approved by scientific permit and Baffinland has not interfered with public rights to fish or hunt in or near the PDA.

Baffinland continues to accommodate all hunting parties and other visitors that travel to the Project.

RECOMMENDATIONS / LESSONS LEARNED

The Weapons on Site Policy has been successful in eliminating firearms from the workplace.

Baffinland continues to monitor and implement the policy banning all employees and contractors from hunting and fishing within the PDA, while at the same time accommodating all hunting parties.

Project Certificate Condition No. 63

Category	Terrestrial Wildlife and Habitat - Public Engagement
Responsible Parties	The Proponent, local Hunters and Trappers Organizations
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To keep communities up to date with Project operations.
Term or Condition	The Proponent shall liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. At a minimum, The Proponent shall also meet annually in person with Hunters and Trappers Organizations to discuss wildlife monitoring and mitigation plans and address community concerns regarding wildlife interactions. The Proponent may be required to facilitate these meetings through payment of honoraria and meeting costs.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG) and with local Hunter and Trappers Organizations (HTOs)
Reference	2021 Community Engagement Records 2021 TEWG Meeting Records 2021 Shipping and Monitoring Program Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.2 Appendix G.4

METHODS

The Mittimatalik Inlet Hunters' and Trappers' Organization (MHTO) became a member of the TEWG in 2016. The TEWG typically meets 4 times a year, twice in-person, with the remaining regular and/or ad hoc meetings held via conference call, though this has varied over the last two years due to ongoing COVID-19 related challenges. Baffinland facilitates these meetings through the provision of honoraria and meeting costs for MHTO members' participation.

In addition to the MHTO's participation in the Working Groups, Baffinland met with the MHTO on a number of occasions, as well as with other North Baffin HTOs throughout the year to provide an update on the Project, discuss specific monitoring program (freshwater fish health monitoring) or mitigations (narwhal adaptive management response), and the Phase 2 Proposal. These meetings are listed in Table 2.1. Baffinland also provided summaries via email on the anticipated monitoring programs (freshwater, marine and terrestrial) to be completed in 2021 including request for feedback on proposed caribou aerial surveys as described in a draft permit application (see corresponding discussion in TEWG meeting held on June 30, 2021).

RESULTS

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

2021 monitoring for mammals included a number of surveys designed to monitor caribou interactions with the Project. Relevant programs included:

- helicopter flight height analysis;
- vegetation and soil base metals monitoring;
- snow track surveys;
- incidental observations and wildlife log.
- snowbank height monitoring;
- Height of Land caribou surveys;
- remote camera monitoring;
- hunter and visitor log summaries
- wildlife interactions and mortalities.

The 2021 surveys were informed by input previously received from MHTO members who had participated in the Height of Land surveys.

TRENDS

Baffinland regards engagement and consultation with Inuit, and incorporation of Inuit in field monitoring, as an important aspect of the programs. Inuit have been involved in various components of the terrestrial environment monitoring program, including: hiring and training Inuit to work on terrestrial monitoring programs; supporting the participation of the MHTO in the TEWG; funding for two full-time on-site Environmental Monitors that are appointed and solely employed by QIA but fully integrated into the Site Environment team; and the implementation of a community-based monitoring program through the Mary River IIBA. Inuit are involved in all terrestrial environment annual monitoring programs conducted by Baffinland's consultant when possible. This has included participation in snow track surveys, Height of Land surveys, vegetation monitoring, and raptor monitoring.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MHTO at TEWG meetings and other meetings organized between Baffinland and the local HTOs. Additionally, under the assumption COVID-19 restrictions will be lifted in 2022, it is Baffinland's expectation that local Inuit, including representatives from the MHTO will continue to play an important role in the terrestrial monitoring programs at site. Additionally, Baffinland will continue to provide support for community-based monitoring programs through IIBA requirements, and/or other collaborative opportunities should they arise in the future.

Project Certificate Condition No. 64

Category	Terrestrial Wildlife and Habitat - Waste Management
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent human-carnivore interactions.
Term or Condition	<p>The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures:</p> <ul style="list-style-type: none"> 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).
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Environment Climate Change Canada, Qikiqtani Inuit Association, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	<p>Environmental Protection Plan (Baffinland, 2021d)</p> <p>Waste Management Plan (Baffinland, 2020c)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Waste management buildings are situated at both the Mine and Port sites. The waste management buildings house a dual chamber incinerator designed for optimal incineration of approved specific wastes, including food wastes. Design constraints at the Project site limited the ability to situate the Waste Management Building(s) directly beside complex kitchens, however, Baffinland employs procedures to minimize animal attractants and interaction of carnivores with food or food wastes as described in the Environmental Protection Plan (EPP) and the Waste Management Plan (which includes the Incinerator Operation Procedure as an appendix). Employees are trained on animal attractant policies upon arrival at Site.

The specific measures implemented to mitigate attractants and animal interactions include; double bagging food and food wastes, storage in closed top bins or sealed seacans, and prompt removal for incineration inside the enclosed Waste Management Building(s). Food wastes are incinerated under stipulated conditions, and ash is visually inspected and tested under applicable Nunavut guidelines for landfilling. Ash deposited in the designated landfill is promptly covered with a layer of material to mitigate animal attraction. Metal Skirting has also been

installed on kitchen and accommodation buildings, including Sailiivik camp, on the Project site to prevent carnivores accessing under buildings.

RESULTS

Both the Environmental Protection Plan and Waste Management Plan incorporate carnivore interaction and attractant mitigation measures and policies, which continued to be implemented in 2021. Food and food wastes were stored as designated by the aforementioned plans, incinerated in the waste management buildings and ash promptly disposed of and covered in the designated landfill. The Mine Site Landfill Facility continued to only accept inert, non-hazardous waste materials in 2021, with all animal attractants (food scraps, wrappers, etc.) diverted to the incineration units. While landfill fencing was completed in 2019 and may result in some additional wildlife deterrence, the primary mitigation measure to reduce animal interactions at the landfill remains the diversion of all animal attractants from placement in the landfill.

Baffinland continues ongoing employee educations around proper waste sorting continues to be conducted to ensure site-wide adherence to the Waste Management Plan. In addition to ongoing employee education, routine inspections of Landfill Facility operations are completed with a focus on waste volume, composition and overall conformance to the Project's Waste Sorting Guidelines, which were recently updated.

Carnivore interactions have been minimized, however, still do occur with Arctic fox. Arctic fox site habituation has proven to be a challenge even while mitigating animal attractants on site. Animal interactions are documented and discussed in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022), which has been released to the Working Group for review and comment.

TRENDS

Carnivore and/or Arctic Fox interactions have generally increased over the life of the Project as it grows in scale. In 2021, the number of interactions with carnivore and/or Arctic Fox remained consistent compared to the number of interactions in 2020 and 2019 validating the continued success of improved waste management practices implemented on site. Incineration, employee training, animal attractant mitigation measures and metal skirting maintenance continue to be implemented.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to mitigate wildlife interactions at the Project area by training, enforcing, and monitoring waste management practices and guidelines. Management attend mandatory Environment Protection Plan training, which is then passed on to all employees. Included in the EPP are wolf, polar bear, fox, and caribou protection measures and waste management guidelines that are continually updated and implemented. Incineration and proper waste sorting are the most prominent deterrents used. Wildlife attractants such as food scraps and human waste are sorted and sealed in animal proof containers and incinerated on site. Posted around each site are waste sorting guidelines, which were reviewed and updated in 2020, that clearly define where food and other attractants should be placed. Another deterrent used is metal skirting to minimize wildlife entry under buildings. Wire skirting is used under the main camps at both sites to ensure no wildlife such as foxes or hares den underneath. Feeding of wildlife is strictly prohibited and non-compliance is dealt with accordingly.

4.6.9 Birds (PC Conditions 65 through 75)

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

Inuit & Stakeholder Feedback

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

Monitoring

Baffinland's bird monitoring program included the following in 2021:

- Active migratory bird nest surveys (AMBNS); and
- Helicopter Overflight Compliance Tracking
- Calculating the amount of habitat lost annually
- Incidental Observation and Wildlife Interaction Tracking

The CWS-ECCC has also conducted seabird monitoring programs that contribute to regional bird distribution data.

The objectives of Baffinland's bird monitoring programs are to monitor the effectiveness of mitigation put in place to minimize effects of the Project on birds (i.e., AMBNS and Helicopter Overflight Compliance Tracking), and the potential residual effects of the Project after the application of mitigation (i.e. Raptor and cliff nesting monitoring programs, calculating the amount of habitat within the Project that is lost annually and wildlife mortality tracking).

From 2011 to 2020, a raptor monitoring program was conducted in collaboration with Arctic Raptors Inc. As reported previously and discussed with the TEWG, the study design is statistically robust. It has provided trends in raptor occupancy and productivity for the Project. After several years of monitoring, a key finding is that occupancy and productivity appear to be stable, and there has been no evidence of Project-related effects on raptors. Therefore, raptor occupancy and productivity surveys were paused for 2021 and efforts were put into preparing a manuscript for a peer-reviewed publication.

To the extent that Project impacts on the terrestrial environment can be evaluated, the Project's effects appear to be within FEIS predictions. **Error! Reference source not found.** summarizes the main activities in 2021 in relation to birds and an impact evaluation compared to the predictions outlined in the FEIS and FEIS Addendum.

Table 4.22: Birds Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
	Destruction of active nests due to	Pre-clearing nest surveys are completed at applicable locations. Two Snow Bunting nest were found in 2021, and construction was	The effect did not occur

Component	Effects	Monitoring Program	Impact Evaluation
Bird Indicator Species/Species at Risk	development in the project footprint	postponed until the chicks had fledged and left the area. Surveys will continue to be required whenever clearing vegetation within the migratory bird nesting season.	
	Habitat loss: direct habitat loss due to the Project footprint; and indirect habitat loss due to sensory disturbances	Cliff-nesting raptor occupancy and productivity survey; cliff-nesting raptor nest site management and effects monitoring. No effect on cliff-nesting raptor nest occupancy rates since 2011. Distance to disturbance analysis suggests there is no adverse effect on monitored raptor nesting. Additionally, as of the end of 2021, the total Project footprint was 587 ha, which is less than what was assessed in the FEIS (7,618 ha).	Effect negligible, within FEIS predictions
	Influences on health	In 2021, after incorporating pilot rationale, helicopter cruising altitude compliance within the Snow Geese area during the moulting season was 72.1%, down from 89% in 2020. Overall compliance in all areas in all months was 92.2%.	Consistent with FEIS predictions
	Mortality	Two (2) bird mortalities were observed in 2021, both Snow Buntings. One of these mortalities were found without any evidence to indicate cause of death. Evidence from the other Snow Bunting mortality suggest it was predated on by a pair of falcons that were observed hunting nearby.	Two (2) mortalities were observed, but this is within FEIS predictions

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect birds, including for species at risk. Baffinland will continue to seek input and review monitoring results trends from technical members of the TEWG. Baffinland will continue to support regional shorebird monitoring, including species at risk in conjunction with CWS-ECCC, as opportunities arise. Active migratory bird nest surveys will continue in future years prior to any proposed land disturbance and/or clearing during the breeding bird window, and raptor monitoring will continue to focus on multiple nesting territory visits in survey years. Baffinland is also partnering on a three-year initiative (though extended due to COVID-19) with CWS-ECCC and multiple universities (McGill, Windsor, and Carleton) entitled “Using cutting-edge biologging and physiological tools to map environmental sensitivities in the Arctic: application to shipping associated with Baffinland Iron Mines.” This partnership followed a successful Natural Sciences and Engineering Research Council of Canada (NSERC) Collaborative Research and Development (CRD) grant application in December 2019. This initiative aims to develop innovative techniques to study the potential impacts of marine shipping on seabirds, and the effects of mining activities on terrestrial birds near the Project. No field work was possible in 2021 due to COVID-19 travel restriction, and as a result the period over which the program will run will be extended to future years.

Project Certificate Condition No. 65

Category	Birds – Awareness
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent disturbance to birds and bird habitat.
Term or Condition	The Proponent shall ensure all employees working at project sites receive awareness training regarding the importance of avoiding known nests and nesting areas and large concentrations of foraging and moulting birds.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (EPP; Baffinland, 2021d) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Section 4.13 (Bird Protection Measures) of the EPP is the relevant document that deals with Bird Awareness training delivered to employees.

In 2021, on-site training of pre-clearing Bird Nest Surveys was performed by EDI to the Baffinland Site Environment Department. Training included nest searching methods and identification of common species known in the area.

Baffinland endeavours to perform construction activities outside of the bird nesting season. If construction activity is required in undisturbed areas during bird nesting seasons (e.g. between May 31 and August 19), active migratory bird nest surveys are conducted in accordance with the *Migratory Birds Convention Act, 1994*. Construction has five (5) days to commence from the time that a migratory bird presence survey is conducted. A new survey is completed if construction does not commence in this five-day timeline. The results of these surveys are provided to the TEWG for review on a yearly basis.

RESULTS

In 2021, Baffinland continued to monitor all new construction activities around development areas prior to conducting any ground disturbance. Of the 360,615 m² of new land disturbed for Project infrastructure in 2021; 287,779 m² of land was disturbed outside of the breeding bird window. During the breeding bird window, all land was surveyed through active migratory bird nest surveys prior to disturbance. Two Snow Bunting nests were found, and construction was subsequently postponed in the area until the chicks had fledged.

TRENDS

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

RECOMMENDATIONS / LESSONS LEARNED

Continue to minimize disturbance (clearing) or other industrial activities in previously undisturbed areas during the nesting season between May 31 and August 19.

Project Certificate Condition No. 66

Category	Birds - Species at Risk
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to sensitive bird species.
Term or Condition	If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan.
Relevant Baffinland Commitments	75
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

To the fullest extent possible, Baffinland plans for new ground disturbance outside of the breeding bird season and conducts active migratory bird nest surveys in areas disturbed in the breeding season, before any activities proceed. Surveys are conducted a maximum of five (5) days before clearing using the rope-drag method, as recommended by CWS-ECCC. Surveys are conducted with a minimum of three observers by walking slowly through the area with the rope drag, looking for nests and birds displaying nesting behaviour. Baffinland establishes clear zones of avoidance when bird nests are found based on species-specific nest setback distances included in Table 3-1 in the TEMMP.

RESULTS

No Species at Risk nests or eggs have been encountered during Project activities.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to avoid Species at Risk nests and eggs when encountered by conducting pre-clearing active migratory bird nest surveys and following established guidelines for setback distances.

Project Certificate Condition No. 67

Category	Birds - Species at Risk
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to sensitive bird species.
Term or Condition	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the Project.
Relevant Baffinland Commitments	75
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Environment and Climate Change Canada (ECCC)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

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

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue coordinating with ECCC through the TEWG to address mitigation and monitoring strategies related to Species at Risk.

In 2019, Baffinland deployed nine (9) passive Autonomous Recording Units (ARUs) to detect Red Knot vocalizations in collaboration with CWS-ECCC. No Red Knot were detected during 2019, and in February of 2020 CWS-ECCC concluded that ARU monitoring was not necessary for the 2020 season. Upon the recommendation of CWS-ECCC, Red Knot monitoring using ARUs will resume before increasing activities in the southern transportation corridor.

Project Certificate Condition No. 68

Category	Birds - Project Infrastructure
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent potential injuries to birds.
Term or Condition	The Proponent shall ensure flashing red, red strobe or white strobe lights and guy-wire deterrents are used on communications towers established for the Project. Consideration should also be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Environment and Climate Change Canada (ECCC), Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Through discussions with ECCC in 2013, Baffinland installed reflectors on guy wires at the communication towers established for the Project and will continue to do so on any new infrastructure as required. It was determined that strobe lights were not a relevant mitigation measure as most birds are in the area during the summer when there is 24 hours of light. If it does not present any risks to operating the Project safely, consideration has been given to reducing lighting where possible.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Strobe lights were not a relevant mitigation measure because birds are mostly present when the Project experiences 24 hours of daylight. Baffinland will maintain the reflectors installed on the guy wires of the Project's communication towers and continue using this method on any new infrastructure as required.

Project Certificate Condition No. 69

Category	Birds - Construction/Clearing Activities
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent nesting by birds in active Project areas.
Term or Condition	Prior to bird migrations and commencement of nesting, the Proponent shall identify and install nesting deterrents (e.g. flagging) to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Baffinland prepared a bird deterrence review discussed at the TEWG meeting held on May 21, 2013. There was no feedback from the group on what would prove to be practical solutions before the 2014 construction season. Although active migratory bird nest surveys were completed, deterrents were not erected. Baffinland conducts clearing activities outside of the breeding bird season whenever possible to discourage birds from nesting in these areas and minimize the potential for nests to be disturbed by clearing or construction.

RESULTS

In 2021, there were no apparent nesting attempts by birds in the previously cleared areas, and one nest was found in a previously undisturbed area. No deterrents were used.

Of the 360,615 m² of new land disturbed for Project infrastructure in 2021, 80% occurred outside of the breeding bird window. During the breeding bird window, approximately 72,836 m² was surveyed through active migratory bird nest surveys. Two Snow Bunting nests were found, and construction was subsequently postponed in the area until the chicks had fledged.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Since the areas cleared during the breeding season are managed by active migratory bird nest surveys before disturbance, deterrents have not been required. Avoidance has been the primary method used to prevent disturbances to nesting birds. The TEWG has made no recommendations that an alternative approach would be more successful or necessary.

Project Certificate Condition No. 70

Category	Birds - Construction/Clearing Activities
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to birds and nesting areas.
Term or Condition	The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird's nests and their young are protected.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Active migratory bird nest surveys are conducted in areas scheduled for clearing disturbance during the breeding bird season. Surveys are conducted a maximum of five days prior to clearing using the rope-drag method, as recommended by CWS-ECCC. Surveys are conducted with a minimum of three (3) observers by walking slowly through the area with the rope drag, looking for nests and birds displaying nesting behaviour. When bird nests are found, Baffinland establishes clear zones of avoidance based on the species-specific nest setback distances are included in Table 3-1 of the TEMMP.

RESULTS

Of the 360,615 m² of new land disturbed for Project infrastructure in 2021, 80% occurred outside of the breeding bird window. During the breeding bird window, approximately 72,836 m² was surveyed through active migratory bird nest surveys. Two Snow Bunting nests were detected during the 2021 AMBNS at the KM 104 pad expansion; a no-disturbance buffer based on the recommended setback distance for songbirds was created to protect the nest, and construction was postponed in the area until the chicks had fledged and left the area. Baffinland Environmental staff noted numerous songbirds during surveys, but no other indications of nesting behavior were observed (e.g., carrying food, carrying nesting material).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 71

Category	Birds - Flight Altitude Requirements
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to birds.
Term or Condition	<p>Subject to safety requirements, the Proponent shall require all Project related aircraft to maintain a cruising altitude of at least:</p> <ul style="list-style-type: none"> • 650 m during point to point travel when in areas likely to have migratory birds; • 1,100 m vertical and 1,500 m horizontal distance from observed concentrations of migratory birds; and • 1,100 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 1,500 m from the boundary of this site.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	<p>Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016)</p> <p>Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)</p> <p>2021 TEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS / RESULTS

Refer to PC Condition No. 59. Reporting on PC Condition No. 71 is identical to that of PC Condition No. 59.

Project Certificate Condition No. 72

Category	Birds - Flight Altitude Requirements
Responsible Parties	The Proponent, Transport Canada
Project Phase(s)	Construction, Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate aircraft disturbance to birds.
Term or Condition	The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and made available for regulatory authorities such as Transport Canada to monitor adherence and to follow up on complaints.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Transport Canada, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2021d) Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Flight height requirements are included in all aviation contracts, and flight paths are recorded using Skytracker. To comply with horizontal guidelines, pilots are given the spatial boundaries of any identified concentrations of migratory birds, which are buffered by the required 1,500 m horizontal avoidance distance. Pilots are then asked to avoid flying in these areas. Pilots are made aware of flight height requirements in 'toolbox' talks given at the beginning of each season and daily toolbox talks are held within each department. In addition, flight height compliance was incorporated into the helicopter contract Baffinland holds with Canadian Helicopters. Random audits of flight logs were also completed throughout the season to help ensure compliance with requirements.

RESULTS

Refer to PC Condition No. 59.

TRENDS

Refer to PC Condition No. 59.

RECOMMENDATIONS / LESSONS LEARNED

Refer to PC Condition No. 59.

Project Certificate Condition No. 73

Category	Birds
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor Project-related effects on migratory birds.
Term or Condition	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the Qikiqtani Inuit Organization and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Marine Environment Working Group (MEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS AND RESULTS

With respect to monitoring, since 2011, Baffinland has conducted several collaborative research initiatives with relevant members of the TEWG and MEWG (e.g. ECCC) as detailed in the Summary for Term and Condition No. 74. Additionally, in accordance with CWS input provided in 2015 at the TEWG meeting, Baffinland acquired two rope-draws (for Mary River and Milne sites) to use during pre-clearing surveys to increase the likelihood of nest/nesting adult detection. Rope draws were constructed following the template provided by CWS (Rausch, 2015).

With respect to mitigation, through discussions with ECCC in 2013, Baffinland installed reflectors on guy wires at the communication towers established for the Project and will continue to do so on any new infrastructure as required. It was determined that strobe lights were not a relevant mitigation measure as most birds are in the area during the summer when there is 24 hours of light. If it does not present any risks to operating the Project safely, consideration has been given to reducing lighting where possible. Baffinland also prepared a bird deterrence review discussed at the TEWG meeting held on May 21, 2013. There was no feedback from the group on what would prove to be practical solutions before the 2014 construction season. Although active migratory bird nest surveys were completed, deterrents were not erected. Baffinland conducts clearing activities outside of the breeding bird season whenever possible to discourage birds from nesting in these areas and minimize the potential for nests to be disturbed by clearing or construction.

TRENDS AND LESSONS LEARNED

Baffinland continues to benefit from the expertise of ECCC via the TEWG and MEWG. See Summary for Term and Condition No. 68, 69 and 74 for more details.

Project Certificate Condition No. 74

Category	Birds – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To develop appropriate mitigation and monitoring of impacts to birds.
Term or Condition	The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity.
Relevant Baffinland Commitments	57, 77
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) 2021 TEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.2

METHODS

Since 2011, Baffinland has continued to monitor cliff-nesting raptor site occupancy and productivity. This is an established monitoring program with the statistical power and robust design required to detect nesting raptor response to disturbances associated with the Project. That program has evolved since 2012 to accommodate statistical data requirements and is described in the TEMMP and terrestrial environment annual monitoring reports. Since 2018, small mammal monitoring was incorporated into the raptor monitoring program to address whether occupancy and reproductive success of rough-legged hawk cycles with small mammal abundance.

Starting in 2012, Baffinland has provided financial support to ECCC's breeding bird PRISM plot surveys and seabird research programs in the region. The last PRISM plot surveys were completed in 2018; they are next scheduled for 2023. The Ship Board Observer (SBO) program did not run in 2020 due to limitations for ship boarding associated with COVID-19 Pandemic public health restrictions, which were put in place to ensure the health and safety of Nunavummiut. The ongoing research results of the PRISM program are reported separately by ECCC's National Research Centre. In 2019, Baffinland deployed nine passive Autonomous Recording Units (ARUs) to detect red knot vocalizations in collaboration with CWS-ECCC. No Red Knot were detected during 2019, and CWS-ECCC concluded that ARU monitoring was not necessary for 2020. Upon the recommendation of CWS-ECCC, Red Knot monitoring using ARUs will resume before increasing activities in the southern transportation corridor.

Since the start of the construction phase, Baffinland has conducted active migratory bird nest surveys for areas of planned disturbance. Pre-clearing nest surveys were conducted by Baffinland Environment staff over the 2021 nesting season. At the beginning of the migratory bird nesting season, Baffinland Environment staff were trained on methods to conduct nest searching surveys and identify common species found in the area. In accordance with CWS input provided in 2015 at the TEWG meeting, Baffinland acquired two rope drags (for Mary River and Milne sites) to use during pre-clearing surveys to increase the likelihood of nest/nesting adult detection. Rope drags were constructed following the template provided by CWS (Rausch, 2015). More detail on the active migratory bird nest surveys can be found in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022: Section 10). Baffinland contributes to an industry NSERC research program focused on the study of seabirds in the shipping corridor, effective December 2019. Fieldwork was to begin in 2020 to support this initiative but was cancelled due to COVID-19 travel restrictions. This program intends to use biologging and physiological tools to map environmental sensitivities in the Arctic, applied to shipping associated with the Project. This collaborates with multiple researchers from various universities, including McGill University, University of Windsor, Carleton University, and ECCC. The period the program was initially intended to occur will be extended into future years due to the delays associated with COVID-19 Pandemic restrictions. Bird monitoring and survey programs by key indicators are conducted as follows:

Peregrine falcon, rough-legged hawk, and gyrfalcon

- Known nest sites have been surveyed annually since 2011. As part of these surveys, crews also attempt to locate new nest sites in suitable areas. All nesting sites are categorized into distance bins from the Project infrastructure to assess the potential effects of disturbance.
- Spring occupancy surveys (indicates the number of pairs that attempt to breed) and summer productivity surveys (to measure nesting success by counting the number of young that reach fledging age) are used to collect demographic information on raptor populations.

Common and king eider as well as shorebird diversity

- Shoreline Surveys (2012 and 2013).
 - Shoreline surveys were conducted to detect which species were present in the area, locations of nests, and their proximity to the shoreline to assess potential effects of ship wakes. Surveys consisted of beach sweeps scanning for birds, bird activity, and potential nest sites. All shore types were surveyed regardless of perceived shorebird and waterbird nesting potential.
 - In 2012, 104 kilometres of shoreline along Steensby Inlet were surveyed. Surveys were conducted north of the proposed Steensby Port area, the port area itself, and south of the port to the mainland area adjacent to the islets at the mouth of Steensby Inlet.
 - In 2013, 135 kilometres of shoreline along Milne Inlet were surveyed.
- East Bay Island migratory bird research (2018).
- Regional studies (ongoing) conducted by ECCC on the influence of climate change and resource development on arctic marine birds, particularly eiders.

Songbird and shorebird diversity

- Baseline bird surveys were conducted from 2006 to 2008, resulting in 32 species being identified in the area.
- PRISM Plot Surveys (2012, 2013, and 2018).

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

Red Knot

- Red Knot, a Species at Risk, were identified as a species that may be found on-site, and observers were aware of their potential presence during all surveys. Targeted red knot surveys were conducted in 2014 and 2015 along Phillips Creek and the shoreline around Milne Port.
- In 2019, Baffinland collaborated with CWS to deploy nine passive ARUs in suitable Red Knot habitat to detect Red Knot vocalizations throughout the summer and fall seasons.

Seabird migration and wintering

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

Seabird research on shipping routes

- Marine habitat use by thick-billed murres on Coats Island (2018 to 2020).
 - Long-term changes in the timing, nestling diet and growth, and population size of Coats Island murre colony has been recorded since the 1980s.
 - ECCC sampling in 2018 to 2019 included: breeding timing, reproductive success, and diet to assess future impacts of planned shipping activity and climate change.
 - All fieldwork was suspended in 2020 due to the COVID-19 Pandemic.
- East Bay Island migratory bird research (2018 to 2020).

- ECCC research included: investigating relationships between polar bears, eiders, and diminishing sea ice; identifying key seabird marine habitats, particularly in shipping areas; physiological mechanisms linking climate variability, reproduction, and survival of arctic-breeders; investigating effects on changing sea ice regimes on eider reproduction and population dynamics; and tracking bird migration patterns to better understand coastal and offshore marine habitat use.
 - All fieldwork was suspended in 2020 due to the COVID-19 Pandemic.
- Ship-based Observer (SBO) program (2013 to 2015, 2018 and 2019).
 - SBO research included collecting observational data on seabirds using the CWS Eastern Canada Seabirds at Sea protocols while aboard the MSV *Botnica* to document abundance and distribution.

RESULTS

Peregrine falcon, rough-legged hawk, and gyrfalcon

- Arctic Raptors Inc. conducted raptor surveys in 2011 and 2012 as part of the Project's terrestrial baseline surveys and have conducted annual raptor monitoring surveys from 2013 through 2020. Results are reported in detail in the 2013–2020 Annual Monitoring Reports. No negative trends in occupancy or productivity were attributed to the Mary River Project.
- Efforts in 2021 were directed towards preparing a draft manuscript for a peer-reviewed journal.

Common and king eider as well as shorebird diversity

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

Songbird and shorebird diversity

- PRISM Plot Surveys:
 - In 2012, 80 rapid PRISM plots were completed, and a total of 507 individual birds from 13 different species were observed.
 - In 2013, 13 rapid PRISM plots were completed in the northern sections of the RSA and a total of 90 individual birds from 7 different species were observed.

- Similar species composition and densities were detected in the 2012 and 2013 surveys.
- Shorebird densities were relatively low compared to those observed at other nearby study sites.
- In 2018, CWS conducted 14 PRISM plot surveys within a 100 Km radius of the Mary River Mine Site and another 24 plots in other areas of North Baffin Island. No new species were observed during the surveys that haven't been reported during other monitoring at Mary River. Some of the plots surveyed were considered suitable red knot habitat; however, no red knot were observed. Preliminary results provided by CWS indicated that 2018 was a low productivity year for shorebirds in the Mary River area and densities appeared lower than previous surveys in 2012/2013.
- Bird Encounter Transects:
 - 424 birds of 18 species were observed.
 - No evidence of a relationship between distance from the road/PDA and the number of birds was detected.
- Power analysis based on 2013 results indicated that songbird and shorebird densities were low and that any monitoring program would be unlikely to detect an effect of disturbance; discussion with the TEWG and CWS concluded that effects monitoring for tundra breeding birds could be discontinued but that Baffinland would commit to completing 20 PRISM plots every five years as a contribution to regional monitoring efforts.

Red knot

- Red knot were observed incidentally by Wayne Renaud in 2007 at Camp Lake, Mary River.
- Red knot were not detected during targeted surveys in 2014 and 2015, but biologists and Baffinland Environment continue to be aware of their potential presence while on site.
- In 2019, Baffinland deployed nine (9) passive ARUs to detect red knot vocalizations in collaboration with CWS-ECCC. No Red Knot were detected during ARU monitoring in 2019, and based on available data, in February 2020 CWS-ECCC advised that additional years of data collection along the northern transportation corridor was not necessary.

Seabird migration and wintering

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

Seabird research on shipping routes:

- Marine habitat use by thick-billed murres (2018 to 2020):
 - Since 2010, counts of thick-billed murres on Coats Island have been lower than the long-term average, suggesting a decline. A similar decline had been observed at Digges Island colony, 200 km to the east suggesting similar factors may be negatively influencing both of these thick-billed murre colonies in Hudson Strait. In 2018 and 2019, numbers seem to have rebounded to those of the late 1990s and 2000s.

- Shifts in prey species (capelin replacing Arctic cod as primary prey species) since the 1990s may be due to reduced summer ice cover.
- Changes in colony size may be related to offspring-related mortality. Bears have accessed the colony, sometimes resulting in up to 30% of the colony failing reproductively.
- Data on distribution, habitat use, foraging behaviour, foraging range, and energetics continues to be collected (though no fieldwork was possible in 2020), with analyses continuing throughout 2020.
- The annual range of murres may have shifted over the past 38 years of data collection. Specifically, it has been noted that murres may be spending more time in Hudson Bay in the fall before their outmigration from the area, due to the later onset of ice formation in recent years. In addition, the range has shifted to the north and west in comparison to 1982.
- Murres also tend to lay their eggs earlier in years when spring sea-ice concentrations are lower. They also tend to breed earlier than three decades ago.
- East Bay Island migratory bird research (2018 to 2020):
 - Shifts in sea ice extent in Foxe Basin result in polar bears arriving at East Bay Island early, allowing bears to opportunistically forage on common eider eggs.
 - It is predicted that Endocrine Disruption Chemicals (EDCs) in eiders, combined with climate change, may produce a decline in nest attentiveness, causing impacts to duckling health.
 - Eiders can use different foraging strategies, which may help eiders adapt to changing sea ice conditions, though further studies are needed.
 - Eider hens with key energetic hormones have larger clutches and higher duckling survival rates.
 - Due to their migration between marine and terrestrial ecosystems, eiders deliver nutrients resulting in altered water quality by enriching water bodies (ponds) with marine-derived nutrients.
 - Based on Common eiders that were known to overwinter in distinct areas with different winter conditions, it was determined that these birds may be able to compensate for poor winter conditions during the spring pre-breeding period.
- Ship-based Observer program (2019) (Golder, 2020b)
 - Observations were completed in July and October 2019.
 - Six seabird species (127 individuals) were observed during summer surveys.
 - Nine seabird species (420 individuals) were observed during fall surveys.

TRENDS

Annual variation in productivity for Peregrine Falcons and Rough-legged Hawks has been apparent (Figure 4.12); however, this is most likely representative of natural variability associated with variation in prey availability and weather conditions rather than due to any influence of anthropogenic disturbance. This analysis is supported by a comparatively higher abundance of lemmings in 2020 coinciding with increased Rough-legged Hawk occupancy and productivity. The occupancy of potential nesting sites by Gyrfalcons in the Raptor Monitoring Area (RMA) has been too low to monitor annual trends. At the population level, ongoing monitoring suggests that distance to disturbance and distance to nearest neighbour (individually and as an interaction) have no adverse effect on occupancy or reproductive success for Peregrine Falcons and Rough-legged Hawks. Future monitoring will continue to focus on multiple nesting territory visits.

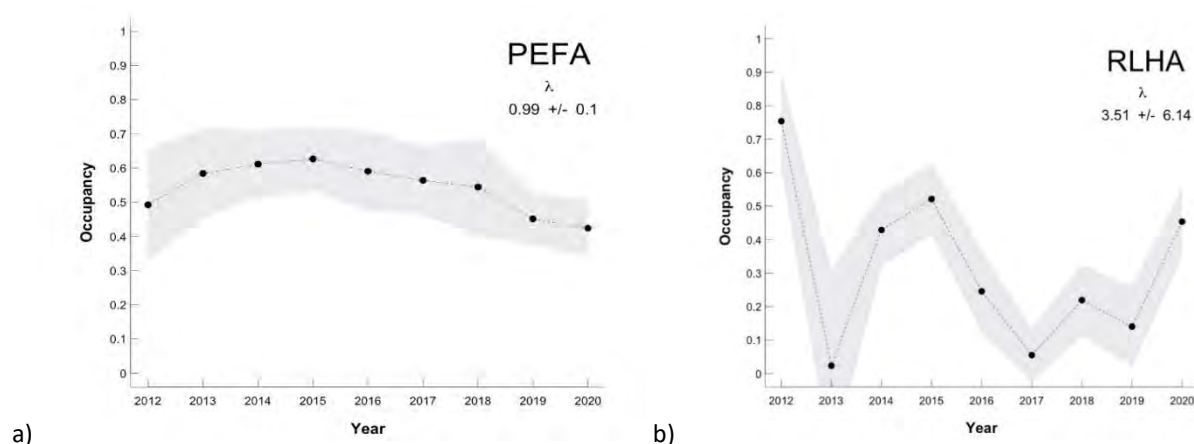


Figure 4.12: Annual Estimates of Peregrine Falcon (PEFA) and Rough-legged Hawk (RLHA) Nesting Territory Occupancy (2012 to 2020)

Notes:

Annual Estimates include \pm standard errors.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue the monitoring programs as described in the TEMMP and will continue to collect opportunistic information when qualified biologists are on site. Monitoring to date has found that bird densities of most species are not sufficient to monitor Project effects (i.e., songbirds, shorebirds, eiders, Red Knot, and Gyrfalcon). To date, trend analysis has only been conducted for cliff-nesting raptors. As populations of cliff-nesting raptors have appeared stable throughout multiple years of surveys with no evidence of Project-related effects, 2021 efforts were put towards preparing a draft manuscript for a peer-reviewed publication.

Baffinland has previously contributed funds to marine bird research on southern shipping routes. Baffinland will continue to support marine bird research (thick-billed murre, common eider) conducted by ECCC in the northern (Cape Graham Moore) and southern shipping routes (Digges Sound, East Bay, and Hudson Strait). PRISM plot surveys are next scheduled for 2023. Upon the recommendation of CWS-ECCC, Red Knot monitoring using ARUs will resume before increasing activities in the southern transportation corridor.

Project Certificate Condition No. 75

Category	Birds – Monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assess the extent of terrestrial habitat loss.
Term or Condition	The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project to verify impact predictions and provide updated estimates of the total Project footprint.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be provided within the Annual Report to the NIRB.
Status of PC Condition	Active
Status	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Impact Review Board, Terrestrial Environment Working Group (TEWG)
Reference	Environmental Protection Plan (Baffinland, 2021d) Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Prior to construction on undisturbed land, the appropriate approvals must be obtained, and construction plans must adhere to the Environment Protection Plan. Baffinland also restricts any overland movement of equipment or personnel which are required to operate to existing site roads and laydowns, to minimize the overall Project footprint; any unauthorized land disturbance or deviation from the PDA is reported as an incident and is investigated.

RESULTS

As of the end of 2021, the total Project footprint is 587 ha, which is less than what was assessed in the FEIS (7,618 ha); predictions were based on the assumption the entire PDA would be disturbed. Any unauthorized land disturbance or deviation from the PDA is reported as an incident and is investigated. Overburden that is removed from an area to be disturbed is stockpiled for the remediation of the area, wherever possible, and materials are suitable for re-use. No unauthorized land disturbance occurred in 2021, and all disturbed land is reported in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022).

TRENDS

To date, construction activities for the Project have remained within the PDA.

RECOMMENDATIONS / LESSONS LEARNED

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

4.6.10 Marine Environment (PC Conditions 76 through 98)

Twenty-four (24) PC conditions relate to the potential impacts of the Project on the marine environment. These conditions encompass the development of a comprehensive environmental effects monitoring program and the establishment of the Marine Environment Working Group (MEWG).

Inuit & Stakeholder Feedback

The marine environment has been a key focus of Inuit and stakeholder interest and concern. Concerns have primarily been centred on the potential for impacts of Milne Port operations on the marine environment, including marine water quality, marine sediment quality, fish and fish habitat, the potential for introduction of non-indigenous species (NIS) and/or aquatic invasive species (AIS) as a result of ballast water discharge and hull fouling, and impacts on marine mammals. Baffinland has continued to engage regulators who have jurisdictional responsibilities and authorities over this component of the Project, including ECCC, DFO and Transport Canada on these issues, as well as the QIA and Inuit community members through regular engagement (Appendix B) and meetings of the MEWG (Appendix C.1).

Monitoring

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

- Benthic Habitat – Diver-based biophysical surveys in semi-permanent quadrats and underwater videography to characterize benthic habitat substrate type/class and detect changes over time.
- Marine Sediment Quality - Sampling sediment for particle size analysis (to detect changes in sediment composition) the presence of hydrocarbons, and iron concentrations as a function of distance from the ore dock.
- Marine Water Quality - Sampling measuring total suspended solids (TSS), salinity, temperature, pH, metals, nutrients and hydrocarbon concentrations over time.
- Epibenthic Community - Diver-based biophysical surveys in semi-permanent quadrats and underwater videography to enumerate benthic epifauna and compare changes over time.
- Fish - Opportunistic sampling of contaminants in fish flesh of both sculpin species and Arctic char, and shellfish species.
- Aquatic Invasive Species (AIS) - Sampling for the presence/absence of aquatic organisms (zooplankton, benthic infauna, benthic infauna, macroflora, encrusting epifauna, fish).
- Ballast Water Monitoring - Monitoring of salinity levels in ballast water to verify exchange of ballast in accordance with Ballast Water Regulations.

Table 4.23 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed at Milne Port up to 2021, relative to predictions presented in the Final Environmental Impact Statement (FEIS) and FEIS Addendum.

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

Table 4.23: Marine Environment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Marine Water and Sediment Quality	Changes in marine water and sediment quality due to prop wash, ballast water discharge, and ore dust deposition	<p>The MEEMP did not detect any meaningful changes in marine water quality. Reported analytical results for marine water quality parameters measured in 2021 were below applicable CCME WQG, or were generally within range of conditions observed in previous MEEMP surveys (2015 to 2020). Iron concentrations in water have not increased between 2014 and 2021. Hydrocarbons and PAHs were not detected in marine water quality samples collected in 2021.</p> <p>Environmental effects monitoring (EEM) for marine sediment was not completed at the same scale as 2020, based on multiple years of monitoring showing no directional changes, or trends, have occurred in marine sediment quality as a result of the Project. Baffinland's technical experts have suggested the full-scale program can be completed every three to five years to align with federal environmental effects monitoring requirements.</p> <p>Metal concentrations in sediment samples collected in 2020 generally correlated with sediment physical composition.</p>	Effect within FEIS predictions
	Changes in marine water and sediment quality due to sewage effluent discharge	Monitoring of effluent as required by water licence. Monitoring results for discharge to the Marine environment complied with all water licence limits.	Effect within FEIS predictions
	Accidental fuel spill from marine shipping of fuel and other supplies	Inspections and visual monitoring during ship to land fuel transfers and sealift deliveries. No accidents or malfunctions occurred that had the potential for effects.	Effect did not occur
Marine Habitat	Disruption and loss of marine coastal habitat due to dock structure	Ore Dock and Freight Dock offset monitoring program indicates that offset habitat is functioning as intended.	Effect within FEIS predictions
Fish Health	Changes in fish health and tissue chemistry related to impacts on marine habitat	Monitoring for fishing effort, relative abundance, fish health indicators (i.e. weight and length) and tissue chemistry. Results of monitoring show that the health of both Fourhorn Sculpin and <i>H. arctica</i> from the Milne Port area appeared good at the time of sampling. Tissue concentrations of metals for Arctic Char, Fourhorn Sculpin and <i>Hiatella arctica</i> , in 2021 were generally comparable to historic data. Annual fish sampling for both	Effects within FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
		2020 and 2021 yielded similar numbers and proportional representation of the dominant fish species in Milne Port (Arctic Char, Fourhorn Sculpin and Shorthorn Sculpin) relative to previous years.	
Marine Biota	Potential changes to marine biota due to discharges to the marine environment, propeller scour, installation of dock structure.	Environmental Effects Monitoring (EEM) for benthic infauna was not performed in 2021 as part of the 2021 MEEMP based on multiple years of monitoring showing no directional changes, or trends, have occurred in marine benthic infauna as a result of the Project.	Effect within FEIS predictions
Marine Biota	Potential changes to marine biota from the introduction of NIS/AIS due to shipping (ballast water discharges, etc.)	<p>Out of 431 marine taxa identified at Milne Port and Ragged Island in 2021 via sampling undertaken as part of the MEEMP and Aquatic Invasive Species/ Non-Indigenous Species (AIS/NIS) Monitoring Program, 53 taxa had not been identified previously at Milne Port during baseline sampling. Of the new taxa, all but one (<i>Tricellaria sp.</i>) had clear records of occurrence in the Canadian Arctic with no record on the AIS databases. Accordingly, <i>Tricellaria sp.</i> was sent for independent verification, and results are pending.</p> <p>Additionally, 2021 samples included five taxa (<i>Pseudofabricia aberrans</i>, <i>Marenzelleria sp.</i>, <i>Ampharete petersenae</i>, <i>Paramphitrite birulai</i> and <i>Crassiorophium sp.</i>) that were flagged in previous years due to uncertainties in their natural range or because they were listed on an AIS database. These specimens were sent to taxonomic experts for independent verification and/or molecular analysis. Following review, <i>A. petersenae</i> has been reclassified as “No Risk” and has been removed from the Project ‘Watchlist’.</p> <p>Overall, the identification and flagging of individual taxa out of the hundreds identified in Milne Inlet indicate the NIS/AIS surveillance program is effective and functioning as intended.</p>	Effect within FEIS predictions

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect the marine environment. Baffinland will continue to seek input and review monitoring results trends from technical members of the MEWG, in addition to gathering feedback through separate forums such as annual pre-shipping and post-shipping meetings led by Baffinland with representatives of relevant Hunters and Trappers Organizations (HTO) (e.g.,

Mittimatalik Hunters and Trappers Organization [MHTO]) and communities (e.g. Pond Inlet). Reporting on each PC condition follows.

Project Certificate Condition No. 76

Category	Marine Environment – General
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To mitigate potential impacts to the marine environment.
Term or Condition	The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and identify potential impacts of the Project on the marine environment.
Relevant Baffinland Commitment	40, 51, 84, 85, 79
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Marine Biological and Environmental Baseline Surveys Milne Inlet 2014 (SEM, 2015) 2020 MEEMP and AIS Monitoring Program Report (Golder, 2021b) Draft 2021 MEEMP and NIS/AIS Monitoring Report (Golder, 2022a) 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1

METHODS

The Marine Environmental Effects Monitoring Program (MEEMP) was initially developed in 2015 following completion of marine biological baseline studies at Milne Port during 2010, 2013 and 2014. The MEEMP includes annual monitoring to detect potential Project-related effects on marine water and sediment quality, benthic invertebrates, substrate and macroflora, fish health, and fish tissue chemistry. The MEEMP sampling design is generally based on Environmental Effects Monitoring (EEM) guidance from Environment Canada (EC, 2012) and includes statistical approaches to detecting potential Project-induced impacts on the marine environment.

Detailed information on study design and sampling methodology is available in the annual monitoring report for the MEEMP and NIS/AIS monitoring programs (Golder, 2022a). Monitoring has been conducted annually since 2015. However, given that sampling results to date do not suggest degradation or impairment of the marine physical or biological environment due to the Project, the scope and effort for the 2021 MEEMP was reduced, focusing exclusively on compliance monitoring for marine water quality, and environmental effects monitoring for marine fish (fish and fish habitat, fish health), with some additional limited sampling to account for data gaps from previous sampling years (e.g. quadrat sampling for epifauna and epiflora).

Note that a summary of the 2021 NIS/AIS program will be provided in the response to PC Condition No. 87 below, rather than duplicating content here.

RESULTS

The only results of note in 2021 are those associated with the targeted sampling of SW-02, a station close to the existing Ore Dock from which anomalous sediment and benthic infauna indicators were reported in 2020, specifically higher sand/lower percent fines content and lower community indices (e.g., richness, SDI). The Qikiqtani Inuit Association (QIA) requested temporal data for SW-2 be revisited to determine whether changes at this station are Project-related (Technical Comment 25 on the 2020 MEEMP), and Baffinland committed to conduct targeted sampling at station SW-2 during the 2021 open-water season.

Sampling in 2021 indicates that the benthic infauna community has rebounded from the localized disturbance, as evidenced by effect indicators showing an increase in total density, richness and species diversity from 2020.

Overall, MEEMP sampling results from 2021 do not suggest degradation or impairment of the marine physical or biological environment (i.e., water quality, marine fish and macroflora/epibenthic communities, fish health) associated with the construction and operation of Milne Port; therefore, no additional mitigation measures are warranted at this time.

Detailed sampling results are available in the Draft Annual Monitoring Report for the MEEMP and NIS/AIS monitoring programs (Golder, 2022a). Monitoring completed to date as part of the MEEMP reflects concordance with the applicable Terms and Conditions of PC No. 005, including PC Conditions No. 1, 76, 83, 83(a), 85, 87, 91, 99, 99(b), 113, 114 and 126.

Marine Physical Environment

Marine Water Quality

All relevant water quality parameters analyzed in 2021 (i.e., major ions, nutrients, metals, hydrocarbons, and polycyclic aromatic hydrocarbons [PAHs]) were either below applicable Canadian Council of Ministers of the Environment (CCME) Water Quality Guideline (WQG; CCME, 2014) or, for parameters without a guideline (such as iron), consistent with concentrations documented in previous years. Marine water quality monitoring undertaken to date indicates that mitigation measures for site drainage and treated effluent discharges are functioning as intended and that the construction and operation of Milne Port does not appear to have negatively affected water quality in Milne Inlet.

Marine Sediment Quality

Golder (2021b) reported that sediment monitoring to date (i.e., 2015 to 2020) suggests that mitigation measures are functioning as intended and that Project activities are being managed in a way that has not adversely affected marine sediment within the Milne Inlet study area. Commensurate with the lack of directional trends observed to date, no sediment sampling was proposed for 2021. Baffinland's technical experts have recommended that a full scale version for this component of the program could be run every three to five years to better align with federal environmental effects monitoring requirements.

The 2020 MEEMP Report considered station SW-2 an outlier in the 2020 sediment quality dataset because of the higher sand content and lower percent fines compared to other stations sampled along the West transect in 2020, and when compared to previous years of sampling at SW-2. Therefore, at the request of QIA, targeted sampling was conducted at this station in 2021. Collectively, the four years of sediment data available at Station SW-2 suggest that there was likely a localized and temporary physical disturbance at this station in 2020; as the change in sediment

composition was not observed at adjacent stations in 2020. Results of targeted sampling in 2021 show that, while there has been a shift to coarser substrates in the last two years, substrates have remained predominantly sandy since 2018. Areas of sediment disturbance by propeller wash effects around the ore and freight docks in Milne Inlet is consistent with what was predicted in the FEIS, which forecasted some localized disturbance with overall negligible residual effects on sediment quality in Milne Port.

Physical Oceanography

Measurements of currents, water levels, temperature, and salinity continued in 2021. The tide gauge was reinstalled at the Ore Dock from July 12 to October 31, 2021. Analysis of tide gauge data indicates typical fluctuations resulting from tidal forcing as well as a distinct seasonal pattern for near-surface water in Milne Inlet, consistent with that observed in previous years.

During the measurement period, data from a total of eight neap-spring tidal cycles were recorded. Water levels ranged between -1.14 m and +1.16 m Canadian Geodetic Vertical Datum (CGVD) and no storm surges were recorded – again, similar to previous years – indicating that the current approach for monitoring relative sea levels and storm surges is effective.

Marine Biological Environment

Benthic Infauna

As was outlined for marine sediment quality above, Golder (2021b) reported that monitoring results to date have not identified Project-induced changes to benthic infaunal communities in the marine environment. Thus, a sampling program was not implemented in summer 2021, commensurate with the lack of directional trends observed to date.

That said, targeted sampling was performed at one station in 2021 – SW-02 – which stood out as an anomaly in 2020 in terms of sediment and benthic community composition. The data suggest that there was likely a localized physical disturbance at station SW-2 in 2020 that was short-term in duration, based on 2021 results showing the benthic community was substantially more diverse (returned to 2019 levels) and abundant (an order of magnitude increase) compared to 2020. The change in sediment composition appeared to be localized and did not impact the overall benthic community ecosystem, given the same patterns were not observed at adjacent sampling stations in 2020 and as demonstrated by 2021 results reflecting increases in benthic indicators of density, richness and diversity. Overall, monitoring results remain within original FEIS predictions, which forecasted negligible residual effects on sediment quality and the benthic infaunal communities.

Limited sampling for benthic infaunal organisms was completed in 2021 to support the AIS Monitoring Program, and results are reported in the response for PC Condition No. 87.

Epibenthic Community

In 2021, Self Contained Breathing Apparatus (SCUBA) surveys were used to monitor for Project effects on epibenthic communities (macroflora and epifauna) representing a shift in methodology away from underwater video; rationale for this is that divers are able to collect data at a better taxonomic resolution through both in situ observation and specimen collection (for taxonomic identification and/or genetic analysis). An additional ten steel quadrats were fabricated and deployed in 2021, five in each the exposure and reference areas.

Similar macroflora and benthic epifaunal taxa were observed in 2021 as in previous years (2018 to 2020). Indicators (i.e., percent cover, density, species richness, and diversity) were shown to be variable within and among quadrats

and between the reference and exposure areas; however, no statistically significant differences were noted between the exposure and reference areas for any of the indicators evaluated. Overall, results of this survey suggest that macrofloral and epibenthic community assemblages are comparable between the Project exposure and reference areas with no obvious evidence of Project-related influence or impairment. It should be noted that results of a power analysis using 2021 data indicate that the current sampling design has insufficient power to detect change such that these results should be interpreted with some caution. The sampling effort required to detect change with statistical power is simply not feasible to achieve within the limited open-water season in the region and it is therefore recommended that this component of the MEEMP be dropped moving forward.

Marine Fish Community

The marine fish sampling program at Milne Port was successfully implemented in 2021, with detailed results presented in Golder (2022a). Fish captures in 2021 were higher relative to previous years, again attributed to increased sampling effort. Taxonomic composition and relative abundance of the fish catch did not measurably change from previous sampling years, with Arctic char, Fourhorn Sculpin (*Myoxocephalus quadricornis*) and Shorthorn Sculpin (*Myoxocephalus scorpius*) remaining the dominant species in the fish community.

Of the six (6) fishing methods used in 2021, gill net surveys were the most effective followed by angling. Long line was added in 2021 based on direction from the MEWG provided during their review of the 2020 MEEMP AIS Report, to target large-bodied demersal fish; however, efforts were unsuccessful and no fish were caught with this method.

Based on recommendations made last year, five Fishing Areas (FAs) were delineated based on habitat features and their location relative to Milne Port to standardize fishing methods and generate catch statistics that can be compared over time. Using 2020 and 2021 datasets, Catch-Per-Unit-Effort (CPUE) was compared across FAs and years and no significant differences were observed (though fish abundance was generally higher in Ore Dock West versus other FAs).

Marine Fish Health and Tissue Chemistry

Tissue chemistry results for Arctic Char sampled in 2021 were generally consistent with those reported in previous years (2010 to 2020). Statistically significant increases have been observed since 2018 for some contaminants of potential concern in Arctic char and *H. artica* (e.g., aluminum and magnesium); however, differences were again small and often inconsistent, likely reflecting natural variability in both the bioavailability and subsequent uptake of metals, reflected in the reported tissue concentrations. All tissue samples for Arctic Char, Fourhorn Sculpin and *H. arctica* collected from 2018 to 2021 were below Health Canada's Maximum Levels for Chemical Contaminants in Foods mercury consumption guideline (Health Canada, 2015) and below the British Columbia Ministry of Environment fish tissue guidelines for selenium (BC MOE, 2014).

Impact predictions in the original FEIS (Baffinland, 2012) forecasted the potential for low magnitude changes in some ecological parameters, such as Arctic char tissue chemistry, but characterized these changes as not significant. Overall, monitoring data from 2021 align with these predictions, as any observed changes have generally been minor, either within established guidelines or consistent with baseline conditions. At present, monitoring indicates that mitigation measures are functioning as intended and that Project activities are being managed in a way that has not resulted in adverse effects on the marine ecosystem. To date, construction and operational activities at Milne Port do not appear to have negatively affected fish health or tissue chemistry in the Milne Port area.

TRENDS

Environmental effects monitoring (EEM) for marine sediment and benthic infauna was not performed for the 2021 MEEMP based on multiple years of monitoring showing that no directional changes, or trends, have occurred in either component of the marine receiving environment.

Overall, MEEMP sampling results from 2021 do not suggest degradation or impairment of the marine physical or biological environment (i.e., physical oceanography, marine water quality, macroflora and epibenthic communities, fish community and health) associated with the construction and operation of Milne Port.

Monitoring completed to date as part of the MEEMP reflects concordance with this Condition (No.76) of PC No. 005, in addition to the other following relevant PC Conditions: No. 1, 83, 83(a), 85, 87, 91, 99, 99(b), 113, 114 and 126.

RECOMMENDATIONS / LESSONS LEARNED

The MEEMP study design, data collection methodology and results are reviewed yearly with the MEWG. Recommendations from the MEWG inform refinements to the program, enhancement of existing mitigation measures, and development of adaptive management measures (when and where applicable). MEEMP results will continue to be presented to the MEWG on an annual basis, and recommended adjustments to the programs will be considered by Baffinland and implemented as deemed necessary and relevant for detecting potential Project-related impacts. Based on results collected to date, no additional mitigation measures are recommended at this time.

The following is a list of 2021 recommendations for the MEEMP - presented by study component:

Marine Water Quality

Marine water quality monitoring at Milne Port is recommended to continue annually to enable evaluation of potential changes in downstream water chemistry from Site operations and to provide continuity in the established time series for the MEEMP.

Marine Sediment Quality

Sediment monitoring to date suggests that mitigation measures are functioning as intended and that Project activities are being managed in a way that has not adversely affected marine sediment within the Milne Inlet study area. While monitoring of marine sediment quality should continue, it is not required annually. It is therefore recommended that monitoring of sediment quality not proceed in 2022, commensurate with a lack of Project effects documented on sediment quality within Milne Inlet. Monitoring of marine sediment quality is recommended once every three years moving forward, with the next sampling program planned for 2023.

Benthic Infauna

Monitoring of benthic infaunal communities to date suggests that mitigation measures are functioning as intended and that Project activities are being managed in a way that has not adversely affected community composition or population parameters in the Milne Inlet study area. While monitoring of benthic invertebrates should continue, it is not required annually. It is therefore recommended that monitoring of benthic invertebrates not proceed in 2022, commensurate with a lack of Project effects documented within Milne Inlet. Monitoring of benthic infaunal communities is recommended once every three years moving forward, with the next sampling program planned for 2023.

Epibenthic Communities

Though both sampling effort and taxonomic resolution of the data increased in 2021, it is recommended that this component be removed from the MEEMP going forward. Power analysis reveals that our ability to detect small to moderate magnitude changes with statistical robustness would be limited, even with a substantial increase in sampling intensity. The cost and effort of this program can no longer be justified when the data collected is insufficient to meet program objectives.

Marine Fish Community

It is recommended to continue fishing efforts using multiple methods with the repeated survey design, based on the five FAs, to facilitate comparisons through time.

Marine Fish Health and Tissue Chemistry

Moving forward, continued monitoring of fish health in Milne Port is recommended to ensure continuity in established time series (e.g., Arctic char) or to better characterize baseline data (e.g., sculpin and *H. arctica* tissue chemistry).

Project Certificate Condition No. 77

Category	Marine Environment - Working Group
Responsible Parties	The Proponent, Environment Canada, Fisheries and Oceans Canada, the Government of Nunavut, the Qikiqtani Inuit Association and interested parties
Project Phase(s)	All Phases
Objective	The MEWG will consult with, and provide advice and recommendations to the Proponent in connection with mitigation measures for the protection of the marine environment, monitoring of effects on the marine environment and the consideration of adaptive management plans. The role of the MEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.
Term or Condition	A Marine Environment Working Group (MEWG) shall be established to serve as an advisory group in connection with mitigation measures for the protection of the marine environment, and in connection with the Project Environmental Effects Monitoring program, as it pertains to the marine environment. Membership on the MEWG will include the Proponent, Environment Canada, Fisheries and Oceans Canada, Parks Canada, the Government of Nunavut, the Qikiqtani Inuit Association, the Mittimatalik Hunters and Trappers Organization, and other agencies or interested parties as determined to be appropriate by these key members. Makivik Corporation shall also be entitled to membership on the MEWG at its election. The MEWG members may consider the draft terms of reference for the MEWG filed in the Final Hearing, but they are not bound by them.
Relevant Baffinland Commitment	46, 49, 51
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 MEWG Meeting Records Concordance to 2020-2021 Board Recommendations
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix E

METHODS

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

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

- Baffinland to provide a Project update to the members (e.g., includes mining and shipping-related activities such as ore production, and vehicular and vessel traffic);

- Discussion of monitoring program planning including sampling approach (e.g., sampling variables, sites, and data collection methods) in advance of field programs to obtain feedback by MEWG members;
- Discussion of results of monitoring programs to obtain feedback by MEWG members; and
- Various research presentations (given by Baffinland, Baffinland technical consultants and other members).

The group typically schedules two (2) yearly in-person meetings, in addition to hosting two (2) interim teleconferences per year. In 2021, engagement with the MEWG was reduced slightly to avoid consultation fatigue and overlap with scheduled engagements associated with the Phase 2 Proposal.

Draft technical annual reports and other documentation are provided to the MEWG in advance of meetings to the extent possible and on an on-going basis to allow for review, comment and advice to be provided by all members. Baffinland reviews all comments received on draft reports, makes effort to provide meaningful responses to each comment, and in so doing, takes into consideration the suggestions for improvement of the report and advice provided by MEWG. This mechanism allows MEWG members to provide constructive feedback on annual reporting efforts.

RESULTS

In 2021, the MEWG met twice. Both meetings were held via teleconference due to COVID-19 restrictions.

A list of the meetings and topics discussed with the MEWG in 2020 is provided in Table 4.24.

Table 4.24: Marine Environment Working Group Meetings in 2021

Date	Location	Topics Discussed
MEWG		
May 13, 2021	Teleconference	<ul style="list-style-type: none"> • 2020 Preliminary Marine Mammal Monitoring Results Technical Memo • Monitoring Results Summary • Narwhal Adaptive Management Response Plan Alternatives • 2021 Ringed Seal Aerial Survey
June 29 2021	Teleconference	Baffinland Update <ul style="list-style-type: none"> • 2021 Shipping Season Overview • 2021 Steensby Baseline Data Collection • 2021 Marine Monitoring Program Overview

As a result of inputs from the MEWG, numerous program modifications have been made since 2015, and additional mitigations have been adapted. When suggestions have been made by working group members on specific programs, Baffinland has made the effort in considering these requests in the most expedited and feasible manner. When a change is not implemented, Baffinland has provided rationale as to why the modification cannot immediately be implemented and/or that additional information is required before it can make an informed decision and/or has provided its reasoning for not pursuing specific requests and requesting that alternative methods be suggested.

Many of the members that participate in the Working Groups also represent regulatory bodies that have the ability to issue directions to Baffinland in accordance with their jurisdiction, mandate or issued permits. As has always been

the intention of the Working Groups, they should not duplicate or fetter regulatory obligations, and rather remain focused on the enhancement of Baffinland's monitoring programs and providing advice on best practices or new research they are aware of to inform the ongoing development and implementation of Baffinland's comprehensive environmental management system.

See also Summary for Term and Condition No. 183.

TRENDS

As the NIRB has previously been made aware, from time to time Baffinland has struggled to reconcile recommendations from the Working Groups that do not properly appreciate or weight health and safety concerns and limitations or operational constraints. Costs or logistics of implementing recommendations are rarely taken into account, despite this reasonably needing to be a consideration when weighing the value of a proposed program or activity. In many cases, despite Baffinland's efforts to specifically and clearly communicate these considerations to the Working Groups, members continue to advocate for research studies that are not feasible. In all cases, it is important to distinguish between initiatives that may be of personal interest or curiosity to individual Working Group members, and those that have a reasonable link to the Mary River Project's activities.

Some Working Group members have expertise conducting research on the marine or terrestrial environments or have intimate knowledge of the area, while others do not have that experience. Some participate solely in their capacity as a government regulator or as an interested Party. However, to Baffinland's knowledge none of the other participants have significant experience operating industrial projects, particularly in the complex and challenging Arctic. While recommendations brought forward within these Working Groups must be subject to appropriate consideration and discussions taking into consideration IQ and western science, they must also be weighed against the practical operationalization of the recommendation along with a fulsome cost benefit analysis, which no other party is suited to do outside of Baffinland. To be clear, Baffinland accepts that some Working Group members wish to see a process inserted into the Terms of Reference to generate and record consensus-based recommendations and this has been reflected in the most recent drafts, however, Baffinland must stress the need to retain ultimate authority to reject recommendations that don't meet reasonable criteria for implementation.

RECOMMENDATIONS / LESSONS LEARNED

In its most recent draft Terms of Reference (ToR) for the Working Groups Baffinland presented a reasonable path forward that would result in meaningful changes to the Groups current structure, operational schedule, and ability to influence the Project. It is expected that this should improve Members' expectations, communication within the Group and outcomes. Baffinland will continue to engage with the Working Groups on the development of a revised Terms of Reference throughout 2022 in hopes of resolving any outstanding concerns raised by members to date. See also responses provided to Board Recommendations in Appendix E.

Project Certificate Condition No. 78

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operation, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To obtain accurate and current ice information.
Term or Condition	The Proponent shall update the baseline information for land fast ice using a long-term dataset (28 years), and with information on inter-annual variation. The analysis for pack and landfast ice shall be updated annually using annual sea ice data (floe size, cover, concentration) and synthesized and reported in the most appropriate management plan.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Ice and Marine Shipping Assessment - Mary River Iron Ore Project – North Baffin Island – Included in Baffinland 2012 Appendix 3 G (Ice and Marine Shipping Assessment; ENFOTEC Technical Services Inc. (ENFOTEC, 2011) Ice Conditions and Ship Access to the Milne Inlet Port Site – Mary River Iron Ore Project - Final Report. Amended in 2015 (ENFOTEC, 2015) Ice Conditions and ship access to the Milne Inlet port site – Update included in Technical Supporting Document (TSD) No. 16. – Ice Conditions Report (ENFOTEC, 2016) 'Baffinland Ice Concentrations – 1997-2020' in Baffinland's Response to Reviewer Comments on Golder's Preliminary Summary of 2020 Narwhal Monitoring Programs (Appendix 2 of Attachment 1 in Baffinland, 2021i) 'Daily Ice Charts for Period of 12-22 July (2018, 2019 and 2020)' in Golder's Preliminary Summary of 2020 Narwhal Monitoring Programs (Attachment 1 in Golder, 2021c). 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix G.12

METHODS

Ice conditions study reports have been commissioned by Baffinland for the Northern Shipping Route on several occasions, including 2011, 2015, 2016 and 2021 (ENFOTEC, 2011; ENFOTEC, 2015; ENFOTEC, 2016; Baffinland, 2021i; Golder, 2021c). Additionally, in support of the Phase 2 Proposal, updated information on the dates for break up and freeze up of landfast ice was provided in Table 1 of a July 2019 memo entitled "Impacts of Icebreaking on Ice (NIRB Registry No. 325731, ENFOTEC, 2019). Ice charts and satellite imagery showing the presence and decay of landfast ice in 2020 were included in Baffinland's presentation during the 2020 NIRB Marine Workshop (NIRB Registry No. 331227, Baffinland, 2020g).

Additionally, accurate and current ice information from the Canadian Ice Service and ice navigators on board the Multipurpose Supply Vessel (MSV) Botnica is obtained by Fednav, on behalf of Baffinland's Shipping Department, on a daily basis during the start and end of the shipping season for the purposes of managing shipping operations safely and within the parameters of the commitments and mitigations made by the Company (i.e., commitment not to break landfast ice and transit restriction mitigations). This information is produced in real-time during active shipping/icebreaking operations. In other words, it cannot be integrated into a management plan in advance of the season to inform planning of shipping operations. However, historical ice data has been integrated into relevant management plans for this purpose.

Ice data is used for the purposes of planning the start and end of each shipping season. As outlined in Sections 5.2 and 5.3 of the Shipping and Marine Wildlife Management Plan (SMWMP; Baffinland, 2021h) that was submitted to the NIRB in July 2020 in accordance with the NIRB's May 25, 2020 Directive following approval of the Production Increase Proposal (PIP) Extension Request (NIRB Registry No. 330106, NIRB, 2020b), this information is used to inform the procurement of vessels at different times of the shipping season, to ensure vessels have the necessary capacity to sail along the shipping route in varying ice conditions. Lastly, this information is used to provide vessel captains with relevant ice and weather Information for navigational purposes, and is integrated into the Standing Instructions to Masters (SITM), which is referenced in Section 1, 2, 4 and 5 of the SMWMP (Baffinland, 2021h).

RESULTS

Accurate and current ice information is used for the purposes of planning the start and end of each shipping season. As outlined in Sections 5.2 and 5.3 and Appendix B (Baffinland Pre-Charter Bulk Carrier Ice Capability Assessment) of the SMWMP (Baffinland, 2021h) that was submitted to the NIRB in July 2020 in accordance with the NIRB's May 25, 2020 Directive following approval of the PIP Extension Request (NIRB Registry No. 330106, NIRB, 2020b). As outlined in Appendix B (Baffinland Pre-Charter Bulk Carrier Ice Capability Assessment) of the SMWMP (Baffinland, 2021h), this information is used to inform the procurement of vessels at different times of the shipping season, to ensure vessels have the necessary capacity to sail along the shipping route in varying ice conditions. Lastly, this information is used to provide vessel captains with relevant ice and weather Information for navigational purposes, and is integrated into the SITM, which is referenced in Section 1, 2, 4 and 5 of the SMWMP (Baffinland, 2021h).

TRENDS

Over the first seven years of Baffinland's shipping season, ice conditions have been quite variable, with no obvious trends apparent. For example, the decay of landfast ice has typically occurred within the same a 1.5-week period beginning mid-to-end of July, with ice freeze occurring over a similar two-week time frame at the mid-to-end of October. If and when climate conditions change such that the ice-free season is notably consistently longer, Baffinland will report on these trends in future years.

RECOMMENDATIONS / LESSONS LEARNED

While Baffinland understands that PC Condition No. 78 was intended for shipping operations along the Southern Shipping Route (Steensby Inlet) where Project shipping engages with landfast ice, the ice condition report for the Northern Shipping Route (where Project shipping does not engage with landfast ice) will be updated periodically as new data becomes available. The ice condition study for the Southern Shipping Route will be updated prior to the construction and operation of the Steensby Port.

Project Certificate Condition No. 79

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent, Canadian Hydrographic Services
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assist in the development of nautical charts for Canadian waters.
Term or Condition	The Proponent shall provide the Canadian Hydrographic Services with bathymetric data and other relevant information collected in support of Project shipping where possible, to assist in the development of nautical charts for Canadian waters.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Canadian Hydrographic Service (CHS)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland entered into a collaborative cost-sharing agreement with CHS for their nautical charting program. The CHS also collected additional detailed bathymetry around the Existing Ore Dock in 2016. No additional data has been collected since that time, as there have been no substantial deviations in the Northern Shipping Route.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 80

Category	Marine Environment - Ice Breaking and Shipping
Responsible Parties	The Proponent, Canadian Hydrographic Services
Project Phase(s)	Construction
Objective	To identify areas of risk along the shipping route.
Term or Condition	Prior to commercial shipping of iron ore, the Proponent shall conduct a detailed risk assessment for Project-related shipping accidents, noting areas along the ship tracks where vessels may be particularly vulnerable to environmental conditions such as sea ice, and any seasonal differences in risk. This assessment shall inform mitigation and adaptive management plans.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Emergency Response Plan (ERP; Baffinland, 2020h) 2021 Oil Pollution Emergency Plan – Milne Inlet (OPEP; Baffinland, 2021l) 2021 Oil Pollution Prevention Plan – Milne Inlet (OPPP; Baffinland, 2021m) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) Spill at Sea Response Plan (SSRP; Baffinland, 2015) Spill Contingency Plan (Baffinland, 2021k) Diesel Environmental Emergency (E2) Plan - Milne Port (Baffinland, 2020i)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.12

METHODS

Baffinland has developed and maintained appropriate contingency plans to respond to spills on land, at the port, and at sea. The plans outline the equipment to be used in the event of a spill, as well as the roles and responsibilities and training necessary to maintain appropriately trained personnel.

See also summary for PC Condition No. 78 and 92.

RESULTS

Emergency response plans outline the equipment to be used in the event of a spill, as well as the roles and responsibilities and training necessary to maintain appropriately trained personnel.

See also summary for PC Condition No. 78 and 92.

TRENDS

Baffinland is committed to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills and any other Project-related shipping accidents.

See also summary for PC Condition No. 78 and 92.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically procure resources and equipment to respond to any Project-related shipping accidents in the unlikely event that these occur.

See also summary for PC Condition No. 78 and 92.

Project Certificate Condition No. 81

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To mitigate potential shoreline effects from shipping.
Term or Condition	The Proponent shall reassess the potential for ship wake impacts to cause coastal change following any further changes to the proposed shipping routes.
Relevant Baffinland Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not Applicable
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Mary River Project – FEIS (Baffinland, 2012) Mary River Project – Phase 2 Proposal – Technical Supporting Document (TSD) No. 22 - Ship Wake and Propeller Wash Assessment (Golder, 2018a)
Ref. Document Link	Not applicable

METHODS

Ship wake effects on shorelines were assessed in Appendix 8D-2 of the FEIS (Baffinland, 2012) and TSD No. 22 for the Phase 2 Proposal (Golder, 2018a). Results indicated that wave energy from wind-generated waves was estimated to exceed ship-generated wave energy during both average and peak wind conditions, and therefore ship wake impacts would be non-measurable relative to existing conditions. These assessments concluded that ship wakes would result in negligible effects on the physical shoreline along the Southern and Northern Shipping Route in comparison to wind-generated waves (i.e. existing condition).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Should changes to the current shipping routes be proposed, Baffinland will undertake the required assessment.

Project Certificate Condition No. 82

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operation
Objective	To mitigate potential shoreline effects from shipping.
Term or Condition	The Proponent is strongly encouraged to have its ore carriers subjected to sea trials to measure wake characteristics at various vessel speeds and distances from the vessel.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not Applicable
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Mary River Project – FEIS (Baffinland, 2012)
Ref. Document Link	Not applicable

METHODS

Baffinland understands that the intent of this condition was to address concerns related to potential erosional effects of ship wakes from purpose-built Baffinland ore carriers on shorelines along the Southern Shipping Route. Ship wake effects on shorelines along the Southern Shipping Route were assessed in Appendix 8D-2 of the FEIS (Baffinland, 2012). Results indicated that wave energy from wind generated waves is estimated to exceed ship-generated wave energy and ship waves are unlikely to cause any measurable erosion or habitat alteration along the Southern Shipping Route.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 83

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	All phases
Objective	To provide data on tide levels and storm surges.
Term or Condition	The Proponent shall install tidal gauges at Steensby and Milne Port to monitor sea levels and storm surges.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	The Proponent shall summarize and supply these monitoring results to NIRB in the annual Project report.
Status of PC Condition	Steensby Port - Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Oceanographic Data Processing – Baffinland Ballast Water Study, Milne Inlet 2014-15 (ASL, 2015) Technical Memorandum: Tide Gauge Data Collection at Milne Port During 2017 Open Water Season (Golder, 2018b) Baffinland Milne Port Tide Gauge Data Collection – 2020 Ice Free Season (Golder, 2021c) Draft 2021 Marine Environmental Effects Monitoring Program (MEEMP) and NIS/AIS Monitoring Program (Golder, 2022a) Baffinland Milne Port Tide Gauge Data Collection – 2021 Ice Free Season (Golder, 2022d) 2021 Marine Fish and Fish Habitat Studies in Steensby Inlet (Draft; Golder, 2022b)
Ref. Document Link	Not applicable

METHODS

Steensby Port

The lack of existing marine infrastructure at Steensby Port means that a water level gauge cannot currently be installed by attaching it to a repeatable location on fixed infrastructure (e.g., a pier or ladder at a dock).

In September 2021, an oceanographic mooring was deployed southeast of the proposed Steensby ore dock in Steensby Inlet. The oceanographic mooring included two (2) Acoustic Doppler Current Profilers (ADCPs) - one upward-looking and one downward-looking - that are programmed to continuously monitor currents, water levels, waves, salinity, and temperature until the mooring is recovered in August 2022. Relative water levels in Steensby Port will be established using the water depth data recorded by the upward-looking ADCPs (Golder, 2022b).

In September 2021, a local ground control point was established on Steensby Island using a survey-grade RTK GPS. The RTK GPS survey was also used to take one measurement of the water surface elevation at the deployed oceanographic mooring location. In 2022, further water surface elevations will be taken at the deployed oceanographic mooring location. When the data from the ADCPs is retrieved following the recovery of the

oceanographic mooring in 2022, the water level elevation data from the ADCPs will be referenced to a datum by comparing it to the surveyed water level elevations at the same time points (Golder, 2022b).

Milne Port

In 2021, oceanographic monitoring continued at Milne Port using an RBRconcerto CTD (RBR) sensor programmed to continuously measure water level, temperature, and conductivity. Additionally, an RBRsolo D logger was deployed as a redundancy to measure water levels in case the RBRconcerto failed to return data. Detailed methods are provided in Golder (2022a).

RESULTS

Steensby Port

Not applicable. Results will be available once the oceanographic mooring has been recovered in August 2022 and the data from the upward-looking ADCPs has been processed and referenced to a datum by comparing it to the RTK GPS survey water level elevations.

Milne Port

A continuous time-series of water level, temperature, and conductivity data was collected with detailed results presented in Golder (2022a). Water level data recorded at Milne Port indicated typical fluctuations resulting from tidal forcing. During the measurement period, a total of eight neap-spring tidal cycles were observed and there were no observable storm surges.

TRENDS

Steensby Port

Not applicable.

Milne Port

Results are consistent with prior years, indicating that the current approach for monitoring relative sea levels and storm surges is effective.

RECOMMENDATIONS / LESSONS LEARNED

Steensby Port

Not applicable.

Milne Port

To support future trends analyses, Baffinland plans to reinstall the tide gauge in 2022 at Milne Port and extend the multi-year analysis of relative sea level variance at Milne Port.

Project Certificate Condition No. 83 (a)

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operation
Objective	To identify potential for and conduct monitoring to identify effects of sediment redistribution associated with construction and operation of the Milne Port.
Term or Condition	The Proponent shall conduct hydrodynamic modelling in the Milne Inlet Port area to determine the potential impacts arising from disturbance to sediments including re-suspension and subsequent transport and deposition of sediment. The modelling results shall be used to update the marine water and sediment quality monitoring and mitigation program to include activities associated with the construction and operation of the Milne Inlet Port. The monitoring program shall include an ongoing assessment of the potential introduction of metals that bio-accumulate in the marine food chain.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Mary River Project – FEIS (Baffinland, 2012) Mary River Project – Addendum to the FEIS (Baffinland, 2013a) 2017 MEEMP and AIS Monitoring Program Report (Golder, 2018c) TSD #20 - Hydrodynamic Modelling Report - Milne Port (Golder, 2018d) 2018 MEEMP and AIS Monitoring Program Report (Golder, 2019a) 2019 MEEMP and AIS Monitoring Program Report (Golder, 2020c) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) 2021 Oil Pollution Emergency Plan – Milne Inlet (OPEP) (Baffinland, 2021i) 2020 MEEMP and AIS Monitoring Program Report (Golder, 2021b) Environmental Protection Plan (Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

In the FEIS (Baffinland, 2012) and the FEIS Addendum for the Early Revenue Phase (ERP; Baffinland, 2013a), it was predicted that installation of the existing ore dock would have minimal effect on local sediment transport and that Project operations were not likely to result in significant adverse effects on water or sediment quality. These impact predictions were used to inform the current MEEMP sampling design (2014 through to 2021) including the selection of sample locations and analytical parameters. To meet the overall objective of assessing and monitoring for potential sediment redistribution associated with Milne Port-related activities, in addition to assessing the potential introduction of metals, Baffinland has implemented the following study components:

Hydrodynamic Modelling

In 2018, Golder conducted hydrodynamic and sediment transport modelling at the head of Milne Inlet near Milne Port to support the Phase 2 Proposal (Golder, 2018c). This included an assessment of the potential changes in

currents, waves, and sediment transport from the existing ore dock configuration to the proposed Phase 2 ore dock expansion. Results indicated little to no change in current, wave, and sediment transport conditions seaward from the existing ore dock configuration to the proposed Phase 2 ore dock expansion for areas seaward and outside the direct vicinity of the ore dock. The largest changes in current, wave, and sediment transport conditions were observed in the areas behind the proposed Phase 2 ore dock expansion which would be isolated from the rest of Milne Inlet.

No additional hydrodynamic modelling was undertaken in 2020 or 2021.

Review of Hydrology and Geomorphology of Phillips Creek

In 2019, Golder conducted a background review of hydrology and geomorphology in Phillips Creek estuary to better understand fluvial processes and whether observed changes in sediment conditions along the West Transect stem from underlying natural or Project-related causes (Golder, 2020c). This included a literature review of Arctic hydrology and sediment regime, analysis of historical air photographs of Phillips Creek estuary and delta, and a review of collected Milne Inlet sediment data from 2014 to 2017. Results suggest that Phillips Creek Delta is a dynamic environment that migrates because of Phillips Creek sediment deposition and coastal processes and the size of sediment that is deposited by Phillips Creek on the delta will change from year to year due to annual variability in sediment load, coastal forcing, and other natural processes. It is suggested that the position of the West Transect from Milne Port Ore Dock towards the Phillips Creek delta means the sediment data may demonstrate large spatial and temporal variabilities. This suggests the measured 2014 to 2017 samples along the West Transect are within the expected range of natural variability.

MEEMP

Baffinland's monitoring efforts at Milne Port include an ongoing assessment of potential Project-related introductions of metals to the marine environment that would have the potential to bio-accumulate in the marine food chain. The 2021 MEEMP (Year 7 of the Program) included marine water quality sampling, as well as various levels of biological sampling including fish tissue collection for analysis of metals (body burden). The marine water quality monitoring program was designed to monitor for potential changes to water quality due to site drainage discharge (including iron ore stockpile run-off) to the marine environment at Milne Port. Water quality samples were analyzed for a variety of parameters that included total and dissolved metals, screening against CCME Water Quality Guidelines (WQG) where applicable.

In order to assess for the potential introduction of metals that bio-accumulate in the marine food chain, incidental fish mortalities (Arctic char) are retained each year for analysis of metal concentrations in tissue (body burden). Targeted captures of resident Fourhorn Sculpin and shellfish species *Hiatella arctica* tissue for health assessments and tissue chemistry analyses were added to the MEEMP in 2020 and 2018, respectively, in the event migratory species (Arctic char) were sampled in insufficient numbers to adequately support statistical analyses. Mercury concentrations in fish and *Hiatella* muscle tissue were compared to the Health Canada Maximum Levels for Chemical Contaminants in Foods mercury consumption guideline of 0.5 milligrams per kilogram wet weight (mg/kg wet weight (wwt); Health Canada, 2015) and the British Columbia Ministry of Environment (BC MOE) and Climate Change Strategy fish tissue guidelines of 0.4 mg/kg dry weight (mg/kg dw) for selenium (BC MOE, 2014).

Detailed information on study design and sampling methodology is available in the Draft 2021 Annual Report for the MEEMP and AIS Monitoring Program (Golder, 2022a), which has been released to the Working Group for review and comment.

RESULTS

Hydrodynamic Modelling

Not applicable in 2020.

Review of Hydrology and Geomorphology of Phillips Creek

Not applicable in 2020.

MEEMP

Results from marine water and sediment quality sampling and fish health and tissue chemistry analyses are presented in the Draft 2021 MEEMP and NIS/AIS Monitoring Report (Golder, 2022a), with a brief summary provided below.

Concentrations of water quality parameters including major ions, nutrients, metals, hydrocarbons, and Polycyclic Aromatic Hydrocarbons (PAH), were less than applicable CCME WQGs (CCME, 2014) in the marine environment downstream of Site drainage and treated effluent discharge sites. For some metals, where total concentrations were detected, dissolved concentrations were below detection and so they were mostly present in particulate form (i.e., aluminum, chromium, iron, nickel, tellurium, and zinc). Iron concentrations in water samples collected in 2021 remained within the range measured in previous years. Hydrocarbons and PAHs were not detected. Detailed fish health data were collected for Fourhorn Sculpin and *H. arctica* in 2020 and 2021. Based on internal and external examinations, Fourhorn Sculpin from the Milne Port area appeared to be healthy at the time of sampling with few abnormalities observed. Comparisons of health endpoints for *H. arctica* between 2020 and 2021 indicated that condition (i.e., total weight relative to total length) was lower in 2021 compared to 2020 which may represent natural variability or effects of localized conditions. Ongoing monitoring with *H. arctica* will improve the ability to draw conclusions regarding variability of health endpoints in *H. arctica*.

A total of 24 samples were submitted for tissue chemistry analysis of metals and PAH in 2021, which included eight samples each for Arctic Char, Fourhorn Sculpin and *H. arctica*. Tissue concentrations of PAH were below Detection Limits (DL) for all species analyzed in 2021, while metal concentrations were generally above DLs and more variable among species and years. Concentrations of metals in fish and *H. arctica* tissue in 2021 were generally consistent with available data reported in previous years. Significant differences were observed for some metals between 2018 and 2021. The differences were small and within the range of variability observed since 2010, likely reflecting natural variability. No samples (i.e., Arctic char, Fourhorn Sculpin or *H. arctica*) exceeded the Health Canada commercial consumption guideline of 0.5 mg/kg ww mercury, and only 6% of *H. arctica* samples exceeded the BC MOE guidelines for selenium of 4 mg/kg dw for selenium; no fish tissues exceeded the selenium guideline.

TRENDS

Hydrodynamic Modelling

Not applicable.

Review of Hydrology and Geomorphology of Phillips Creek:

Not applicable.

MEEMP

Collectively, marine water quality monitoring undertaken to date indicates that the construction and operation of Milne Port does not appear to have negatively affected marine water quality in Milne Inlet, as the reported analytical results for water quality parameters measured in 2021 were below applicable CCME WQG, or were generally within range of conditions observed in previous MEEMP surveys (2015 to 2020). With respect to iron, which is of primary concern for the Project, laboratory analyses have not revealed a trend of increased concentrations between 2014 and 2021. Monitoring results remain within original FEIS predictions, which forecasted no significant residual effects on water quality but indicated the potential for minor localized increases in TSS, nutrient, metal, and hydrocarbon concentrations.

The health of both Fourhorn Sculpin and *H. arctica* from the Milne Port area appeared good at the time of sampling, and ongoing monitoring will further improve understanding of natural variability in health endpoints for *H. arctica* in particular.

Tissue concentrations of metals for Arctic Char in 2021 were generally comparable to historic data; however, from 2018 to 2021 significant differences were observed among years for three (3) Contaminants of Potential Concern (CoPC): aluminum, magnesium, and selenium. Concentrations of aluminum have decreased over this period by 20% while magnesium and selenium have increased by 4% and 3%, respectively. Historic data indicated that metal concentrations were variable over time and despite significant increases in aluminum and magnesium concentrations from 2018 to 2021, concentrations of these metals remain similar to baseline data, with no indication of changes based on Project activities.

Tissue concentrations of metals for Fourhorn Sculpin and *Hiatella arctica* in 2021 were generally comparable to data collected in previous years; however, significant temporal differences were observed among years for four (4) CoPCs (i.e., aluminum, iron, mercury, and selenium). Aluminum and iron concentrations decreased significantly from 2019 to 2020, and aluminum concentrations decreased significantly from 2019 to 2021. Mercury concentrations did not differ significantly among years. Selenium concentrations were significantly lower in 2020 when compared to 2019, but did not differ significantly among other years.

Significant differences in concentrations of CoPCs for Arctic char, Fourhorn Sculpin and *H. arctica* between 2018 and 2021 appear to reflect natural variability and are not considered to be Project-related.

RECOMMENDATIONS / LESSONS LEARNED***Hydrodynamic Modelling***

Not applicable.

Review of Hydrology and Geomorphology of Phillips Creek

Not applicable.

MEEMP

All marine water quality samples collected in 2021 were below the applicable WQG for all tested parameters, including iron, and were within the range of previous survey years. Temporal and spatial variability was generally low among water samples collected in 2021 and a substantial number of parameters were frequently below the limits of detection. Marine water quality sampling should be repeated in 2022 following the same procedures outlined in the Draft 2021 MEEMP Annual Monitoring Report (Golder, 2022a).

Fish health (i.e., external and internal assessments) and tissue chemistry analyses are recommended to continue for incidental fish mortalities and targeted species. Fourhorn Sculpin, Arctic char and *H. arctica* remain recommended sentinel species for tissue chemistry analysis.

As the MEEMP evolves and additional data become available for analyses, the design and approach to analyses will be continuously revisited to optimize the statistical power for detecting change.

Project Certificate Condition No. 84

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent sediment redistribution along the shipping route
Term or Condition	The Proponent shall update its sediment redistribution modeling once ship design has been completed and sampling should be undertaken to validate the model and to inform sampling sites and the monitoring plan.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not Applicable
Stakeholder Review	None
Reference	Mary River Project – FEIS (Baffinland, 2012) Mary River Project – Phase 2 Proposal - TSD No. 22 - Ship Wake and Propeller Wash Assessment (Golder, 2018e)
Ref. Document Link	Not applicable

METHODS

Baffinland understands that the intent of this condition was to address concerns related to potential ship-induced sediment redistribution from propeller wash and ship wake effects for shipping operations using purpose-built vessels for use along the Southern Shipping Route (i.e., Steensby Port). Ship wake effects on shorelines along the Southern Shipping Route were assessed in Appendix 8D-2 of the FEIS (Baffinland, 2012) and along the Northern Shipping Route in Appendix 8D-2 of the FEIS (Baffinland, 2012) and TSD No. 22 (Golder, 2018e). Additionally, propeller wash effects on sediment redistribution in direct vicinity of the proposed Phase 2 ore dock were assessed in TSD No. 22 (Golder, 2018e). Given that the Southern Shipping Route of the Project is not active, and Baffinland has not constructed or utilized any built-for-purpose vessels, the designation is considered Not Applicable to the Northern Shipping Route shipping operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 85

Category	Marine Environment - Shoreline Effects and Sediment Redistribution
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operation
Objective	To prevent sediment redistribution along the shipping route.
Term or Condition	The Proponent shall develop a monitoring plan to verify its impact predictions associated with sediment redistribution resulting from propeller wash in shallow water locations along the shipping route. If monitoring detects negative impacts from sediment redistribution, additional mitigation measures will need to be developed and implemented.
Relevant Baffinland Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not Applicable
Stakeholder Review	None
Reference	Mary River Project – Phase 2 Proposal - TSD No. 22 - Ship Wake and Propeller Wash Assessment (Golder, 2018e)
Ref. Document Link	Not applicable

METHODS

Baffinland understands that the intent of this condition was to address concerns related to potential ship and/or tug propeller wash effects in shallow-water areas along the Southern Shipping Route. Propeller wash effects on sediment redistribution in the direct vicinity of the proposed Phase 2 ore dock were assessed in TSD No. 22 (Golder, 2018e). Given that the Southern Shipping Route of the Project is not active, and Baffinland has not constructed or utilized any built-for-purpose vessels, the designation is considered Not Applicable to the Northern Shipping Route shipping operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will develop a monitoring plan to verify predictions of sediment redistribution resulting from propeller wash in shallow locations along the Southern Shipping Route if and/or when ore carriers are commissioned for the Southern Shipping Route.

Project Certificate Condition No. 86

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To update ballast water discharge impact predictions.
Term or Condition	Prior to commercial shipping of iron ore, the Proponent shall use more detailed bathymetry collected from Steensby Inlet and Milne Inlet to model the anticipated ballast water discharges from ore carriers. The results from this modeling shall be used to update ballast water discharge impact predictions and should account for density dependent flow and annual timescales over the project life. Additional sampling should also be undertaken to validate the model and to inform sampling sites and the monitoring plan.
Relevant Baffinland Commitment	85
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Oceanographic Data Processing – Baffinland Ballast Water Study, Milne Inlet 2014-15 (ASL, 2015) Ocean Circulation and Ballast Water Dispersal in Milne Inlet, Baffin Island (CORI, 2014) Data Report for the 2015-2016 Observational Oceanography Program in Milne Inlet (CORI, 2016) Tide Gauge Data Collection at Milne Port During the 2017 Open Water Season (Golder, 2018b) TSD 18 - Ballast Water Dispersion Modelling Report (Golder, 2018f) 2015 MEEMP Report (SEM, 2016a) 2016 MEEMP and AIS Monitoring Program Report (SEM, 2017a) 2017 MEEMP and AIS Monitoring Program Report (Golder, 2018c) 2018 MEEMP and AIS Monitoring Program Report (Golder, 2019a) Mary River Project – Phase 2 Addendum to the Final Environmental Impact Statement (Baffinland, 2018b) Ballast Water Model Validation Report (Golder, 2019b) Response to DFO Ballast Water Modelling Concerns (Golder, 2020d) Ballast Water Dispersion Sensitivity Simulations (Golder, 2019c) Baffinland Milne Port Tide Gauge Data Collection – 2021 Ice Free Season (Golder, 2022d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Ballast water dispersion modelling was initially undertaken in 2014 by Coastal and Ocean Resources Inc. (CORI) on behalf of Baffinland prior to the start of commercial shipping of iron ore at Milne Port (CORI, 2014; 2016).

Oceanographic data collected in the model region, including CTD data, ocean current data (via deployment of ADCPs), hydrology data, atmospheric data, and bathymetric data, were used to determine basic ocean conditions and to prepare gridded fields for the initial and boundary conditions for the model. The model was validated using ADCPs and CTD data collected in Milne Inlet in 2014. Modelling results were used to inform sampling sites for Baffinland's AIS monitoring program in 2015 and 2016.

In 2018, Golder was retained to perform updated ballast water dispersion modelling in Milne Inlet. The Ballast Water Dispersion Modelling Report for the Phase 2 Proposal was included as a Technical Supporting Document (TSD) No. 18; Golder, 2018f) in Baffinland's FEIS Addendum for the Phase 2 Proposal (Baffinland, 2018b). A three-dimensional hydrodynamic model was developed in the MIKE3 suite to assess the discharge of ballast water in Milne Inlet. This included modelling of ballast water discharges under the present Project (Early Revenue Phase), as well as under Phase 2 operations. The model was calibrated and validated to oceanographic data collected in the model region in 2014 by CORI (CORI, 2014). This included CTD data, ocean current data (via deployment of ADCPs), hydrology data, atmospheric data, and bathymetric data. However, data near Milne Port was not available.

In 2019, in response to comments from NIRB, the QIA, DFO and Parks Canada, Golder validated the ballast water dispersion model to observed 2018 oceanographic data and updated the model with improved wind data, estimates of discharge from Phillips Creek, and more spatially resolved heat-flux inputs. This involved running the ballast water dispersion model for the 2018 open-water season with measured 2018 ballast water discharge volumes, temperature, and salinity. Golder also assessed the sensitivity of ballast water dispersion to variations in ballast water salinity and temperature through six model sensitivity simulations (Golder, 2019b; 2020d). Additionally, Golder developed a box model analysis to assess the potential increase and/or decrease in temperature and salinity in distinct water masses due to ballast water discharge at the end of the 2018 open water season.

No additional ballast water modelling was undertaken in 2020 or 2021.

Additional oceanographic data were collected in Milne Inlet, specifically near Milne Port in 2018, 2019, and 2020 as follows:

- Oceanographic data (ocean currents and CTD measurements) were collected by Golder in 2018, 2019, and 2020 (Golder, 2019a; 2020c) for the purpose of providing ocean current, water level and CTD data needed to validate the improved ballast water model. Oceanographic data was collected near Milne Port and Bruce Head in 2018 and 2019, and in Milne Port only in 2020. The 2020 oceanographic data has not been processed or analyzed; this dataset will be archived for potential future ballast water model validation, if and when needed.

In addition, the following oceanographic data have been collected to address other NIRB Conditions and assist with ballast water dispersion model validation:

- Water level data were collected at a tide gauge installed at the Milne Port ore dock by Golder between 2017 and 2021 (Golder, 2018b; 2019a; 2020c; 2022d).
- CTD data has been collected annually as part of the MEEMP between 2014 and 2019 (SEM, 2016a; 2017a; Golder, 2018c; 2019a; 2020c).

RESULTS

Results of the updated modelling undertaken indicate that under a worst-case scenario the furthest distance a single molecule of ballast water discharged at Milne Port could travel up Milne Inlet is near Ragged Island. Accordingly, Baffinland has focused its 2021 NIS/AIS monitoring program at sampling locations near Milne Port.

TRENDS

In 2021, a total of 53 species were reported that had not been identified previously at Milne Port during previous baseline, MEEMP and NIS/AIS sampling. Of the new taxa, all but one (*Tricellaria* sp.) had clear records of occurrence in the Canadian Arctic with no record on the AIS databases. Accordingly, *Tricellaria* sp. has been sent for independent verification, and results are pending. Additionally, 2021 samples included five taxa (*Pseudofabricia aberrans*, *Marenzelleria* sp., *Ampharete petersenae*, *Paramphitrite birulai* and *Crassicorophium* sp.) that were flagged in previous years due to uncertainties in their natural range or because they were listed on an AIS database. These specimens were sent to taxonomic experts for independent verification and/or molecular analysis. Following review, *A. petersenae* has been reclassified as “No Risk” and has been removed from the Project ‘Watchlist’. The majority of identified taxa in benthic infauna samples collected at Milne Port and Ragged Island were not considered NIS or AIS.

There is no indication that further expansion of this program is required based on monitoring results to-date or updated ballast water modelling conducted.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 87

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent invasive species introductions resulting from Project shipping.
Term or Condition	The Proponent shall develop a detailed monitoring program at a number of sites over the long term to evaluate changes to marine habitat and organisms and to monitor for non-native introductions resulting from Project-related shipping. This program needs to be able to detect changes that may have biological consequences and should be initiated several years prior to any ballast water discharge into Steensby Inlet and Milne Inlet to collect sufficient baseline data and should continue over the life of the Project.
Relevant Baffinland Commitment	85
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2015 AIS Monitoring Report (SEM, 2016b) 2016 MEEMP and AIS Monitoring Report (SEM, 2017a) 2016 Milne Ore Dock Fish Offset Monitoring Report (SEM, 2017b) 2018 MEEMP and AIS Monitoring Program Report (Golder, 2019a) 2019 MEEMP and AIS Monitoring Program Report (Golder, 2020c) 2020 MEEMP and NIS/AIS Monitoring Report (Golder, 2021b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland's Non-Indigenous Species and Aquatic Invasive Species (NIS/AIS) Monitoring Program was developed in 2015 as part of the MEEMP to detect potential NIS/AIS introduced to Milne Inlet via high-risk Project related vectors such as ballast water discharges or hull biofouling. NIS/AIS surveys target lower trophic levels, including zooplankton, benthic infauna, epifauna and fish, using direct sampling methods in addition to considering all species observed during the MEEMP and NIS/AIS surveys.

Taxa identified in samples are cross-checked against the taxonomic inventory for Milne Inlet and, if it is newly observed (i.e., not listed), it is checked for NIS/AIS status through a detailed literature review of species descriptions and collection records to determine their documented and presumed ranges as well as compared against various databases listing NIS/AIS. Any taxa flagged as potential NIS/AIS, or with uncertainties in their ranges, are sent for independent verification of the taxonomic identification; specimens are typically sent to a DFO-endorsed Benthic Ecology Lab at Université Laval (Quebec) for independent verification of the taxonomic identification, the Canadian Centre for DNA Barcoding at the University of Guelph, or a global expert specializing in the specimen(s) in question (e.g., Dr. Vasily Radashevsky for Marenzelleria). Results and rationale for the independent verifications are reviewed and taxa that are not determined to be "no risk" undergo a detailed information gathering stage and, ultimately, either placed on the "Watchlist" or the "Trigger List"; the Watchlist is comprised of taxa that are considered to be

low risk (i.e., not listed on AIS databases, but the Canadian Arctic is not part of accepted range on record) or high risk (i.e., listed on AIS databases and/or Canadian Arctic not part of accepted range on record) but not attributable to the Project while the Trigger List is comprised of high risk taxa introduced via Project shipping activities.

Detailed information on study design and sampling methodology is available in the annual monitoring reports for the MEEMP and NIS/AIS monitoring programs (Golder, 2022a).

RESULTS

Detailed results of the 2021 NIS/AIS Monitoring Program are presented in the Draft 2021 MEEMP and NIS/AIS Monitoring Report (Golder, 2022a), with a summary provided below.

In 2021, a total of 431 taxa were identified, 53 of which had not been identified previously at Milne Port during baseline, MEEMP and NIS/AIS sampling. Of the new taxa, all but one (*Tricellaria* sp.) had clear records of occurrence in the Canadian Arctic with no record on the AIS databases. Accordingly, *Tricellaria* sp. was sent for independent verification, and results are pending.

Additionally, 2021 samples included five taxa (*Pseudofabricia aberrans*, *Marenzelleria* sp., *Ampharete petersenae*, *Paramphitrite birulai* and *Crassicorophium* sp.) that were flagged in previous years due to uncertainties in their natural range or because they were listed on an AIS database. These specimens were sent to taxonomic experts for independent verification and/or molecular analysis. Following review, *A. petersenae* has been reclassified as “No Risk” and has been removed from the Project ‘Watchlist’. The majority of identified taxa in benthic infauna samples collected at Milne Port and Ragged Island were not considered NIS or AIS.

Overall, the identification and flagging of individual taxa out of the hundreds identified in Milne Inlet indicate the NIS/AIS surveillance program is effective and functioning as intended.

TRENDS

The NIS/AIS program represents the most comprehensive monitoring program for NIS/AIS conducted by a marine port in Canada. Seven (7) years of monitoring during Project operations has yielded a comprehensive inventory of marine organisms residing in Milne Port and Milne Inlet; in fact, approximately 870 taxa have been identified in Milne Inlet through NIS/AIS monitoring to date, and include macroflora, zooplankton, benthic invertebrates and fish. The identification and flagging of individual taxa out of the hundreds identified in Milne Inlet indicate this surveillance program is effective and functioning as intended. The vast majority of these taxa have been designated as “No Risk” and are not considered to be of concern. To date, no Project-related introduction of a NIS/AIS species have been documented at Milne Port and the requirement for a rapid response has not been triggered.

RECOMMENDATIONS / LESSONS LEARNED

NIS/AIS results will continue to be presented to the MEWG on an annual basis, and adjustments to the programs will be made as needed.

It is recommended that sampling across multiple trophic levels continues in 2022, that the taxonomic inventory for Milne Inlet continue to be expanded upon, and that all flagged specimens continue to be screened for known geographic ranges and NIS/AIS status.

Project Certificate Condition No. 88

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent invasive species introductions resulting from Project shipping.
Term or Condition	<p>Prior to commercial shipping of iron ore and in conjunction with the Marine Environment Working Group, the Proponent shall provide an updated risk analysis regarding ballast water discharge to assess the adequacy of treatment and implications on the receiving environment. This risk analysis shall consider, but not be limited to:</p> <ul style="list-style-type: none"> a. Invasive species b. Seasonal oceanography c. Ballast water quality and quantity d. Receiving water quality; e. Residual physical, chemical, and/or biological effects; and f. Any risk assessment analysis regarding ballast water exchange and treatment efficacy in arctic waters
Relevant Baffinland Commitment	85, 86
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Work Group (MEWG)
Reference	<p>Risk assessment for ship-mediated introductions of aquatic nonindigenous species to the Canadian Arctic (Chan et al., 2012)</p> <p>Risk Assessment for Potential Introduction of Aquatic Nonindigenous Species through Ballast Water Discharge at Milne Port (SEM, 2013)</p> <p>International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Convention; International Marine Organization [IMO] 2017)</p> <p>Ballast Water Regulations (SOR/2021-120) (Transport Canada, 2022)</p> <p>Ballast Water Management Plan (Baffinland, 2019d)</p> <p>Mary River Project – Addendum to the Final Environmental Impact Statement. (Baffinland, 2013a)</p> <p>Draft 2021 MEEMP NIS/AIS Report (Golder, 2022a)</p> <p>2021 MEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1

METHODS

In order to establish the relative risk of introduction of AIS through ballast water exchange and ship hull biofouling, the Milne Port activities associated with the ERP were subjected to a semi-quantitative risk assessment using methods developed by DFO (Chan et al., 2012). The results, as presented in Appendix 8B-4 of the ERP Addendum to the FEIS (Baffinland, 2013a), indicated that the risk of AIS introductions at Milne Port due to ERP shipping operations was low (Invasion Risk categorized as 'Lowest') based on the following combined risk rankings:

- Probability of Arrival = Highest
- Probability of Survival = Lower
- Probability of Introduction = Lower
- Magnitude of Consequence = Lowest

Under the 6 million tonnes per annum (Mtpa) scenario (PIP Extension Request), the number of yearly ballast water discharge events would increase from 53 (as assumed in Appendix 8B-4) to 84 vessels. This would increase the total volume of ballast water discharged per year in the marine environment from 662,000 tonnes to 1,025,000 tonnes. Following application of a correction factor (0.10) to estimate for propagule supply (Chan et al., 2012), the corrected volume of discharged ballast water (102,500 tonnes) under a 6 Mtpa scenario would end up resulting in the same probability and consequence rankings as those described above for 4.2 Mtpa, continuing to result in a low AIS invasion risk overall.

Ballast water exchange has been shown to be an effective method for preventing the introduction of AIS in Milne Inlet under current shipping volumes (5.6 Mtpa in 2021), which is slightly less than the volume permitted and assessed for in the Extension Application (6 Mtpa). Throughout 2022, Baffinland will continue to require ore carriers to undertake both exchange and treatment (in that order, for vessels that have treatment systems onboard in anticipation of requirements for meeting the D-2 standard) prior to discharge. This commitment serves to further address any the potential risks for AIS introductions to the marine environment from ballast water discharges under a 6 Mtpa scenario.

In addition to federally-mandated ballast water regulations, Baffinland, as part of its Ballast Water Management Plan (Baffinland, 2019d) exceeds federal ballast water regulatory requirements by voluntarily conducting ballast water compliance monitoring in one randomly sampled ballast tank on all ore carriers arriving at Milne Port prior to ballast water discharge as a part of its compulsory ship inspections to verify their compliance with the Ballast Water Control and Management Regulations and International Maritime Organization's (IMO's) D-1 standards.

In 2019, the ballast water simulation was re-run for the 2018 shipping season (mid-July to mid-October) using 2018 oceanographic data for comparison and direct observations of ballast water as input. This allowed a second comparison of the model with direct measurements; this time with measurements near Milne Port and near Bruce Head and actual ballast water measurements as input.

RESULTS

Under the 6 Mtpa scenario (PIP Extension Request), the number of yearly ballast water discharge events would increase from 53 (as assumed in Appendix 8B-4) to 84 vessels. This would increase the total volume of ballast water discharged per year in the marine environment from 662,000 tonnes to 1,025,000 tonnes. Following application of a correction factor (0.10) to estimate for propagule supply (Chan et al., 2012), the corrected volume of discharged ballast water (102,500 tonnes) under a 6 Mtpa scenario would end up resulting in the same probability and consequence rankings as those described above for 4.2 Mtpa, continuing to result in a low AIS invasion risk overall.

In 2021, 28 of the 39 ore carriers (72%) that serviced Milne Port had IMO-approved D-2 ballast water treatment systems installed onboard. All of the vessels with a D-2 system on board completed an exchange in addition to treating their ballast water prior to discharge at Milne Port. This included the Admiral Schmidt, Arkadia, Conrad Oldendorff, Despina V, Flag Mette, Gebe Oldendorff, Gisela Oldendorff, Golden Amber, Golden Bull, Golden Freeze, Golden Frost, Golden Ice, Golden Opal, Golden Ruby, Golden Strength, Kai Oldendorff, Kendra Oldendorff, Nordic

Nuluujaak, Nordic Oasis, Nordic Odin, Nordic Odyssey, Nordic Olympic, Nordic Orion, Nordic Oshima, Nordic Qinnua, NS Energy, NS Yakutia, and Vitus Bering. As most of these vessels conducted repeat voyages to Milne Port during the 2021 shipping season, this resulted in 56 of the 74 ore carrier voyages having completed both ballast water exchange and treatment methods prior to releasing their ballast water in the Regional Study Area (RSA; i.e., representing 72% of all ore carriers that called to Port and 76% of all voyages in 2021).

NIS/AIS monitoring in 2021 identified seven (7) taxa flagged for further review/investigation due to uncertainties in each species' natural range and known biological distribution, or presence on the Program's Watchlist. This included identification of *Marenzelleria* sp., a spionid polychaete genus with representative species listed in the National Risk Assessment as a species of concern for Canadian and Arctic waters, with primary invasion vectors through ballast water. However, there is substantive biogeographic evidence that there are multiple species from this genus present in Arctic waters prior to Project-related shipping operations and that the accepted geographic ranges on record may be incomplete and likely includes the Project area. Specimens of *Crassiorophium* sp. were also identified during 2021 sampling at Milne Port. This taxon is on the Program's Watchlist due to it being morphologically similar to taxa of concern in Canadian waters and based on its invasive behaviour in other regions. However, this genus was previously identified in Milne Port during baseline surveys, and therefore its presence in Milne Port cannot be attributed to Project operations. Further review is ongoing to determine NIS/AIS status of this genus and the other taxa flagged in 2021. More information is presented in the response to PC Condition No. 87, and in the Draft 2021 MEEMP and NIS/AIS Monitoring report (Golder, 2022a), which has been released to the Working Group for review and comment.

Ballast water concentrations are low to undetectable within a short distance of the discharge location. Ballast water has little to no impact on the temperature and salinity of the waters in Milne Inlet. Even near the discharge location, the change in temperature and salinity caused by ballast water is negligible and generally not measurable. This is in part due to the small ballast water volume to ambient water volume ratio and in part due to the similarity between physical characteristics of ballast water and ambient water in Milne Inlet.

Even by arbitrarily increasing or decreasing temperature by 110% and salinity by 17%, which is more than would be expected in reality, the model continued to show that natural temperature and salinity conditions would not be affected. Note that 2018 measurements show ballast water had an average salinity of 33 Practical Salinity Unit (PSU).

TRENDS

Seven (7) years of NIS/AIS monitoring has yielded a relatively large dataset of marine organisms residing in Milne Port and Milne Inlet. Further investigations into the status of several new species identified during the 2021 NIS/AIS program are in progress in consultation with DFO and other external experts, with representative specimens sent to secondary laboratories for confirmatory taxonomic analysis.

RECOMMENDATIONS / LESSONS LEARNED

Ongoing annual NIS/AIS monitoring will add to the current AIS dataset for determining whether changes are occurring as a result of Project-related activities that could have biological consequences on marine ecosystem health in Milne Inlet. NIS/AIS results will continue to be presented to the MEWG on an annual basis, and adjustments to the programs will be made as needed.

Baffinland has also committed to collaborate with DFO to develop a risk-based approach for ballast water sampling with the pilot program originally intended to start in 2021 but was suspended due to COVID-19 travel and ship boarding restrictions. It is Baffinland's intention to resume engagement with DFO on timelines for implementation of the pilot program in 2022, if there are no impeding ship boarding or travel restrictions associated with the COVID-19 Pandemic.

Project Certificate Condition No. 89

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine water quality resulting from ballast water exchange.
Term or Condition	The Proponent shall develop and implement an effective ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with applicable regulations and/or exceed those regulations if they are determined to be ineffective for providing the desired and predicted results. The ballast water management program shall include, without limitation, a provision that requires ship owners to test their ballast water to confirm that it meets the salinity requirements of the applicable regulations prior to discharge at the Milne Port, and a requirement noting that the Proponent, in choosing shipping contractors will, whenever feasible, give preference to contractors that use ballast water treatment in addition to ballast water exchange.
Relevant Baffinland Commitment	57, 87
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada, Marine Environmental Working Group (MEWG)
Reference	Ballast Water Management Plan (BWM; Baffinland, 2019d) International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO, 2017) Discussion paper: Canadian implementation of the ballast water convention (Transport Canada, 2012)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships'-Ballast-Water-and-Sediments-(BWM).aspx

METHODS

In response to the threat of the introduction and spread on non-native species through ballast water, the IMO adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments (i.e., the BWM Convention). The BWM Convention was ratified and entered into force on 8 September, 2017. Under the BWM Convention, all ships are required to have an International Ballast Water Management Certificate, their own Ballast Water Management Plan (BWMP), and a comprehensive record of ballast water exchange and monitoring results recorded in an on-board ballast water record book (with a detailed record of when ballast water is taken on board, when it is circulated or treated for BWM purposes, and when it is discharged into the ocean). Ships also need to record accidental or other exceptional discharges of ballast water to the marine environment.

The BWM Convention includes two performance standards for the discharge of ballast water: D-1 and D-2. The D-1 standard concerns ballast water exchange, which must be undertaken within open ocean areas, defined as waters

>200 nautical miles from land and in seas >2,000 m deep. The D-2 standard covers approved ballast water treatment systems. All ships entering Canadian waters must currently meet the D-1 standard. The D-2 standard will come into force over a phased time period depending on each ship's date of construction and the timing of its International Oil Pollution Prevention (IOPP) certificate renewal survey, which is required every five years. All new build ships must meet the D-2 (treatment) standard after entry into force (8 September, 2017). For existing ships, the BWM Convention requires that either the D-1 (exchange) or D-2 (treatment) standard is met after entry into force (8 September, 2017).

The D-2 standard (treatment) specifies a maximum number of organisms and indicator microbes that are allowed to be discharged to the receiving marine environment according to the schedule set by the IMO. At this point in time, sampling and analysis methodologies to test for compliance with the D-2 standard have not been fully developed by the IMO yet. It is acknowledged in the IMO guidelines that although significant technical advances and refinements have been made in this area since the adoption of the Convention, there are still numerous issues to be resolved. Administrations are still undertaking research to define the most appropriate methods to test for compliance, and the best way to collect, handle and analyze samples. However, it is expected that in due course, appropriate guidance will become available once full compliance testing regimes are developed and the applicable regulators have had time to gain experience and develop best practice in ballast water sampling and analyses.

Baffinland has developed a comprehensive, stand-alone BWMP that is reflective of its current (ERP) and future shipping operations under the Phase 2 Proposal (Baffinland, 2019d). The BWMP includes information on applicable legislation, BWMP program objectives, monitoring responsibilities, sampling equipment specifications, detailed technical procedures for sampling and analyses, comprehensive QA/QC procedures, and adaptive management measures for implementation during non-compliance events. The BWMP identifies procedures to manage and monitor ship ballast water in a manner consistent with applicable regulations, guidelines, and terms and conditions of the Project Certificate. The BWMP includes a Standard Operating Procedure (SOP) which provides detailed instructions for salinity testing of ballast water tank on carriers calling at Milne Port, including directives for accessing on-board ballast tanks, selecting ballast tanks for testing, equipment set-up and deployment, detailed sampling and data entry procedures, guidance on instrument calibration, maintenance, and storage, and reporting requirements.

As a matter of due diligence, Baffinland, as stipulated in its BWMP (Baffinland, 2019d), conducts voluntary ballast water sampling in one randomly selected ballast water tank on all ore carriers arriving at Milne Port prior to ballast water discharge to verify their compliance with the Regulations and the IMO's D-1 standard.

In 2021, all bulk carriers that called at Milne Port during the shipping season were boarded by a Baffinland representative trained in the procedure detailed in the BWMP, that conducted salinity testing of the ship's ballast water before it was approved for release in Milne Port and before loading of the carrier could begin. In these instances, a single ballast tank on the vessel was tested for salinity concentration using a calibrated water quality meter (i.e., YSI Pro 30) or on board equipment (hydrometer) to confirm that ballast water salinity levels were above 30 ‰ (parts per thousand), prior to being authorized by the port captain to discharge in Milne Port. Salinity levels were consistent with mid-ocean exchange requirements for vessels conducting a transoceanic voyage (salinity of mid-Atlantic seawater, where open-water exchange takes place, is typically in the range of 34-35‰).

It is important to note that the ship operators/owners are the responsible party for ensuring their ships are compliant with federal ballast water regulations and the BWM Convention. To facilitate the administration of ballast water management and treatment procedures on board each bulk carrier, a responsible officer is designated to ensure the

maintenance of appropriate records and to ensure that ballast water management and/or treatment procedures are followed, recorded, and reported in accordance with the regulations. There are no specific legal obligations on the part of port and harbour authorities in relation to overseeing ballast water management or treatment procedures on behalf of the ship owner/operators, including for testing of ballast water or reporting ballast water readings to the federal authority. Baffinland's voluntary measure of testing a ballast water tank on each bulk carrier to confirm that salinity is at least 30‰ prior to discharge in the RSA, represents a level of monitoring that exceeds all federal (Transport Canada) and international (IMO) regulatory requirements related to ballast water management, and surpasses management practices currently implemented at any marine port in Canada.

RESULTS

In 2021, 28 of the 39 ore carriers (72%) that serviced Milne Port had IMO-approved D-2 ballast water treatment systems installed onboard. This included the Admiral Schmidt, Arkadia, Conrad Oldendorff, Despina V, Flag Mette, Gebe Oldendorff, Gisela Oldendorff, Golden Amber, Golden Bull, Golden Freeze, Golden Frost, Golden Ice, Golden Opal, Golden Ruby, Golden Strength, Kai Oldendorff, Kendra Oldendorff, Nordic Nuluujaak, Nordic Oasis, Nordic Odin, Nordic Odyssey, Nordic Olympic, Nordic Orion, Nordic Oshima, Nordic Qinngua, NS Energy, NS Yakutia, and Vitus Bering. As most of these vessels conducted repeat voyages to Milne Port during the 2021 shipping season, this resulted in 56 of the 74 ore carrier voyages having completed both ballast water exchange and treatment methods prior to releasing their ballast water in the RSA (i.e., representing 72% of all ore carriers that called to Milne Port and 76% of all voyages in 2021).

All bulk carriers servicing Milne Port, including those during the 2021 shipping season, conducted mid-ocean ballast water exchange as required by federal Ballast Water Control and Management Regulations (D-1 standard). Vessels with D-2 treatment systems completed both a ballast water exchange and treatment prior to releasing ballast waters.

Ballast water salinity was measured in all ore carriers (n=74) that called to Milne Port in 2021. Results are presented in Table 4.25. Salinity measurements for most carriers ranged between 30.1‰ to 40.0‰, which was compliant with federal Ballast Water Regulations (>30.0‰). One exception occurred on 19 August 2021 where ballast water tested on the Golden Frost measured 29.8‰. Baffinland confirmed that the Port of Origin for this vessel was Port Alfred, Quebec, Canada and that the ballast water could be discharged in Milne Port as the vessel was coming directly from another Canadian Port located within the Canadian Exclusive Economic Zone (i.e., it did not arrive at Milne Port directly from international waters).

Table 4.25: 2021 Ship Ballast Water Salinity Test Results Prior to Discharge in Milne Port

Vessel	Date	Salinity (‰)	Tank Tested
NS Yakutia Voyage 1 ^{D-2}	July 27, 2021	30.4	CH4
Nordic Orion Voyage 1 ^{D-2}	July 27, 2021	33.6	2/3 Port
Nordic Odin Voyage 1 ^{D-2}	July 27, 2021	32.8	2/3 Port
Nordic Oshima Voyage 1 ^{D-2}	July 28, 2021	33.8	CH#4
NS Energy Voyage 1 ^{D-2}	July 29, 2021	31.7	3 Port
Nordic Odyssey Voyage 1 ^{D-2}	July 30, 2021	30.9	CH#4
Despina V Voyage 1 ^{D-2}	July 31, 2021	33.0	3/4 Port
Nordic Olympic Voyage 1 ^{D-2}	July 31, 2021	34.0	CH#4

Vessel	Date	Salinity (‰)	Tank Tested
Arkadia Voyage 1 ^{D-2}	August 2, 2021	32.3	#3 Port
Sagar Samrat Voyage 1	August 3, 2021	32.3	CH#4
Golden Diamond Voyage 1	August 4, 2021	33.1	#3Port
Golden Freeze Voyage 1 ^{D-2}	August 5, 2021	31.7	#2Port
Golden Amber Voyage 1 ^{D-2}	August 6, 2021	31.2	#3 Port
Nordic Oasis Voyage 1 ^{D-2}	August 6, 2021	31.2	CH4
Golden Bull Voyage 1 ^{D-2}	August 8, 2021	31.6	#5 Port
Golden Ruby Voyage 1 ^{D-2}	August 8, 2021	33.1	5 Port
Admiral Schmidt Voyage 1 ^{D-2}	August 9, 2021	31.4	#3 S + B
AM Buchanan Voyage 1	August 10, 2021	32.0	#4 Port
Pabal Voyage 1	August 11, 2021	30.1	5/6 Port
Golden Brilliant Voyage 1	August 13, 2021	32.2	#3 Port
Vitus Bering Voyage 1 ^{D-2}	August 14, 2021	30.2	#3 S + B
Golden Opal Voyage 1 ^{D-2}	August 15, 2021	32.8	#4 Port
Nordic Qinnua Voyage 1 ^{D-2}	August 16, 2021	35.5	6 WB TP
Gisela Oldendorff Voyage 1 ^{D-2}	August 17, 2021	31.3	3/4 WBT S
Golden Opportunity Voyage 1	August 18, 2021	35.6	TS / DB 5 Port
Golden Frost Voyage 1 ^{D-2}	August 19, 2021	29.8*	DB 1 S
Golden Rose Voyage 1	August 20, 2021	32.9	5TS WB Port
Golden Ice Voyage 1 ^{D-2}	August 21, 2021	32.1	3TS WBT
Nordic Odin Voyage 2 ^{D-2}	August 22, 2021	31.5	5/6 Port
NS Yakutia Voyage 2 ^{D-2}	August 23, 2021	30.7	TS DB 3 Port
Nordic Orion Voyage 2 ^{D-2}	August 24, 2021	32.0	5/6 TS Port
Gebe Oldendorff Voyage 1 ^{D-2}	August 25, 2021	31.6	5/6 WBT Port
AM Quebec Voyage 1	August 26, 2021	32.6	4 WBT (P)
Conrad Oldendorff Voyage 1 ^{D-2}	August 28, 2021	31.8	No. 4 TWBTK
Nordic Oshima Voyage 2 ^{D-2}	August 28, 2021	32.0	#4 CH
Nordic Olympic Voyage 2 ^{D-2}	August 30, 2021	30.7	WBT 5/6 Port
Pabur Voyage 1	August 31, 2021	30.8	WBT 4 Port
Despina V Voyage 2 ^{D-2}	September 1, 2021	31.0	3/4 WBT P
Golden Diamond Voyage 2	September 2, 2021	30.6	TS DB 4 StB
Nordic Oasis Voyage 2 ^{D-2}	September 3, 2021	30.2	WBT DB/TS 5/6 Port
Sagar Samrat Voyage 2	September 4, 2021	30.6	WBT CH 4
AM Hamburg Voyage 1	September 5, 2021	32.3	WBT 4 Port
Kai Oldendorff Voyage 1 ^{D-2}	September 9, 2021	30.7	WBT 3,4 Port
Golden Freeze Voyage 2 ^{D-2}	September 9, 2021	35.0	DB/TS 5/6
Golden Ruby Voyage 2 ^{D-2}	September 9, 2021	34.0	4 Port
Golden Strength Voyage 1 ^{D-2}	September 11, 2021	40.0	4S

Vessel	Date	Salinity (‰)	Tank Tested
Nordic Qinnua Voyage 2 ^{D-2}	September 11, 2021	40.0	5P
Nordic Odyssey Voyage 2 ^{D-2}	September 11, 2021	37.7	CH4
Golden Bull Voyage 2 ^{D-2}	September 12, 2021	36.0	5P
Pabal Voyage 2	September 13, 2021	32.0	4P
Admiral Schmidt Voyage 2 ^{D-2}	September 14, 2021	30.2	3port
Vitus Bering Voyage 2 ^{D-2}	September 15, 2021	32.4	5S
Arkadia Voyage 2 ^{D-2}	September 17, 2021	33.2	4 port
Golden Opal Voyage 2 ^{D-2}	September 19, 2021	31.9	5 port
Golden Opportunity Voyage 2	September 20, 2021	32.9	3 port
Elena VE Voyage 1	September 21, 2021	33.1	4 port
Nordic Odin Voyage 3 ^{D-2}	September 21, 2021	32.3	2/3 Port
Nordic Orion Voyage 3 ^{D-2}	September 22, 2021	31.7	5 port
Golden Amber Voyage 2 ^{D-2}	September 23, 2021	32.5	4 Port
Flag Mette Voyage 1 ^{D-2}	September 25, 2021	32.3	4 Port
Kendra Oldendorff Voyage 1 ^{D-2}	September 26, 2021	31.4	3/4 Port
Golden Frost Voyage 2 ^{D-2}	September 29, 2021	30.8	5 6 WBT Port
Golden Ice Voyage 2 ^{D-2}	October 1, 2021	31.2	3 Port
Pabur Voyage 2	October 4, 2021	31.5	2/3 Port
Golden Brilliant Voyage 2	October 6, 2021	30.8	5 Port
Nordic Nuluujaak Voyage 1 ^{D-2}	October 6, 2021	32.2	2 Port
Nordic Qinnua Voyage 3 ^{D-2}	October 7, 2021	32.1	#5 WBT P
Nordic Oshima Voyage 3 ^{D-2}	October 8, 2021	34.1	CH4
Admiral Schmidt Voyage 3 ^{D-2}	October 10, 2021	32.8	WBT 5 (5)
Vitus Bering Voyage 3 ^{D-2}	October 12, 2021	31.2	WBT 3s
Despina V Voyage 3 ^{D-2}	October 14, 2021	33.7	# 3/4 Di3 Port
Nordic Olympic Voyage 3 ^{D-2}	October 19, 2021	34.3	2/3 WBT P
Sagar Samrat Voyage 3	October 20, 2021	33.3	No 4. CH
**Nordic Oasis Voyage 3 ^{D-2}	October 24, 2021	31.6	DB/IS 5/6 Port

Notes:

* Golden Frost originated from a port within Canadian waters and was not required to exchange prior to arrival at Milne Port under the D-1 standard.

** Nordic Oasis arrived on October 24, 2021, and ballast water was tested. However, the voyage was cancelled and ballast water was not released in Milne Port.

^{D-2} Vessels that called to Milne Port that had an IMO-approved ballast water treatment system installed, and that undertook both ballast water exchange and treatment in the RSA prior to releasing ballast water.

TRENDS

All ships arriving at Milne Port in 2021 were compliant with the D-1 standard of the BWM Convention. An increase in the number of vessels calling to Milne Port with the approved D-2 treatment systems installed onboard occurred since 2020 (76% of carrier voyages compared to 58% in 2020). Actions implemented to date based on compliance

monitoring data indicate that the current ballast water management measures, as outlined in Baffinland's BWMP, are shown to be effective in protecting the marine environment.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement and, as necessary, update the BWMP to maintain compliance with Canadian and international ballast water regulations.

Project Certificate Condition No. 90

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine water quality resulting from ballast water exchange.
Term or Condition	The Proponent shall incorporate into its Shipping and Marine Mammal Management Plan provisions to achieve compliance with the requirements under the International Convention for the Control and Management of Ship's Ballast Water and Sediment (2004) or its replacement and as implemented by the Canadian Ballast Water and Control Regulations as may be amended from time to time.
Relevant Baffinland Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada, Marine Environment Working Group (MEWG)
Reference	Ballast Water Management Plan (Baffinland, 2019d) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h). Ballast Water Regulations (SOR/2021-120) (Transport Canada, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland's stand-alone BWMP (Baffinland, 2019d), which is one component of Baffinland's overall SMWMP (Baffinland, 2021h) describes Baffinland's commitment and steps taken to verify that vessels calling at Milne Port meet the legal requirements for ballast water management, including IMO Ballast Water Convention Regulation D-1, and Section 6(1) of the Canadian Ballast Water Regulations under the *Canada Shipping Act* (SOR/2021-120; Transport Canada, 2022). The Milne Port BWMP includes voluntary on-board inspection of ship logs by a Baffinland representative to re-confirm mid-ocean ballast water exchange has occurred, and on-board testing of ballast water in a single random tank for each ship calling at Milne Port to verify that it meets the regulation for salinity (at least 30 ppt) prior to discharge. Baffinland has implemented these procedures, which exceed federally mandated regulations, to further mitigate potential impacts from Project-related activities.

In addition to federally-mandated ballast water regulations, Baffinland, as part of its BWMP (Baffinland, 2019d) exceeds federal ballast water regulatory requirements by voluntarily conducting ballast water compliance monitoring in one randomly sampled ballast tank on all ore carriers arriving at Milne Port prior to ballast water discharge as a part of its compulsory ship inspections to verify their compliance with the Ballast Water Control and Management Regulations and IMO's D-1 standards and requires ore carriers that are D-2 compliant to undertake both exchange and treatment (in that order, for vessels subject to the D-2 standard) prior to discharge.

RESULTS

In 2021, 28 of the 39 ore carriers (72%) that serviced Milne Port had IMO-approved D-2 ballast water treatment systems installed onboard. This included the Admiral Schmidt, Arkadia, Conrad Oldendorff, Despina V, Flag Mette, Gebe Oldendorff, Gisela Oldendorff, Golden Amber, Golden Bull, Golden Freeze, Golden Frost, Golden Ice, Golden

Opal, Golden Ruby, Golden Strength, Kai Oldendorff, Kendra Oldendorff, Nordic Nuluujaak, Nordic Oasis, Nordic Odin, Nordic Odyssey, Nordic Olympic, Nordic Orion, Nordic Oshima, Nordic Qinngua, NS Energy, NS Yakutia, and Vitus Bering. As most of these vessels conducted repeat voyages to Milne Port during the 2021 shipping season, this resulted in 50 of the 68 ore carrier voyages having completed both ballast water exchange and treatment methods prior to releasing their ballast water in the RSA (i.e., representing 72% of all ore carriers that called to Port and 74% of all voyages in 2020).

Ballast water salinity was measured in all ore carriers (n=74) that called to Milne Port in 2021, for all voyages. Results are presented in Table 4.25. Salinity measurements for most carriers ranged between 30.1‰ to 40.0‰, which was compliant with federal Ballast Water Regulations (>30.0‰). One exception occurred on August 19, 2021 where ballast water tested on the Golden Frost measured 29.8‰. Baffinland confirmed that the Port of Origin for this vessel was Port Alfred, Quebec, Canada and that the ballast water could be discharged in Milne Port as the vessel was coming directly from another Canadian Port located within the Canadian Exclusive Economic Zone (EEZ; i.e., it did not arrive at Milne Port directly from international waters).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement and, as necessary, update the BWMP to maintain compliance with Canadian and international regulations. With Canada's ratification of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO, 2017) that entered into force on September 8, 2017, ships are required to incorporate on-board ballast water treatment to meet D-2 performance standards. Newly built ships must immediately meet the D-2 standard, while requirements for existing ships will be phased over a period up to 2024 in coordination with the renewal of each ship's International Oil Pollution Prevention Certificate (IOPPC). Until then, all ships will continue ballast water exchange outside the Canadian Exclusive Economic Zone (EEZ).

Project Certificate Condition No. 91

Category	Marine Environment - Ballast Water
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine water quality in Steensby Inlet and Milne Inlet.
Term or Condition	The Proponent shall develop a detailed monitoring plan for Steensby Inlet and Milne Inlet for fouling that complies with all applicable regulatory requirements and guidelines as issued by Transport Canada, and includes sampling areas on ships where antifouling treatment is not applied such as the areas where non-native species are most likely to occur.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Milne Inlet – Active Steensby Inlet – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada, Marine Environmental Working Group (MEWG)
Reference	2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) 2020 MEEMP and AIS Monitoring Program Report (Golder, 2021b) Concordance to NIRB Recommendations
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix E

METHODS

Mitigation for hull fouling is implemented for all vessels calling on Milne Inlet and for all international vessels. As outlined in the SMWMP (Baffinland, 2021h, in order to reduce or eliminate the risk of invasive aquatic species and pathogens being introduced into Canadian waters as a result of ship hull biofouling, an anti-fouling coating will be applied to the hulls of all Project vessels that will arrive and depart from Milne Port. The anti-fouling coating used will comply with the anti-fouling convention as well as be approved under the Pest Management Regulatory Agency of Canada and Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals (2007-86). This convention prohibits the use of dangerous organotin chemicals in anti-fouling systems. Any anti-fouling system that has a component listed under Annex I of the convention will not be used. The potential anti-fouling systems include:

- Organotin-free polishing type paint
- Organotin-free ablative type paint
- Organotin free conventional type paint
- Biocide-free silicon type paint
- Other biocide-free paints

As the iron ore carriers commissioned for operations will exceed 400 gross tonnes and will be undertaking international voyages, these vessels will require an international anti-fouling system certification. Baffinland is committed to ensuring all vessels procured for the Project meet the IMO International Convention on the Control of

Harmful Anti-fouling Systems on Ships. As per Annex I of the convention (and Schedule 6 of the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals [2007-86]), the anti-fouling system will:

- Not bear organotin compounds on their hulls or external parts or surfaces; or
- Bear a coating that forms a barrier to such compounds leaching from the underlying non-compliant anti-fouling systems.

Ship hull biofouling monitoring was undertaken in Milne Port over a three-year period (2018 to 2020) in Milne Port as part of Baffinland's NIS/AIS program. This consisted of conducting underwater video surveys of the hulls of several ore carriers per season using a remotely operated vehicle (ROV) based underwater video system. Video footage was subsequently reviewed by qualified marine biologists to identify potential biofouling species to the lowest practical taxonomic level including potential NIS/AIS.

As outlined in the update for PC Condition No. 87, in addition to ship hull monitoring, multi-trophic NIS/AIS monitoring (zooplankton, macroflora, benthic epifauna and infauna, and fish) has been conducted every shipping season since 2014. AIS surveys conducted as part of the MEEMP are designed to detect potential NIS/AIS introductions primarily from ship ballast water releases but also from ship hull fouling.

RESULTS

Ship hull surveys were not conducted during the 2021 open water season given that results from the three-year ROV-based ship hull biofouling program demonstrated that the ROV-based video surveys do not allow for adequate taxonomic resolution (to species-level) to achieve the program objective of identifying NIS/AIS due to the difficulty of identification of encrusting or small bodied taxa without collecting a specimen. Diver-based sample collection from hulls is also not possible due to health and safety concerns associated with diving on a berthed or anchored ship. As an alternative however, the settlement substrates deployed through Milne Port served to monitor for recruitment of encrusting species, similar to what may be present on ship hull biofouling. Use of this method is consistent with biofouling studies undertaken by DFO between 2012 and 2015 in Nova Scotia and New Brunswick (Sephton et al. 2017). See Appendix E for additional details.

Furthermore, as detailed in a study conducted by DFO on biofouling potential for vessels travelling to the Arctic, biofouling assemblages on vessels have poor survivorship (i.e. reduced risk) when travelling through the Arctic (Chan et al. 2016). Nevertheless, through the Phase 2 review process, Baffinland has committed to working further with DFO to explore options to improve taxonomic resolution in ship hull surveys. This may include evaluating the use of ROVs with 'manipulator arms', which are intended to facilitate sample grabs on areas of the vessels where video/photographic imagery would be inadequate to support species identification. Following a decision on the Phase 2 proposal, Baffinland will initiate these discussions with DFO. In the meantime, current methods (i.e. use of settlement substrates), in conjunction with the extensive AIS/NIS monitoring conducted in the receiving environment are sufficient relative to the risks associated with current operations.

The ship hull biological sampling program will also be applied to vessels calling at Steensby Port as soon as shipping commences for the southern route.

TRENDS

Surveys from 2018 to 2019 revealed various extents of biofouling on ship hulls, ranging from low to high. Barnacles (unidentifiable to species) were the most commonly observed biofouling taxa. It is clear modifications to the hull

biofouling monitoring methodology are required, as analysis of video imagery does not enable taxonomic identification at the resolution required to be informative.

Despite the introduction of a high-resolution camera in 2019 and having an additional biologist with local Arctic faunal expertise present onboard with the Remotely Operated Vehicle (ROV) operator while video data was being collected in 2020, the taxonomic resolution of biofouling organisms did not improve in the third year of monitoring, many taxa were not resolved to species level due to the difficulty of identification of encrusting or small bodied taxa without a specimen. Specimen collection cannot be performed by divers along the hulls, as these surveys occur in an active shipping port, where diving on a berthed vessel may be severely hazardous. Moving forward, Baffinland will be working collaboratively with DFO to explore options to improve the methodology of hull fouling surveys so that data can be collected with greater resolution, as per Baffinland's Phase 2 commitment related to DFO 3.6.6 NEW (ID#96).

RECOMMENDATIONS / LESSONS LEARNED

It is recommended that Baffinland, DFO, and other relevant parties continue to work collaboratively to devise a sampling methodology for ship hull biofouling monitoring that improves taxonomic resolution without putting divers at risk. It is also recommended that the number of ore carriers target for annual sampling be determined in consultation with the MEWG.

Project Certificate Condition No. 92

Category	Marine Environment – Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operation, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure adequate spill response capacity.
Term or Condition	The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self-sufficient manner.
Relevant Baffinland Commitment	10, 108, 110
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Milne Port – Active\
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Emergency Response Plan (Baffinland, 2020h) Spill Contingency Plan (Baffinland, 2021k) 2021 Oil Pollution Emergency Plan – Milne Inlet (Baffinland, 2021l) Spill at Sea Response Plan (Baffinland, 2015) 2021 Community Engagement Records 2021 MEWG Working Group Meeting Records Concordance to NIRB Recommendations
Ref. Document Link	Appendix B Appendix C.1 Appendix E https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland has developed and maintained appropriate contingency plans to respond to spills on land, at Milne Port, and at sea. The plans outline the equipment to be used in the event of a spill, as well as the roles and responsibilities and training necessary to maintain appropriately trained personnel. Oil Pollution Emergency Response training and spill response exercises are conducted annually. Timing of the training corresponds with ship-to-shore fuel transfer events at Milne Port. In 2021, training of Baffinland staff on its Oil Pollution Prevention Plan (OPPP) and Oil Pollution Emergency Plan (OPEP) was conducted by spill response consultant Navenco Marine on July 9 to 11, 2021. The training encompassed classroom and hands-on spill response techniques including a mock exercise for potential port oil spills during ship-to-shore transfer. The training also included an audit to confirm that Baffinland's spill response equipment and training requirements were in compliance with the OPEP and Transport Canada regulations for Baffinland's Class 2 Oil Handling Facility. General land-based spill response training is periodically reviewed with the Mine Rescue Team; however, this does not apply to the OPEP. Baffinland also maintains a contract with Oil Spill Response Ltd. (OSRL) for emergency response in the event of a marine spill.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 93

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment at Steensby Inlet.
Term or Condition	Prior to construction, based on vessel selection and if so required, the Proponent shall reassess the risk analysis of using vessel-based fuel storage, including the potential environmental impacts of containment failure under a range of winter ice conditions, how a spill might spread and the impact of fuel if it does not volatilize to the atmosphere.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

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

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 94

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To promote public awareness of Project activities.
Term or Condition	The Proponent shall consult directly with affected communities regarding its plans for over-wintering of fuel in Steensby Inlet, with discussion topics to include descriptions of the duration of proposed activities, vessel type, spill preparedness and emergency response protocols, environmental impact predictions and answers to community member questions.
Relevant Baffinland Commitment	106
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	Not applicable
Stakeholder Review	Communities of Sanirajak and Igloolik
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not Applicable in 2021. Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 95

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent, Transport Canada
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment at Steensby Inlet.
Term or Condition	The Proponent shall meet or exceed all regulatory regulations and requirements as apply to the practice of overwintering a fuel vessel at Steensby Inlet, with reporting to the NIRB and Transport Canada.
Relevant Baffinland Commitment	8
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021. Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 96

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To ensure adequate oversight of Project activities is occurring.
Term or Condition	The Proponent will update the NIRB on the results of all compliance monitoring and site inspections undertaken by government agencies for the overwintering of a fuel vessel in Steensby Inlet.
Relevant Baffinland Commitment	8
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021. Overwintering of fuel in Steensby Inlet is not currently proposed.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

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

Project Certificate Condition No. 97

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment along the shipping route.
Term or Condition	<p>Prior to the commercial shipping of iron ore, the Proponent shall conduct fuel spill dispersion modeling that will, at a minimum, consider:</p> <ol style="list-style-type: none"> Modeling of oil spills for both the Northern and Southern Shipping Routes, in representative locations, identified by the Proponent, in consultation with the Marine Environment Working Group along both Shipping Routes, and including: <ol style="list-style-type: none"> Pinch points; The approaches into Steensby Inlet and Milne Inlet; Shallow water and shorelines; and, Areas that have been identified as having high flows and/or high concentrations of marine mammals, marine fish or seabirds. Open water and, where applicable, ice-covered conditions <ol style="list-style-type: none"> Spill volumes up to and including loss of a full tanker cargo 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
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada Marine Safety. Canadian Coast Guard
Reference	<p>Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season – Milne Inlet, Eclipse Sound, Pond Inlet (AMEC Foster Wheeler, 2015)</p> <p>Spill at Sea Response Plan (Baffinland, 2015)</p> <p>Emergency Response Plan (ERP; Baffinland, 2020h)</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

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

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

Two (2) scenarios were modelled at each of the five (5) locations using the software OST, which computes spill probability distributions to indicate geographical regions (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet) which might be affected as a result of a spill, how frequently and how soon.

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

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

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

RESULTS

The modelling results from the 2015 report were presented in a series of figures showing expected spill trajectories after 1 day and 5 days. The spill model informed the development of Baffinland's Spill at Sea Response Plan (Baffinland, 2015).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The spill modelling results highlight the importance of spill prevention, the OPPP and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

Management plans, including the Spill at Sea Response Plan (Baffinland, 2015) and the Emergency Response Plan (Baffinland, 2020h) are being updated as part of the Phase 2 Proposal Environmental Impact Statement (EIS)

regulatory process to incorporate the updated fuel spill dispersion modelling that was completed in support of the Phase 2 Proposal. Versions of the aforementioned management plans that are currently operational will remain in effect until anticipated approval of the Phase 2 Proposal is received. The OPPP and OPEP for ship to shore fuel transfers at Milne Port are updated on an annual basis and approved by Transport Canada.

Project Certificate Condition No. 98

Category	Marine Environment - Spill Prevention
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to the marine environment along the shipping route.
Term or Condition	The Proponent shall incorporate the results of revised fuel spill dispersion modeling into its impact predictions for the marine environment and its spill response and emergency preparedness plans.
Relevant Baffinland Commitment	11, 106
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada Marine Safety, Canadian Coast Guard
Reference	Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season – Milne Inlet, Eclipse Sound, Pond Inlet (AMEC Foster Wheeler, 2015) Spill at Sea Response Plan (Baffinland, 2015) Emergency Response Plan (ERP; Baffinland, 2020h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

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

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

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

Two (2) scenarios were modelled at each of the five (5) locations using the software OST, which computes spill probability distributions to indicate geographical regions (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet) which might be affected as a result of a spill, how frequently and how soon.

In addition, ten (10) (two fuel types by five locations) simulations were run with a September 'P50' wind condition defined as the average wind speed conditions and the associated most frequent wind direction. Finally, a sensitivity run considering a full fuel tanker loss of 15 mL arctic diesel cargo at a location in Eclipse Sound was also prepared. For these scenarios, RPS ASA's OILMAP was used to provide additional estimation of spill weathering and fate. This

includes slick characteristics, estimate of fuel concentrations in the surface layer, amounts evaporated and that have reached shore, and remaining amounts of fuel, and fuel and water (mousse) volume. The spill modelling completed in this study assumes no intervention, response or containment and that the slick is assumed to freely discharge (during a very short duration) from the damaged vessel.

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

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

RESULTS

The modelling results from the 2015 report were presented in a series of figures showing expected spill trajectories after 1 day and 5 days. The spill model informed the development of Baffinland's Spill at Sea Response Plan (Baffinland, 2015).

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

The spill modelling results highlight the importance of spill prevention, the Oil Pollution Prevention Plan and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

Management plans, including the Spill at Sea Response Plan (Baffinland, 2015) and the Emergency Response Plan (Baffinland, 2020h) are being updated as part of the Phase 2 EIS regulatory process to incorporate the updated fuel spill dispersion modelling that was completed in support of the Phase 2 Proposal. Versions of the aforementioned management plans that are currently operational will remain in effect until anticipated approval of the Phase 2 Proposal is received. The Oil Pollution Prevention Plan (OPPP) and Oil Pollution Emergency Plan (OPEP) for ship to shore fuel transfers at Milne Port are updated on an annual basis and approved by Transport Canada.

4.6.11 Marine Wildlife (PC Conditions 99 through 128)

Thirty-one (31) PC conditions (including 125 and 125a) relate to the potential effects of the Project on marine wildlife. These conditions provide direction on mitigation and monitoring programs and identify shipping information to be communicated to potentially affected communities regarding shipping activities.

Inuit & Stakeholder Feedback

The potential effects of shipping on marine mammals (particularly narwhal, seal, bowhead) continues to be brought forward to Baffinland during community engagement sessions (Appendix B), and through the MEWG (Appendix C.1). Underwater noise from shipping and its potential impact on marine mammal migration and other disturbances (e.g., impacts to calving grounds, traditional shipping activities) has been consistently raised as key concerns. Additionally, throughout 2021, stakeholders raised concerns regarding the health of marine mammals with questions to Baffinland regarding how this is being addressed in the marine monitoring programs. Baffinland was also provided feedback from Inuit community members regarding the need for increased monitoring of ringed seal. Baffinland addressed this concern through the implementation of a Ringed Seal Aerial Survey Monitoring Program in 2021.

Monitoring

Throughout 2021, Baffinland again implemented a robust suite of marine mammal monitoring programs designed to assess the noise of vessels relative to acoustic disturbance thresholds for marine mammals, the behavioural responses of narwhals when Project vessels were both absent and present, and the Relative Abundance and Distribution (RAD) of marine mammals in the Project area. A list of the 2021 marine mammal monitoring programs is as follows:

- 2021 Ship-based Observer Monitoring Program – replaced by the Marine Mammal Observer Network (MMON) Monitoring Program due to boarding restrictions associated with the COVID-19 Pandemic in 2021;
- 2021 Marine Mammal Aerial Survey Program (Eclipse Sound and Admiralty Inlet) (Golder, 2022e);
- 2021 Ringed Seal Aerial Survey Program (Golder, 2022f);
- 2021 Bruce Head Shore-based Monitoring Program (Golder, 2022g);
- 2021 Passive Acoustic Monitoring Program (Austin et. al., 2022a, 2022b).

In addition, Baffinland undertook the 2021 Marine Environmental Effects Monitoring Program and NIS/AIS Monitoring Program (Golder, 2022a) to assess how the Project, if at all, is affecting the quality of marine habitat which marine mammals rely on.

Table 4.26 provides an evaluation of the Project's impacts on the marine environment, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.26: Marine Mammals Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Ringed Seals, Bearded Seals, Walrus, Beluga Whales, Narwhal, Bowhead Whales, Polar Bear	Habitat change resulting from icebreaking and/or ice management of landfast ice	There is no breaking of landfast ice associated with the current phase of the Project.	Not applicable in 2021
	Hearing impairment and/or damage caused by sound from construction activities	No constructions activities occurred at Milne Port in 2021 that would have the potential to cause hearing impairment.	Not Applicable in 2021.
		Multiple years of acoustic monitoring of shipping noise demonstrate that there is no potential for acoustic injury as a result of Project-related shipping.	Effects within FEIS predictions.
	Disturbance caused by airborne and/or underwater sound from construction, shipping and aircraft	<p>Data available to date from Baffinland's acoustic monitoring programs (Austin et. al., 2022a, 2022b) and narwhal behavioural response studies (Golder, 2020e, 2022g) have demonstrated that:</p> <ul style="list-style-type: none"> Vessel noise in the RSA is lower than predicted in the FEIS. Vessel noise exposure on marine mammals in the RSA is temporary in nature and below sound levels that could cause acoustic injury. Assessed relative to a broadband SPL of 120 dB re 1 µPa (i.e., the current noise disturbance threshold standard used by industry and government for assessing disturbance to marine mammals by continuous-type sounds such as vessel noise), sound exposure durations averaged less than 1 hour per day. Narwhal behavioural responses to shipping are limited to short-term and localized disturbance effects. <p>In 2020 and 2021, there was a statistically significant decrease in the abundance of the Eclipse Sound narwhal stock compared to previous survey years (2013, 2016 and 2019) (Golder, 2022e). However, the</p>	<p>A holistic review of the data from the 2021 shipping season does not conclude that the relatively lower numbers of narwhal observed in Eclipse Sound in 2021 is Project-related.</p> <p>Acoustic monitoring and behavioural observations of marine mammal behavioural responses to shipping activities remain within FEIS predictions.</p> <p>Available data suggests that current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits during early shoulder season, etc.) are effective at managing Project incremental effects from shipping on narwhal in the RSA.</p>

Component	Effects	Monitoring Program	Impact Evaluation
		<p>combined narwhal abundance in Eclipse Sound and Admiralty Inlet was shown to be similar in 2020 to that observed in previous survey years (2013 and 2019); and was statistically higher in 2021 than in previous survey years (2013, 2019 and 2020) (Golder, 2022e).</p> <p>A review of available Inuit knowledge and scientific monitoring data supports that the Admiralty Inlet and Eclipse Sound stock may actually be one stock that shift between summering areas. Another factor could be that narwhal migratory routes and summering areas have been influenced by environmental factors, such as ice condition and prey/predator dynamic.</p>	
Narwhal	Masking of environmental sounds caused by vessel and construction sound	<p>Acoustic monitoring results collected to date (Austin et al., 2022a, 2022b) demonstrate that both ambient and vessel noise sources can result in Listening Range Reduction (LRR), at different contributing levels depending on the vocalization type of interest. The listening range for sound at 25 kHz (representative of narwhal clicks and high-frequency buzzes) was more affected, by both vessel noise and ambient noise, than sound at 1 kHz (a representation frequency for burst pulses) where narwhal have decreased hearing sensitivity. The potential consequence is a reduced range at which the listener (narwhal) can detect potential prey. At frequencies consistent with narwhal clicks, knocks, and whistles, vessel noise resulted in LRR similar to what narwhal experience from ambient noise sources (e.g., wind, waves, rain). A small seasonal effect is present for both narwhal vocalization types, with vessel noise slightly more influential than ambient noise sources during the early shoulder season (particularly at Ragged Island) and ambient noise sources have comparable influence as vessel noise during the open-water</p>	Effects within FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
		season. Burst pulses were the least susceptible vocalization type to LRR due to vessel noise, with a 90% LRR occurring $\leq 1\%$ of the time during the early shoulder season and $\leq 2.1\%$ of the time during the open-water season. As aforementioned, ambient noise did not result in any appreciable level of LRR for burst pulses because the hearing threshold for narwhal at 1 kHz is higher than the median ambient sound level at this frequency.	
Bowhead Whales	Mortality from collisions with vessels and blasting during construction	No collisions were noted by ship crew in 2021.	Effects within FEIS predictions
Polar Bears	Mortality from human-bear interactions	Polar bear monitors look for polar bears entering camps and remote work areas. No polar bear mortalities resulted from Project operations in 2021.	Effects within FEIS predictions

Path Forward

Baffinland will remain vigilant about the mitigation and monitoring activities that are in place to protect marine mammals. Baffinland will continue to seek input and review monitoring results trends with Inuit community members and the MEWG. Reporting on each PC condition follows.

Project Certificate Condition No. 99

Category	Marine Environment - Supplemental Baseline Assessments
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To supplement baseline information and improve predictions for potential impacts to marine wildlife.
Term or Condition	<p>The Proponent, working with the Marine Environment Working Group, shall consider and identify priorities for conducting the following supplemental baseline assessments:</p> <ol style="list-style-type: none"> Establish shipping season, inter-annual baseline in Steensby Inlet and Milne Inlet that enables effective monitoring of physical and chemical effects of ballast water releases, sewage outfall, and bottom scour by ship props, particularly downslope and downstream from the docks. This shall include the selection and identification of physical, chemical, and biological community/indicator components. The biological indicators shall include both pelagic and benthic species but with emphasis on relatively sedentary benthic species (e.g., sculpins). The collection of additional baseline data: <ol style="list-style-type: none"> In Steensby Inlet on walrus, beluga, bearded seal anadromous arctic char abundance, distribution ecology and habitat use. In Milne Inlet on narwhal, bowhead and anadromous arctic char abundance, distribution ecology and habitat use. Enhance baseline data on marine wildlife (fish, invertebrates, birds, mammals, etc.) and to provide more details on species abundance and distribution found in the Project area. This shall include, but not be limited to the following: <ol style="list-style-type: none"> Aerial surveys for basking ringed seals throughout the landfast ice of Steensby Inlet and at an appropriate control location Shore-based observations of pre-Project narwhal and bowhead whale behavior in Milne Inlet that continues at an appropriate frequency throughout the Early Revenue Phase and for not less than three consecutive years Enhance the baseline for affected freshwater systems, which includes control sites to detect Project-related changes before they cause significant harm.
Relevant Baffinland Commitment	81
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Inlet – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Draft 2021 MEEMP and NIS/AIS Monitoring Program (Golder, 2022a)
Ref. Document Link	Not applicable

METHODS

This PC Condition applies to the pre-construction phase of the Project and completion of supplemental baseline assessments. The Project is currently in the Early Revenue Phase with the temporary Production Increase, and supplemental baseline assessments are now complete (pre-2021). These have been submitted to NIRB and are also available on Baffinland's Document Portal.

Current effort is focused on environmental effects monitoring (EEM) using a number of different EEM programs that focus on detection of potential Project effects on marine mammals and the marine environment. Detailed information on EEM study design and sampling methodology are available in Baffinland's Marine Environmental Effects Monitoring Plan (Golder, 2022a).

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baseline information for Steensby Inlet will be updated prior to the construction and operation of the Steensby Port through supplemental baseline studies. Studies will be based on ongoing monitoring methodologies as part of the EEM Program at Milne Port.

Project Certificate Condition No. 100

Category	Marine Environment - Supplemental Baseline Assessments
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To supplement baseline information and improve predictions for potential impacts to marine wildlife.
Term or Condition	The Proponent shall update its Shipping and Marine Wildlife Management Plan, to include avoidance of polynyas and mitigation measures designed for potential fuel spills along the shipping lane during the winter months, with consideration for the impact of spilled fuel on marine mammals when they might be less mobile or able to avoid contact with spilt fuel or fumes.
Relevant Baffinland Commitment	57
Reporting Requirement	To be developed following approval of the Project by the Minister.
Responsible Party	Baffinland
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.12

METHODS

Fuel Spills

As outlined in Section 1.2 and Section 3 of the Shipping and Marine Wildlife Management Plan (SMWMP), the SMWMP should be reviewed in relation to other management plans, including the Spill at Sea Response plan (SSRP). Section 7 of the SSRP addresses spill management during the end and start of the shipping season (i.e., July and October). Additionally, Baffinland notes that all vessels contracted by the Company are required under MARPOL to have a Shipboard Oil Pollution Emergency Plan (SOPEP). For clarity, the spill and emergency responses management measures are the mitigation for efficiently and effectively dealing with unforeseen effects of the Project, such as a fuel spill during the shoulder season.

Avoidance of the North Water Polynya

Baffinland understands the North Water Polynya is more or less defined with geographic boundaries at the top of Baffin Bay between Northwest Greenland (Avanersuaq) and Ellesmere Island and Devon Island on the Canadian Coast (Hastrup et al, 2018). At its peak, the general area covered by this polynya is between 76°N and 79°N and 70°W and 80°W.

Vessels generally follow a route below 75 °N through Baffin Bay, and so, ore carriers will not normally enter the area the polynya is known to occur. See Appendix G.9 for a copy of the Daily Ship Tracks with Ice Imagery as supporting evidence. Additionally, in July of 2019, Baffinland submitted mapping/ice charts to the NIRB that show the condition of the North Water Polynya relative to the shipping route in early July between 2014 and 2018 (NIRB Registry

No. 325730; Baffinland, 2019h). As shown in Figures 2 through 6 of that document, there are safe navigable routes across Baffin Bay in areas south of the polynya even during the shoulder season. Therefore, this component of Term and Condition No. 100 is not applicable to the current phase of the Project as the Northern Shipping Route does not overlap with the North Water Polynya at any point during shipping operations in Baffin Bay. This is because the sea ice boundaries separating the North Water Polynya from the rest of Baffin Bay are melted away or broken up by June of each year at which point the polynya is indiscernible from adjacent areas during July and because of the designated shipping route.

Mitigations for Marine Mammals that might be “less mobile”

Baffinland has developed mitigation measures for the shoulder seasons, as outlined in Section 6.2, Table 2 of the SMWMP, that are specific to circumstances when marine mammals would be “less mobile”, or in heavier ice conditions. These include:

- When marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows);
- All Project vessels are provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice;
- All Project vessels are provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group; and
- Baffinland will place Marine Wildlife Observers (MWOs) on icebreaking vessels during the shoulder seasons that will be responsible for recording relative abundance, group composition and behaviour of marine mammals relative to icebreaker transits along the Northern Shipping Route. MWOs will also be responsible for recording any incidences of marine mammal strikes or near misses with Project vessels, including icebreaker vessels.

Baffinland notes that this above list does not account for all mitigations outlined in Section 6.2 (Table 2) of the SMWMP and would refer the NIRB to that for a complete list of all mitigation measures employed by Baffinland to reduce potential effects on marine mammals associated with shipping while ice is present.

RESULTS

In 2021, there were no fuel spills during shoulder season shipping, no interactions with the North Water Polynya and no ship strikes on marine mammals.

TRENDS

Shipping during the shoulder seasons has not resulted in large-scale fuel spills along the shipping route, interactions with the North Water Polynya or ship strikes on marine mammals.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will update the Shipping and Marine Wildlife Management Plan prior to any winter shipping. Furthermore, Baffinland notes that this condition is relevant only to the Construction phases of the project.

Project Certificate Condition No. 101

Category	Marine Environment – Monitoring
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operation
Objective	To monitor for potential impacts to marine wildlife and marine habitat.
Term or Condition	<p>The Proponent shall incorporate into the appropriate monitoring plans the following items:</p> <ul style="list-style-type: none"> a. A monitoring program that focuses on walrus use of Steensby Inlet and their reaction to disturbance from construction activities, aircraft, and vessels; b. Efforts to involve Inuit in monitoring studies at all levels; c. Monitoring protocols that are responsive to Inuit concerns; d. Marine monitoring protocols are to consider the use of additional detecting devices to ensure adequate monitoring through changing seasonal conditions and daylight; e. Schedule for periodic aerial surveys as recommended by the Marine Environment Working Group; f. Periodic aerial surveys for basking ringed seals throughout the landfast ice of Steensby Inlet, and a suitable control location. Surveys shall be conducted at an appropriate frequency to detect change inter-annual variability; g. Shore-based observations of pre-Project narwhal behavior in Milne Inlet, that continues at an appropriate frequency throughout the Early Revenue Phase (not less than three years); h. Conduct landfast ice monitoring for the duration of the Project Operations phase, which will include: <ul style="list-style-type: none"> i. The number of ship transits that are able to use the same track; ii. The area of landfast ice disrupted annually by ship traffic; and iii. Monitoring strategy focused on assessing and mitigating interaction between humans and wildlife at the port site(s).
Relevant Baffinland Commitment	Not Applicable
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG), Nunavut Impact Review Board
Reference	Draft 2021 Marine Mammal Aerial Survey Program Report (Golder, 2022e) Draft 2021 Ringed Seal Aerial Survey Program Report (Golder, 2022f) Draft 2021 Bruce Head Shore-based Monitoring Report (Golder, 2022g) 2020 Underwater Acoustic Monitoring Program (Open-Water Season) (Austin et al., 2022a) 2021 Underwater Acoustic Monitoring Program (Open-Water Season) (Austin et al., 2022b) 2021 MEWG Meeting Records Preliminary Summary of 2020 Narwhal Monitoring Programs (Golder, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix C.1

	Appendix G.16 Appendix G.14 Appendix G.25
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METHODS

- a. No construction or operational activity took place at Steensby Port in 2021. This phase of the project is currently inactive.
- b. As part of yearly planning and review of upcoming field programs, Baffinland provides its annual monitoring results to MEWG members (which include Inuit representation through the MHTO and QIA) for comment, and also presents plans for monitoring for the upcoming year during MEWG meetings. During teleconference MEWG meetings on 13 May and 29 June 2021, Baffinland discussed upcoming 2021 monitoring programs and continued to engage the MEWG in the application of Project effect indicators including an Early Warning Indicators for the Project. A pre-shipping meeting was held with the MHTO on 8 May 2021. This included both background on 2020 shipping season and planning for the 2021 shipping season. Follow-up correspondence occurred following the meeting, and distribution of meeting minutes.
- c. Baffinland's ongoing development and refinement of monitoring programs and protocols considers input from local community members (e.g., concerns that are communicated through community workshops) as well as discussions with the MEWG, in which Inuit organizations actively participate. Furthermore, Baffinland meets directly with the MHTO multiple times each year and requests letters of support on an annual basis from the MHTO prior to program implementation.

Prior to the start of the 2021 shipping season and monitoring programs, a meeting was held with the MHTO on 8 May 2021. Prior to restrictions put in place as a result of the COVID-19 Pandemic, Inuit program participants participated in end of program interviews to review and discuss preliminary monitoring results, and to solicit input on program design and program planning for future Monitoring Programs. It is expected that these post-program consultations will resume once restrictions are lifted and Inuit from local communities are once again able to fully participate in field programs. Baffinland's monitoring programs strive to actively involve local participation and take into account community concerns in the development and adaptation of its monitoring programs. Monitoring results are reviewed and discussed annually by MEWG members, including Inuit participants, and by the MHTO during meetings in Pond Inlet.

- d. Baffinland understands that the intent of Condition No. 101(d) is to address concerns related to the efficacy of Project effects monitoring along the Southern Shipping Route which would involve year-round shipping operations and would therefore require year-round effects monitoring including monitoring during periods of 24-h darkness and extensive land-fast ice coverage, when standard visual-based monitoring techniques are not as effective. This condition is not currently relevant to the Project as no construction or operational activities took place along the Southern Shipping Route or in Steensby Inlet during 2021 - this phase of the project is currently inactive. Shipping operations in 2021 were limited to the Northern Shipping Route between the period of July to October. Daylight and ice conditions during this period do not impede visual-based monitoring techniques and therefore additional detecting devices are not presently required to ensure adequate monitoring through changing seasonal and daylight conditions under current shipping operations.

- e. In 2021, marine mammal aerial surveys were conducted in the North Baffin during the early shoulder season (July), the peak open-water season (August), and at the end of the shipping season (October) as part of the 2021 Marine Mammal Aerial Survey Program (MMASP). Three different types of marine mammal aerial surveys were performed in 2021. A reconnaissance survey was initially run during the early shoulder season (Leg 1) to collect data on the presence/absence and distribution of marine mammals in the RSA relative to available ice conditions at that time of year and prior to the start of shipping activities. A systematic aerial-based transect survey was then conducted during the open-water season (Leg 2) to obtain abundance estimates of the Eclipse Sound and Admiralty Inlet narwhal summer stocks. A visual clearance survey (Leg 3) was also conducted during the fall shoulder season to confirm that no narwhal entrapment events occurred in the RSA following completion of Baffinland's 2021 shipping operations along the Northern Shipping Route.

A letter of support for the 2021 MMASP was requested from the MHTO and Arctic Bay HTO. DFO and other MEWG members were actively consulted on the study design and data collection methods during 2021 MEWG meetings (Appendix C.1). Input and recommendations provided by these parties were incorporated into the program. Detailed methodology and analytical procedures of the 2021 MMASP are presented in Golder (2022e).

- f. In response to community concerns, a ringed seal survey was conducted along the Northern Shipping Route in early June 2021 to calculate ringed seal densities. The MHTO and MEWG were consulted prior to the survey being conducted to incorporate technical advice and Inuit input in the methodology and analytical procedures, as well as avoid potential impacts to hunters at the floe edge. Detailed methodology and analytical procedures of the 2021 Ringed Seal Aerial Survey Program are presented in Golder (2022f)

No construction or operational activity took place at Steensby Inlet in 2021. This phase of the project is currently inactive. A baseline ringed seal aerial survey of Steensby Inlet was flown in early June 2021. The photographic data collected during this survey is being archived for later analysis at the time when Steensby Inlet operations are planned to begin.

- g. Baffinland undertook a shore-based narwhal monitoring program at Bruce Head from 2013–2017² and again from 2019 to 2021³. The objective of the Bruce Head shore-based monitoring study is to investigate narwhal response to shipping activities along the Northern Shipping Route in Milne Inlet. During the open-water season of 2021, visual survey data were collected from a cliff-based observation platform at Bruce Head overlooking the nominal shipping route. Data were collected systematically on the RAD, group composition, and behavior of narwhal. Additional data were collected on environmental conditions and anthropogenic activities (e.g., shipping and hunting activities) to distinguish between the potential effects of Project-related shipping activities and confounding factors that may also affect narwhal behaviour. Narwhal behavioural data were also collected in 2020 and 2021 using Unmanned Aerial Vehicle (i.e. drones) to evaluate behavioural responses of narwhal to vessel traffic via focal follow video surveys of individual groups. Detailed methodology and analytical procedures of the 2021 Bruce Head Shore-based Monitoring Program are presented in Golder (2022g).

² 2013 represented a pilot study year for the shore-based monitoring program.

³ A Bruce Head vessel-based narwhal monitoring program pilot study was conducted in 2018 instead of a shore-based study due to safety concerns following a damaged observation platform that prevented safe implementation of the land-based program.

- h. Baffinland understands that the intent of Condition No. 101(h) is to address concerns related to icebreaking of land-fast ice in support of shipping operations along the Southern Shipping Route and in Steensby Port. This phase of the project is currently inactive. Baffinland has not undertaken icebreaking of land-fast ice along the Northern Shipping Route. The break-up of landfast ice is confirmed at the start of the shipping season each year via satellite imagery and the Canadian Ice Service daily ice charts. Additionally, the commencement of Baffinland's current shipping operations are limited to when the floe edge is no longer being used by Pond Inlet land users. To ensure the implementation of this, prior to the start of the shipping season, Baffinland receives formal written confirmation from Pond Inlet that the floe edge has been closed for harvesting. As a temporary precautionary-based mitigation measure introduced in 2021, shipping operations in 2021 did not commence until a continuous path of 3/10ths or less ice concentrations was present in the RSA between the entrance of Eclipse Sound and Milne Port.

RESULTS

- a. Not applicable in 2020.
- b. Due to restrictions relating to the COVID-19 pandemic, Inuit from local communities were not able to fully participate in 2021 field monitoring programs. A limited number of Inuit participants were able to join 2021 monitoring programs in progress when COVID-19 restrictions allowed Inuit back at site. A total of 10 Inuit participants (eight from Pond Inlet and two from Arctic Bay) were employed for the 2021 monitoring programs. Inuit participants were hired through an Inuit-owned company. The total amount of work hours for Inuit staff on the 2021 monitoring programs was 1,922 hours. The work positions filled by Inuit participants in 2021 included: marine mammal observers, polar bear monitors and field technicians.
- c. Based on feedback provided by the MHTO and the QIA in 2020, Baffinland implemented a ringed-seal aerial survey along the Northern Shipping Route during June 2021 to assess the relative density of ringed seal in the RSA. The design of the ringed seal aerial survey incorporated advice and input provided by the MHTO. The most easterly transect lines of the ringed seal survey in Eastern Eclipse Sound were removed from the survey design to ensure that hunters at the floe edge would not have their hunt impacted by aircraft noise.
- d. Not applicable in 2021.
- e. A total of nine (9) different species of marine mammals were observed during the 2021 aerial surveys: narwhal, bowhead whale, beluga whale, killer whale, ringed seal, harp seal, bearded seal, walrus, and polar bear.

At the beginning of the Leg 1 survey program, open water was present in the north portion of Navy Board Inlet, and throughout Milne Inlet and in Eastern Eclipse Sound (i.e., Pond Inlet strata). By the end of the Leg 1 survey program, open water was present throughout the RSA. Results from the 2021 Leg 1 survey indicated low narwhal numbers prior to the first vessel transit into the RSA. During the first ore carrier transit in the RSA on 26 July 2021, narwhal relative abundance appeared to have increased with narwhal in the RSA primarily concentrated in Koluktoo Bay and in Tremblay Sound. Narwhal remained concentrated in these two areas for the duration of the Leg 1 survey program. Detailed results for Leg 1 are presented in Golder (2022e).

For the Leg 2 surveys, narwhal summer stock abundance was calculated for the Eclipse Sound stock, Admiralty Inlet stock, and the combined Eclipse Sound and Admiralty Inlet stock. The narwhal abundance

estimate for the combined Eclipse Sound and Admiralty Inlet stock during the 2021 open-water season (Leg 2) was 75,177 individuals based on aerial surveys completed on 19–21 August 2021. This estimate is statistically higher than the abundance calculated during the previous DFO survey conducted in 2013 (45,532 narwhal), 2019 (38,677), and 2020 (36,044). For the Eclipse Sound stock alone, the narwhal abundance estimate during the 2021 open-water season was 2,595 individuals based on aerial surveys conducted on 20 to 21 August 2021. The 2021 estimate for the Eclipse Sound stock alone is statistically lower than the 2016 DFO estimate of 12,039, the 2013 abundance estimate of 10,489, the 2019 abundance estimate of 9,931, and the 2020 abundance estimate of 5,018.

- f. Results from the 2021 forward-looking infrared (FLIR) survey indicated that ringed seal densities were higher in Milne Inlet compared to previous ringed seal surveys undertaken by DFO in 2016 using the same methodology (Young et al. 2019), and were similar in Eclipse Sound and Navy Board Inlet compared to the 2016 surveys. For the Eclipse Sound stratum, a comparison between the highest estimate in 2021 (1.04 seals/km²) and the highest estimate in 2016 (0.92 seals/ km²) indicated no statistically significant difference in density ($p = 0.31$). Similarly, for the Navy Board Inlet stratum, a comparison between the highest estimate in 2021 (0.83 seals/ km²) and the highest estimate in 2016 (0.74 seals/km²) indicated no statistically significant difference in density ($p = 0.79$). For the Milne Inlet stratum, a comparison of the highest estimate in 2021 (2.84 seals/ km²) and the highest estimate in 2016 (1.40 seals/ km²) indicated a statistically significant increase in density in 2021 ($p = 0.007$). However, ringed seal surveys undertaken in the RSA in 2014 by Baffinland did not statistically differ from estimates in 2021 suggesting that some amount of statistical variation within the Milne Inlet stratum ringed seal densities can be expected from year to year.

Ringed seal hotspots were identified in similar geographic areas in 2021 as those identified during the 2016 to 2017 surveys, with seal hotspots identified in western Eclipse Sound, southern Milne Inlet and in Tremblay Sound. The eastern Eclipse Sound hotspot identified in 2016 and 2017 was not present in 2021. The northern half of Navy Board Inlet had low sightings of ringed seals in all years (2016, 2017, and 2021). Detailed results of the 2021 Ringed Seal Aerial Survey Program are presented in Golder (2022f).

- g. The requirement to complete a minimum of three years of shore-based monitoring of narwhal behaviour in Milne Inlet (relative to shipping activities) has been achieved. In 2021, the Bruce Head Shore-based Monitoring Program completed its seventh year of monitoring of narwhal behavioural monitoring in the RSA (Golder, 2022g). Following is a summary of key findings pertaining to narwhal behavioural response to vessel traffic based on seven years of shore-based visual survey data collected at Bruce Head between 2014 and 2021.

Relative Abundance and Distribution

- Interannual variation: The relative abundance of narwhal (total number of narwhal corrected for survey effort) in the Stratified Study Area (SSA) was substantially lower in 2020 and 2021 than in previous survey years (2014 to 2019), including years prior to the start of Baffinland's iron ore shipping operations in the RSA (i.e., 2014). The observed decrease in local narwhal abundance at Bruce Head in 2021 is consistent with findings from the 2020 and 2021 aerial surveys which indicated that narwhal abundance in Eclipse Sound was statistically lower in 2020 and 2021 than in previous survey years (2013, 2016 and 2019) (Golder, 2022f). However, the combined narwhal

abundance in Eclipse Sound and Admiralty Inlet was shown to be similar in 2020 to that observed in previous survey years (2013 and 2019); and was statistically higher in 2021 than in previous survey years (2013, 2019 and 2020) (Golder, 2022f).

Narwhal Density

- Vessel exposure was shown to result in a significant decrease in narwhal density in the Stratified Study Area (SSA) compared to when no vessels were present, but only when narwhal were in close proximity to vessels (i.e., within 2 km from a vessel). This was equivalent to a maximum period of 14 min per vessel transit (based on a 9 knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). During the Program (1 to 26 August), there were approximately two vessel transits per day in the SSA (58 one-way transits in SSA over a 24-day period). Therefore, the maximum period per day associated with vessel disturbance on narwhal density was 28 minutes. These findings are consistent with previous years' findings and with behavioural results from the narwhal tagging study (Golder 2020e), indicating that narwhal density in the SSA is influenced by vessel traffic but only at close distances (i.e., within 2 km of a vessel). Localized avoidance of the sound source (i.e., the vessel) by narwhal is consistent with a moderate severity behavioural response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 14 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.

Group Composition and Behaviour

- Group Size: Modelling results from the combined multi-year dataset suggest that narwhal may associate in marginally larger group sizes when in close proximity (<1 km) to vessels. The noted response was shown to be short in duration, equivalent to a maximum period of 7 min per vessel transit (based on a 9 knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal group size was 14 minutes (based on an average of two vessel transits per day in the SSA). A change in group cohesion (e.g., change in group size) by narwhal is consistent with a moderate severity behavioural response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 7 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.

- Group Composition:
 - All narwhal life stage categories (adults, juveniles, yearlings, and calves) were recorded in the Behavioural Study Area (BSA) throughout the seven-year sampling program.
 - The mean daily proportion of calves recorded in the BSA (relative to the total number of narwhal observed per day) was higher in 2021 (annual mean of mean daily calf proportions = 14.8%) than all previously estimated annual means, which ranged from 9.5% (2017) to 12.9% (2015). While this may suggest that calving rate (i.e., reproductive success) of the Eclipse Sound summering stock in 2021 was consistent with pre-shipping levels, the finding is likely attributed to the influence of two survey days when narwhal sightings in the BSA were limited to a mother-calf pair, resulting in a 50% daily calf proportion on those days.
 - Presence of Immatures: Consistent with previous years' findings, results based on the combined multi-year dataset suggest that narwhal groups are more likely to include immatures when in close proximity (<2 km) to vessels. This finding is potentially due to groups without calves or yearlings being more capable of diving and moving away, thus inflating the probability of observing groups with calves or yearlings at the surface. The noted response was shown to be short in duration, equivalent to a maximum period of 14 min per vessel transit (based on a 9 knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal group composition was 28 minutes (based on an average of two vessel transits per day in the SSA). A change in group cohesion and/or a disruption of female and dependant offspring (exceeding baseline case) is consistent with a moderate severity behavioural response (Southall et al., 2021). However, given the temporary nature of the effect (i.e., up to 14 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.
 - Proportion of Immatures (Early Warning Indicator "EWI"): Findings from the multi-year dataset indicated that the proportion of immature narwhal (i.e., calves and yearlings) in the observed population in 2021 was lower than all previous sampling years but was not significantly lower than the 2014/2015 baseline condition. This was likely associated with the low sample size and high variability observed in 2021 relative to the other sampling years. Although the EWI threshold was not exceeded, the results warrant further investigation. To address this, Baffinland will undertake an equivalent EWI analysis of the 2021 aerial survey data (using the dedicated 1000 ft. survey data which was collected for

this purpose) to confirm that this is a reflection of the low sample size and not a pattern of decreasing proportion of immature narwhal in the RSA.

- **Group Spread:** Modelling results from the combined multi-year dataset suggest that narwhal congregate in more tightly associated groups when in close proximity (i.e., ≤ 2 km) to vessels. The noted response was shown to be short in duration, equivalent to a maximum period of 14 min per vessel transit (based on a 9-knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal group spread was 28 minutes (based on an average of two vessel transits per day in the SSA). A change in group cohesion (e.g., change in group spread) by narwhal is consistent with a moderate severity behavioural response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 14 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.
- **Group Formation:** Narwhal groups were most often observed in parallel formation under both vessel presence and vessel absence scenarios. Consistent with previous years' findings, results from the combined multi-year dataset suggest that narwhal do not significantly alter their group formation in response to vessel traffic. The lack of response is supportive of impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.
- **Group Direction:** Narwhal groups were predominantly observed travelling south through the Behavioural Study Area (BSA). Consistent with previous years' findings, results from the combined multi-year dataset suggest that narwhal group travel direction is not affected by approaching vessels but that narwhal groups may avoid "following" in the wake of vessels moving away from the BSA. That is, narwhal tended to move in the opposite direction of vessels that move away from the BSA, regardless of whether the vessel was north- or southbound. The noted response was demonstrated up to a maximum distance of 4-km from the vessel, equivalent to a period of 28 min per vessel transit (based on a 9-knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal group direction was 56 minutes (based on an average of two vessel transits per day in the SSA). A change in orientation response (e.g., a change in group direction) by narwhal is consistent with a low severity behavioural response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 28 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the

RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour

- **Travel Speed:** Results from the combined multi-year dataset suggest that if narwhal were among other narwhal groups travelling at a medium or fast speed, they were more likely to travel slowly when less than 4 km from a vessel compared to when no vessels were present. For narwhal occurring among other narwhal groups already travelling slowly, no significant change in group travel speed was evident. The noted response was shown to be short in duration (i.e., within 4 km of a vessel) equivalent to a maximum period of 28 min per vessel transit (based on a 9-knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal group travel speed was 56 minutes (based on an average of two vessel transits per day in the SSA). A change in energy expenditure (e.g., a change in travel speed) by narwhal is consistent with a moderate severity response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 28 min per vessel transit), this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.
- **Distance from Bruce Head Shoreline:** Narwhal groups were observed more often within 300 m of the Bruce Head shoreline under both vessel presence and vessel absence scenarios. Results from the combined multi-year dataset suggest that narwhal may swim closer to shore when in close proximity (≤ 2 km) to vessels. The noted response was shown to be short in duration, equivalent to a maximum period of 14 min per vessel transit (based on a 9 knot travel speed, assuming narwhal remain stationary during exposure), with animals returning to their pre-response behaviour shortly following the initial vessel exposure (i.e., a temporary effect). The maximum period per day associated with vessel disturbance on narwhal distance from shore was 28 minutes (based on an average of two vessel transits per day in the SSA). A minor deviation from typical migratory pathway (e.g., a change in distance from shore) by narwhal is consistent with a low severity response (Southall et al. 2021). However, given the temporary nature of the effect (i.e., up to 14 min per vessel transit) this would not be considered a biologically significant behavioural response and would not be expected to result in a significant alteration of natural behavioural patterns by narwhal in the RSA or disruption to their daily routine. Accordingly, no effects are anticipated on the individual fitness and/or vital rates of narwhal in the RSA, which may ultimately affect population parameters. This response is in line with impact predictions made in the FEIS for the Project, in that ship noise effects on narwhal are anticipated to be limited to temporary, localized avoidance behaviour.

UAV Focal Follow Surveys:

- The UAV focal follow surveys differed from the observer-based data collection in the BSA in that emphasis was placed on narwhal groups that comprised immatures (e.g., mother/calf pairs) to better assess potential behavioural responses of narwhal in more vulnerable life stages, including potential vessel effects on nursing behaviour and relative positioning of dependants during vessel interactions.
- A total of 249 unique focal follow surveys have been conducted to date (85 surveys in 2020 and 164 surveys in 2021), providing 23.6 hours of recorded behavioural data of narwhal near Bruce Head. Of the focal follow surveys conducted, 43 surveys coincided with a vessel transiting within 5 km of the focal group, providing a total of 3.9 hours of behavioural data in the presence of vessels (Closest Point of Approach [CPA] between 0.4 km and 4.7 km). While the additional data collected via UAV focal follow surveys in 2021 is valuable in providing insight into narwhal behaviour, the sample size in close proximity to vessels remains insufficient to conduct a meaningful quantitative analysis of behavioural response variables relative to 'distance from vessel', with total time spent within 0 km, 1 km, 2 km, and 3 km of focal groups including only 2.5 min, 11.5 min, 62.0 min, and 60.5 min, respectively. Therefore, results presented below pertaining to the UAV focal follow surveys should be interpreted accordingly.
- Group Formation (Unmanned Aerial Vehicle [UAV]-based): The most frequently observed group formation during the focal follow surveys was parallel (42% of time), similar to the predominant formation recorded in the BSA by shore-based observers. This was followed by linear formation (23% of the time) and cluster formation (23% of the time). In the absence of vessels, the proportion of groups in parallel formation was slightly lower (40% of the time) compared to when vessels were present (52%). In contrast, the proportion of groups in linear formation was slightly higher in the absence of vessels (24%) relative to when vessels were present (15%). The proportion of groups in cluster formation was similar when a vessel was absent compared to when a vessel was present (23% and 26%, respectively). No significant effect of vessel presence on group formation was demonstrated.
- Group Spread (UAV-based): Narwhal were shown to spend less time in tightly associated groups when vessels were present (32%) compared to when vessels were absent (44% of the time). This finding is inconsistent with results obtained from the shore-based monitoring dataset which found that narwhal formed tighter groups in the presence of vessels. A limited sample size in the focal follow surveys at close range to vessels may contribute to observed discrepancy. Vessel presence was shown to have a marginally significant effect on group spread in mother-immature narwhal groups ($P=0.071$); but not for other group types ($P>0.2$ for all).
- Primary Behaviour (UAV-based): Narwhal spent the majority of time travelling (71% of the time), followed by resting / milling (22% of the time), and social behaviours (7% of the time). The proportion of time that narwhal spent resting / milling was similar when a vessel was present (19%) compared to when no vessels were present (12%). For groups including life stages that may be more vulnerable to disrupted opportunities to rest (i.e. mother-immature groups), the proportion of time engaged in resting / milling behaviour was 9-67% when a vessel was present (depending

on distance from vessel) compared to 35% when no vessels were present. The proportion of time that mixed groups with immatures engaged in resting / milling behaviour was 14% when a vessel was present (sightings limited to 3 km distance from vessel) and 22% when a vessel was absent. No significant effect of vessel presence on primary behaviour was demonstrated.

- Unique Behaviours (UAV-based): Unique behaviours that would not be expected under stressful conditions, such as nursing, social rubbing, sexual displays, and rolling (either vertically in the water column or horizontally) were recorded in 119 of the total focal follow surveys conducted, including during 23% of the time in the absence of vessels and 19% of the time when vessels were present. Vessel presence was shown to have a marginally significant effect on unique behaviour in adult groups ($P=0.052$) and lone calves ($P=0.066$); but not for mother-immature groups ($P=0.5$) or mixed groups with immatures ($P=0.2$).
 - Nursing: Nursing of a calf or yearling from its mother was recorded during 24 of the focal follow surveys (12 surveys in 2020 and 12 surveys in 2021; accounting for 14% and 7% of all groups in 2020 and 2021, respectively). During the 24 events where nursing was observed, time spent nursing ranged between 5% and 63% of the focal follow period (mean value of 25% of the time, SD of 17% of the time). Two focal follow surveys coinciding with vessel presence included nursing behaviour. No significant effect of vessel presence on nursing activity was demonstrated.
- Focal Groups with Immatures: Mother-immature pairs were observed in 45 individual focal follow surveys for a total of 170 min (including 21 min in the presence of vessels), while mixed groups with immatures were observed in 27 focal follow surveys for a total of 103 min (including 39 min in the presence of vessels). Calves were observed on their own (i.e., either as a single calf or two calves together without other individuals) in 22 individual focal follow surveys, for a total of 158 min (including 12 min in the presence of vessels).
 - Relative and Distal Association of Immature with Mother: Immatures were most often recorded underneath their presumed mother compared to abreast, behind, or above in both the presence and absence of vessels (40% and 49% of the time, respectively). When an immature was positioned underneath of the presumed mother, it was tightly associated with the adult 99% of the time and the association was not affected by vessel presence (97% in presence of vessel and 99% when no vessels were present). That is, immatures did not appear to change their relative or distal association with their mother in response to vessel presence. No significant effect of vessel presence on the relative position or spread of immatures was demonstrated. In general, the results may have implications for the broader shore-based monitoring program at Bruce Head, suggesting that calves and yearlings passing through the BSA may be disproportionately underrepresented given the reduced ability to sight a smaller animal underneath an accompanying adult.

Detailed results of the 2020 Bruce Head Shore-based Monitoring Program are presented in Golder (2022g).

- h. Not applicable in 2021.

TRENDS

- a. Not applicable in 2021.
- b. Inuit have been involved in monitoring studies at all levels since the inception of the program, with the exception of the 2020 to 2021 monitoring programs given restrictions associated with the COVID-19 Pandemic. The addition of the MHTO as members of the MEWG in 2016 and the hiring of Inuit participants from Inuit-based companies has increased the participation of Inuit in this process. Inuit participation in Baffinland's monitoring programs increased in 2019 compared to 2017 and 2018 (from 2,265 hours / 12 participants in 2017 and 1,610 hours / 9 participants in 2018 to 6,500 hours / 23 participants in 2019). In spite of limited involvement due to the COVID-19 Pandemic in 2021, a total of 1,922 hours / 10 Inuit participants were employed for the 2021 monitoring programs. Inuit engagement has progressed to include training in data analysis and reporting in 2019.
- c. Engagement with Inuit community members with respect to monitoring protocols applied within the marine-based monitoring programs has continued to increase on an annual basis, with the exception of during the 2020 to 2021 monitoring programs given restrictions associated with the COVID-19 Pandemic. End of program interviews were newly implemented in 2019 to review and discuss monitoring protocols and preliminary monitoring results, and to solicit input on program design and planning for Baffinland to consider during subsequent year monitoring activities.
- d. Not applicable in 2021.
- e. Results from the 2021 aerial survey indicate that: i) narwhal abundance in Eclipse Sound was statistically lower in 2021 than observed in previous years when aerial surveys were conducted (i.e., 2013, 2016, 2019 and 2020), and ii) the combined narwhal abundance in Eclipse Sound and Admiralty Inlet was statistically higher in 2021 to what was observed in previous years (2013, 2019 and 2020). These results suggest a displacement or shift of a portion of the Eclipse Sound stock to the Admiralty Inlet summering ground during the summer of 2021. They also suggest there is potentially more movement/exchange of narwhal between neighbouring summer stock areas (i.e., Admiralty Inlet, Somerset Island, and/or East Baffin Island) than previously thought.
- f. The results of the 2021 ringed seal aerial survey program showed ringed seal densities have remained stable since the onset of shipping or ice-breaking activities along the Northern Shipping Route, with some inter-annual variation as expected. These results confirmed that mitigation measures appear to be functioning as intended and that Project activities along the Northern Shipping Route are not resulting in adverse effects on ringed seal beyond those predicted in the FEIS and FEIS Addendum, with no evidence of population-level effects observed.

A baseline ringed seal aerial survey of Steensby Inlet was flown in early June 2021. The photographic data collected during this survey is being archived for later analysis at the time when Steensby Inlet operations are planned to begin.
- g. A summary of trends observed in the integrated 7-year Bruce Head Shore-based Monitoring Program is presented above under Results – see response (g)
- h. Not applicable in 2021.

RECOMMENDATIONS / LESSONS LEARNED

- a. Not applicable in 2019.
- b. Marine monitoring programs will be reviewed with the MEWG and MHTO in 2022 in consideration of increasing Inuit involvement in field monitoring and data reporting if possible, though it is conceivable that continued COVID-19 travel restrictions may limit in-person involvement in 2022 monitoring programs by local Inuit.
- c. Marine monitoring programs will be reviewed with the MEWG and MHTO in 2022, with the intention of increasing responsiveness to Inuit concerns. Continuous communication with the MHTO and Inuit communities will continue in 2022, with consideration to restrictions associated with the COVID-19 Pandemic.
- d. Not applicable in 2021.
- e. Despite the elimination of both potential anthropogenic causal factors (underwater noise from icebreaking and impact pile driving for small craft harbour construction) in 2021 through adaptive management, results from the 2021 monitoring programs again indicated lower narwhal numbers in Eclipse Sound during the 2021 shipping season. Underwater noise from these sources is therefore not considered to be an influencing factor on narwhal abundance in Eclipse Sound during the 2021 season. Open-water shipping, the other Project contributor of noise in the RSA, is also not considered a likely cause of narwhal displacement from the RSA based on the available visual, acoustic, and tagging results collected to date.

Given that the combined stock estimate for Admiralty Inlet and Eclipse Sound indicate that the regional narwhal population remains stable relative to pre-shipping conditions, and in consideration of the available IQ regarding the degree of exchange between narwhal groups on their summering grounds, the observed decrease in narwhal relative abundance in Eclipse Sound most likely reflects natural exchange between the two putative stock areas, or alternatively, that animals, at this point in time, are finding more favourable ecological conditions en route to, and in Admiralty Inlet, due to changing ice conditions, prey availability and/or predation pressure, all of which are known to be influenced by a rapidly changing climate in the Arctic. It is also possible that what is occurring is a combination of the two instances, where a natural exchange of narwhal is being driven by local and temporary ecological differences. To better understand what is occurring additional engagement and monitoring is needed, inclusive of regional scape monitoring that looks at the population dynamics of the Baffin Bay narwhal stock as a whole.

- f. Although the current phase of the Project does not involve breaking of landfast ice Baffinland acknowledges recent feedback from hunters indicating they are observing local changes in seal abundance and distribution along the Northern Shipping Route, with carry-over effects on seal harvesting. In response to this feedback, Baffinland conducted a ringed seal aerial survey program along the Northern Shipping Route to monitor for potential Project-induced changes in ringed seal distribution and relative abundance (i.e., density and seal hot spots) in the RSA. The results of the 2021 survey indicate that ringed seal densities in the RSA are stable relative to 2016 survey estimates since the onset of shipping or ice-breaking activities in the RSA, with some natural inter-annual variation expected. No ringed seal aerial surveys along the Northern Shipping Route are planned for 2022.

- g. With respect to future monitoring initiatives for the Bruce Head Shore-based Monitoring Program, Baffinland will consult with the MEWG on making the following changes to the programs:
- Increase emphasis on the UAV survey component of the program, given the valuable insight this tool provides with respect to monitoring changes in group composition and fine scale behaviours in the presence of shipping (Broker et al. 2019). UAV surveys provide a detailed and permanent record of key narwhal behaviours (i.e., nursing, resting, territorial behaviour) that may not otherwise be quantifiable by shore-based visual methods. For example, one of the benefits of the focal follow surveys is an enhanced ability to monitor for moderate to high severity responses such as change in nursing or signs of aggression. While the sample size of surveys conducted when ships were 'present' remains insufficient to achieve adequate detection power for statistical analysis based on the 2020 to 2021 integrated dataset alone, increasing the sample size through future UAV surveys would have the potential to quantitatively evaluate changes in key narwhal behaviours in response to shipping. Furthermore, UAV survey methods allow for increased data collection at the closer vessel approach distances (i.e., 0-2 km range) compared to the BSA study design because focal follows can be undertaken directly on the shipping lane; whereas vessels rarely approach at close distances to the BSA given the location of the shipping lane (which was adjusted further eastward in 2020).
 - Undertake additional analysis of the 2021 aerial survey data for specific evaluation of the EWI metric (using the dedicated 1,000 ft survey data which was collected for this purpose) to confirm that this is a reflection of the low sample size and not a pattern of decreasing proportion of immature narwhal in the RSA.
 - Undertake dedicated UAV surveys for narwhal group composition as a secondary assessment of the EWI metric (i.e., proportion of immature narwhal relative to the adult population). This would provide for improved detection probability and increased accuracy in animal detection and enumeration, age class determination and gender confirmation compared to the current traditional monitoring method (observer-based data collection). Having a permanent record of the UAV video survey will eliminate observer bias in the data collection phase and allow for a better assessment of variability in the EWI data.
- h. Not applicable in 2021.

Project Certificate Condition No. 102

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To promote public awareness of Project shipping activities for the general public.
Term or Condition	The Proponent shall ensure that routing of Project vessels is tracked and recorded for both the southern and northern shipping routes, with data made accessible in real time to communities in Nunavut and Nunavik.
Relevant Baffinland Commitment	30, 36
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status of PC Condition	Steensby – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Baffinland Corporate Website – Operation – Shipping and Monitoring
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/

METHODS

Baffinland has contracted exactEarth®, a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The vessel tracking information is available throughout the entire duration of the shipping season on Baffinland’s website (<https://www.baffinland.com/operation/shipping-and-monitoring/>) to allow communities to check on vessel coordinates, which direction the vessel is moving, and its destination.

Although the vessel locations plotted on the online map are available 24 hours a day, 7 days a week over the entire duration of the shipping season, they are not available “real-time” per se on a minute by minute basis, but do provide regularly updated snapshot of latest vessel position in the North Baffin region approximately every 30 minutes. Data is immediately uploaded to the website once the data, as captured by satellites, are made available through the software.

Following on the success of the 2019 efforts to enhance communications regarding Baffinland’s daily shipping activities in the community of Pond Inlet as requested through feedback received by the MHTO, in 2021 Baffinland continued its Shipping Monitor Program which consists of hiring a minimum of two full-time employees to actively track daily Project vessel movements in the RSA through tracking of data available through exactEarth®, and in relation to reported marine mammal sightings (as shared by residents of Pond Inlet through marine VHF radio and Baffinland monitoring teams). One of the primary roles of the Shipping Monitors is to provide direct liaison between the community of Pond Inlet, hunters and Baffinland. They work directly out of the Baffinland office situated on the second floor of the MHTO office building in Pond Inlet. Through this role, Shipping Monitors provide updates on Baffinland’s shipping activities using a variety of communication methods including local public radio, marine VHF radio (for hunters on the water) and through social media (e.g., Facebook posts). Shipping Monitors are also available to track any comments/questions that are communicated by residents, and provide answers as needed.

RESULTS

Baffinland trained and hired ten (10) full-time and part-time Shipping Monitors in 2021 (see Photo 27 in Appendix D). Three (3) of the Shipping Monitors had previously worked with Baffinland in 2019 and/or 2020 as Shipping Monitors or as summer students in Baffinland's Pond Inlet office. Baffinland has made vessel routing accessible to the public via the Baffinland website. Baffinland continues to maintain an Automatic Identification System (AIS) tracker system in Baffinland's Shipping Monitor office located in the second floor of the MHTO building on a dedicated laptop and wall-mounted monitor. This provides live continuous monitoring of vessels active in the Northern Shipping Route to all office visitors during office hours (8am to 5pm). Baffinland notes that due to COVID-19 Pandemic public health restrictions, the office was regrettably closed to visitors for the majority of the shipping season, and as a result viewing of vessels could only be possible by accessing the website through individual access points. Baffinland also created a dedicated "Baffinland Shipping" Facebook page to further enhance regular communications over the shipping season, attracting hundreds of followers during the active shipping season; a Facebook Baffinland Shipping group was also created for those particularly interested in most up to date information on vessel locations. Key information was posted including maps showing the Northern Shipping Route extending from Baffin Bay to Milne Port, contact information of Shipping Monitors including direct cell phone line and email, and a link to the live vessel tracking available on the Baffinland website.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth® to be beneficial in providing information related to ship routing to the public. Baffinland will continue to use this service. Furthermore, it is Baffinland's intent to continue providing live viewing of vessel tracks through its Pond Inlet Office in 2022 (in consideration of latest COVID-19 guidance), and to continue the hiring of Shipping Monitors over the entire duration of the shipping season.

Project Certificate Condition No. 103

Category	Marine Environment – Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor effectiveness of mitigation of shipping impacts to marine wildlife.
Term or Condition	<p>The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including:</p> <ul style="list-style-type: none"> a. A record of all ship tracks taken along both shipping routes covering the entire shipping season; b. When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; c. A comparison of recorded ship tracks to the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; d. An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and e. When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board
Reference	<p>Daily Ice Charts (Canadian Ice Service, 2021)</p> <p>Draft 2021 Marine Mammal Aerial Survey Program (Golder, 2022e)</p> <p>All Project-related Vessel Transits Along the Northern Shipping Route During 2021 (Figure 4.13)</p> <p>2018 Annual Report to the Nunavut Impact Review Board. (Baffinland. 2019f)</p> <p>2021 Incidental Marine Mammal Sightings</p> <p>2021 Daily Ship Tracks with Ice Imagery</p>
Ref. Document Link	<p>https://www.baffinland.com/operation/shipping-and-monitoring/</p> <p>https://www.baffinland.com/media-centre/document-portal/</p> <p>Appendix G.10</p> <p>Appendix G.9</p>

METHODS

- a. Project-related vessel tracks and associated speeds along the Northern Shipping Route are recorded throughout the shipping season using the Automatic Identification System (AIS), which tracks the movement of each vessel using an onboard AIS transceiver with integrated Global Positioning System (GPS). The AIS signals in the Project area are recorded by base stations set up at Pond Inlet and Bruce Head; and when out of range of the base stations, through satellite based AIS receivers (exactEarth® AIS archive). Vessel tracks are publicly accessible through the Baffinland website during the shipping season and at the

Baffinland office located in the Mittimatalik Hunters and Trappers Organization (MHTO) building on a large wall-mounted monitor.

- b. Daily maps are prepared showing Project vessel tracks (including the MSV *Botnica* and vessels under escort) on all days when ice concentrations were 1/10 or greater. These vessel track maps include an overlay of daily sea ice concentration (i.e., coverage) provided by the Canadian Ice Service (2021) showing vessels transiting in open water whenever possible, while avoiding shore leads and polynyas.
- c. See (a) and b) above.
- d. See (a) and (b) above.
- e. Similar to 2020, the Ship-based Observer (SBO) Program could not be implemented in 2021 due to boarding restrictions related to the COVID-19 global Pandemic. As an alternative, Baffinland partnered again with the Marine Mammal Observation Network (MMON) to run a marine mammal incidental sightings program through the participation of vessels contracted by Baffinland, the MSV *Botnica*, Nordic Bulk Carriers and Oldendorff Carriers. The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program (Baffinland, 2019f). In 2021, MMON made available a new whale identification training to participating vessels through an online link, <https://observers.navigatingwhales.ca/>. Vessel crews unable to take the online training were also provided offline training.

No early season icebreaking was conducted by Baffinland in 2021. An aerial clearance survey was completed in the RSA at the end of the shipping 2021 shipping season which had the purpose of identifying the risk for marine mammal ice entrapment in the region (Golder, 2022e). The survey team included a Golder marine mammal biologist, a representative from the MHTO and four Inuit researchers from Pond Inlet.

RESULTS

- a. Recorded 2021 Project-related vessel tracks are plotted in Figure 4.13.
- b. Figures showing an overlay of daily vessel tracks onto ice imagery for both 2021 shoulder seasons (July 8 to August 6 and 1 October to 5 November) are presented in Appendix G.9. The figures demonstrate that vessels actively avoided shore leads and polynyas during icebreaker escort transits in Baffin Bay and the RSA.
- c. Project vessels are required to leave the nominal shipping route near Ragged Island to access established anchorages at that location (Figure 4.13). The Project vessel tracks shown approaching and departing Pond Inlet in 2021 are from the MSV *Botnica*, which was the research vessel used to deploy and retrieve an acoustic monitoring device near Pond Inlet (Figure 4.13). Apart from these instances, there were no Project vessel deviations from the nominal shipping route in the RSA during the 2021 shipping season (see Figure 4.13).
- d. See update to (c) above.
- e. A total of eleven (11) vessels participated in the 2021 MMON pilot program (Table 4.27). The majority of sightings (59%) were made by the MSV *Botnica*. Most sightings consisted of various seal species (Table 4.28). Narwhal (3) were the only whale observed that was identified to species.

No risks for marine mammal ice entrapment were identified during the aerial clearance survey (Golder, 2022e).

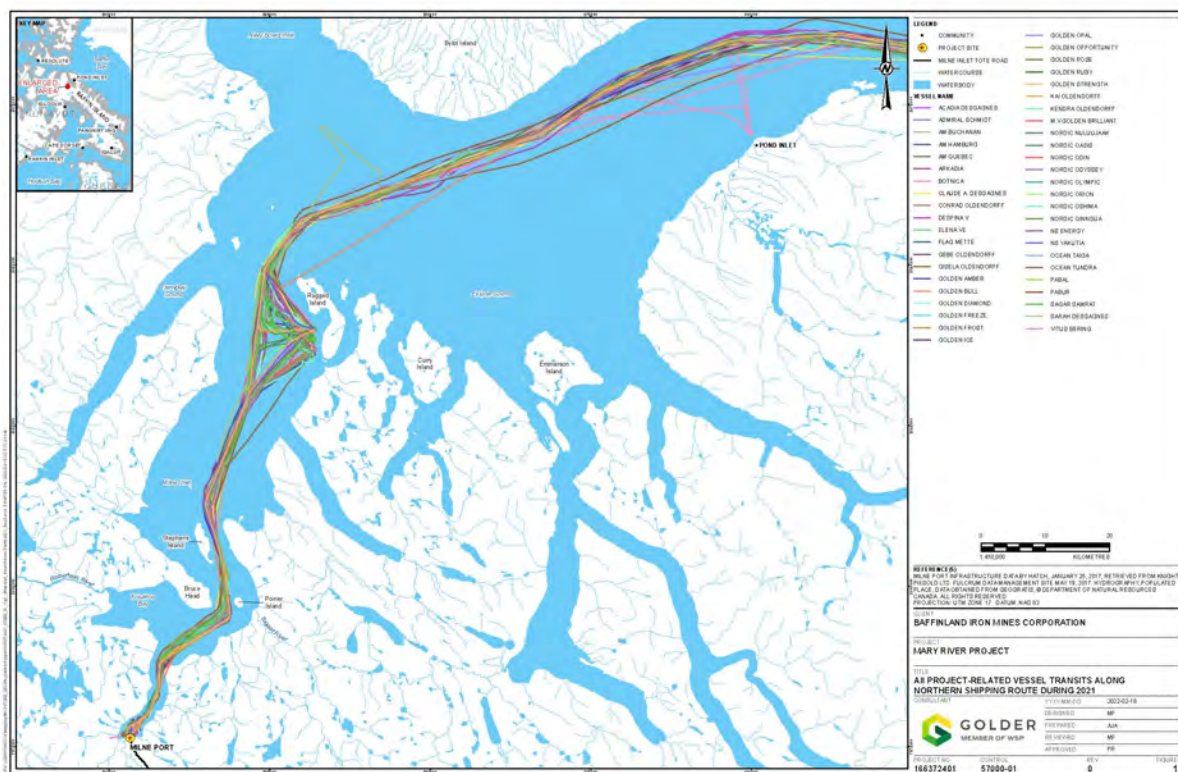


Figure 4.13: All Project-Related Vessel Transits Along Northern Shipping Route During 2021

Appendix G.10 includes the locations of marine mammal sightings recorded in the RSA during the 2021 shipping season (July to October, 2021).

TRENDS

No unplanned deviations from the nominal Northern Shipping Route in the RSA were undertaken by Project ore carriers during the first seven years of iron ore shipping in this area (2015 to 2021).

Table 4.27: Number of Marine Mammal Sightings in the Regional Study Area by Participating Vessel, July to October, 2021

Vessel Name	No. of Sightings
MSV Botnica	10
Nordic Oasis	0
Nordic Odin	3
Nordic Odyssey	1
Nordic Olympic	0
Nordic Orion	2

Vessel Name	No. of Sightings
Nordic Oshima	0
Nordic Qinngua	1
Nordic Nuluujaak	0
Kai Oldendorff	0
Gebe Oldendorff	0
Total	17

Note:

A sighting refers to when a minimum of one individual was recorded at a specific location by a participating vessel during its transit along the Northern Shipping Route.

Table 4.28: Summary of Marine Mammal Sightings in the Regional Study Area, July to October, 2021

Species	No. of Sightings
Narwhal	3
Harp Seal	2
Ringed Seal	2
Unidentified Whale	4
Unidentified Seal	6
Total	17

Note:

A sighting refers to when a minimum of one individual was recorded at a specific location by a participating vessel during its transit along the Northern Shipping Route.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor Project vessel movements in the RSA using the shore-based AIS stations at Pond Inlet and Bruce Head, and satellite-based AIS using the exactEarth® archive. Baffinland will also continue to communicate expectations to Masters with regards to avoiding deviations from the nominal Northern Shipping Route when vessels are under contract to Baffinland, and will maintain active tracking through the use of notification alerts.

Project Certificate Condition No. 104

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To prevent impacts to marine wildlife from Project shipping activities.
Term or Condition	<p>Subject to safety considerations and the potential for conditions as determined by the crew of transiting vessels, to result in route deviations:</p> <ul style="list-style-type: none"> a. The Proponent shall require, for shipping to/from Steensby Port, project vessels to maintain a route to the south of Mill Island to prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island. Where project vessels are required to transit to the north of Mill Island owing to environmental or other conditions, an incident report is to be provided to the Marine Environment Working Group and the NIRB within 30 days, noting all wildlife sightings and interactions as recorded by shipboard monitors. 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.
Relevant Baffinland Commitment	Not Applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

- a. Not applicable
- b. Project-related vessel tracks and associated speeds along the Northern Shipping Route are recorded throughout the shipping season using the Automatic Identification System (AiS) on ships. AiS is a digital positional awareness system that integrates a standardized Very High Frequency (VHF) transceiver with a Global Positioning System (GPS) receiver installed on marine vessels, along with other onboard electronic navigation sensors, such as a gyrocompass or rate of turn indicator. Vessels fitted with dedicated AiS transceivers can be tracked by AiS base stations located along coastlines or, when out of range of terrestrial networks, through satellites fitted with special AiS receivers. The purpose of the AiS system is to allow vessels, maritime authorities and/or other third parties to track and monitor vessel movements in a defined area in relation to navigational markers and bathymetric features. In Canada, all self-propelled vessels of ≥ 150 gross tonnage carrying more than 12 passengers are required to carry Class A AiS systems, as per the federal *Navigation Safety Regulations* (SOR/2005-134). The IMO Convention for the Safety Of Life At Sea (SOLAS) Regulation V/19.2.4 requires all vessels of 300 gross tonnage (GT) and above engaged on international voyages and all passenger ships irrespective of size to carry AiS onboard. AiS signals emitted

by Project vessels transiting in the RSA are recorded by shore-based stations set up at Pond Inlet and Bruce Head; and when out of range of the base stations, through satellite based AIS receivers (exactEarth® AIS archive). Vessel tracks are publicly accessible through the Baffinland website during the shipping season and at the Baffinland office located in the Mittimatalik Hunters and Trappers Organization (MHTO) building on a large wall-mounted monitor.

RESULTS

- a. Not applicable.
- b. Project vessels are required to leave the nominal shipping route near Ragged Island to access established anchorages at that location (Figure 4.13). The Project vessel tracks shown approaching and departing Pond Inlet in 2021 (Figure 4.13) belong to the MSV Botnica, which was the research vessel used to deploy and retrieve an acoustic monitoring device near Pond Inlet. Apart from these instances, there were no Project vessel deviations from the nominal shipping route in the RSA during the 2021 shipping season.

TRENDS

- a. Not applicable in 2021.
- b. No unplanned deviations from the nominal Northern Shipping Route in the RSA were undertaken by Project ore carriers during the first seven years of iron ore shipping in this area (2015 to 2021).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor vessel movements using the shore-based AIS stations at Pond Inlet and Bruce Head, and satellite-based AIS using the exactEarth® archive. Baffinland will also continue to communicate expectations to Masters with regards to avoiding deviations from the nominal Northern Shipping Route when vessels are under contract to Baffinland, and will maintain active tracking through use of notification alerts.

Project Certificate Condition No. 105

Category	Marine Environment - Traffic Log and Shipping Information
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operation
Objective	To prevent impacts to marine wildlife from Project shipping activities.
Term or Condition	<p>The Proponent shall ensure that measures to reduce the potential for interaction with marine mammals, particularly in Hudson Strait and Milne Inlet, are identified and implemented prior to commencement of shipping operations. These measures could include, but are not limited to:</p> <ul style="list-style-type: none"> 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. 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.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	<p>Steensby Port – Not Active</p> <p>Milne Port – Active</p>
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	<p>Standing Instructions and General Information for Masters of Vessels Loading at Milne Inlet Port (Fednav, 2021)</p> <p>Draft 2021 Marine Mammal Aerial Survey Program Report (Golder, 2022e)</p> <p>Draft 2021 Bruce Head Shore-based Monitoring Program Report (Golder, 2022g)</p> <p>2021 Ringed Seal Aerial Survey Program - Draft Report (Golder, 2022f)</p> <p>2020 Underwater Acoustic Monitoring Program (Open-Water Season) - Report (Austin et al., 2022a)</p> <p>2021 Underwater Acoustic Monitoring Program (Open-Water Season) - Draft Report (Austin et al., 2022b)</p> <p>2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)</p> <p>2021 MEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.12 Appendix G.16 Appendix G.25

METHOD

- a. Several mitigation measures, including those relevant to shipping operations and icebreaking activities associated with the current Project committed to by Baffinland to avoid and/or minimize adverse effects from shipping on marine mammals along the Northern Shipping Route, are adhered to by Baffinland and are identified in Baffinland's Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) including:
- Defined shipping lane throughout RSA.
 - Maintain constant speed and course when possible.
 - No breaking of landfast ice.
 - Between the period of 01 July and 30 July, a maximum of one icebreaker transit (with escorted vessels) will occur per 24-hour period where ice concentrations of 6/10 or greater cannot be avoided along the shipping route.
 - Between the period of 01 July and 30 July, a maximum of two icebreaker transits (with escorted vessels) will occur per 24-hour period where ice concentrations of 3/10 or greater cannot be avoided along the shipping route.
 - All Project vessels will reduce speeds to a voluntary maximum of 9 knots when travelling within the RSA.
 - Establishment of a 40-km buffer zone (set-back area) at the floe-edge (extending from the Nunavut Settlement Boundary).
 - All icebreaking activities will be conducted outside of the period of ringed seal denning, pupping, nursing and breeding/mating periods.
 - When marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows).
 - All Project vessels will be provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice.
 - All Project vessels will be provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group.
 - COVID-19 restrictions allowing, Baffinland will place Marine Wildlife Observers (via the SBO Program) on icebreaking vessels during the shoulder season that will be responsible for recording relative abundance, group composition and behavior of marine mammals, and if relevant any incidences of marine mammal strike of near misses with Project vessels.
 - Posting of ice analyst on board icebreaking vessels.
 - Project aircrafts (helicopter and airplanes) will maintain an altitude of 450 m over marine waters when possible.
 - Establishment of restricted "no-go" zones to avoid key sensitive areas and hunting camp areas (Koluktoo Bay, Tremblay Sound, western shoreline of Milne Inlet).
 - No drifting in Eclipse Sound.
 - Maximum of three (3) vessels anchored at Ragged Island.
 - Limiting vessel idling.

It is important to note that several of these mitigation measures have been implemented on a voluntary basis by Baffinland and exceed any applicable regulatory requirements in Canada. This suite of measures represents a more conservative practice of vessel traffic management than is demonstrated by any other industrial/commercial shipping operator or government vessel in the RSA (i.e., Canadian Coast Guard, DFO).

Additionally, since receiving approval from the NIRB on the Extension Request, Baffinland has worked with DFO to update Baffinland's commitments on the transit restrictions mitigations, which were applied beginning in summer 2021. The commitments are as follows:

1. Apply spring transit restriction mitigations as long as ice concentrations, as defined by the Canadian Ice Service, of greater than 3/10 persist along the Northern Shipping Route, or meet the obligations of applicable commitments to others if more conservative, to determine the earliest date for commencing the shipping season. Initiation of this commitment began in 2021.
2. As a temporary measure for 2021, Baffinland committed to avoid icebreaking during the 2021 early shoulder season; that is, shipping was not to commence until a continuous path of 3/10th or less ice concentrations was shown to be present between the entrance of Eclipse Sound and Milne Port.
3. Beginning in 2021, the following transit restriction mitigations were applied during the fall shoulder season:
 - When a continuous sailing route of open water and/or new ice (<10 cm) occurs between the entrance of Pond Inlet and Milne Port, then icebreaker transits and other unescorted vessels in the RSA may proceed under open-water operating conditions.
 - A maximum of two (2) transits or four (4) half transits will occur per day (24-h period) where grey ice (10 to 15 cm) cannot be avoided along the shipping route.
 - No breaking of landfast ice along the shipping route.

Mitigation measures currently implemented by Baffinland to manage adverse effects on marine mammals from shipping are routinely evaluated as part of the ongoing marine mammal monitoring programs. In 2021, monitoring programs included the 2021 Bruce Head Shore-based Monitoring Program (Golder, 2022g), the 2021 Marine Mammal Aerial Survey Program (Golder, 2022e), the 2021 Ringed Seal Aerial Survey program (Golder, 2022f) and the 2021 Passive Acoustic Monitoring (PAM) Program (Austin et al., 2022b). The SBO Program could not be conducted in 2021 because of boarding restrictions for international vessels related to the COVID-19 Pandemic.

- a. Baffinland's Standing Instructions to Masters (SITM) (Fednav, 2021) identifies a "maximum vessel speed limit of 9 knots over ground beginning at the entrance to Pond Inlet (at 74 degrees longitude) through Eclipse Sound and throughout Milne Inlet". Project vessel speeds are tracked in real-time using the satellite-based Automatic Identification System (AIS), supported by two shore-based AIS base stations installed along the Northern Shipping Route (at Bruce Head and Pond Inlet).
- b. Not applicable in 2021 as the Southern Route is not active.

RESULTS

- a. Mitigations outlined in the methods section above were successfully implemented by Baffinland in 2021.
- b. Table 4.29 presents vessel speed information for all Project-related vessels calling at Milne Port in 2021. A total of 74 ore carrier voyages (comprising 39 ore carrier vessels), 7 freight vessels/tanker voyages (comprising 3 vessels), 2 tugs, and 1 icebreaker called to Milne Port during the 2021 shipping season. Project

vessels traveled below the 9-knot speed limit for 99.4% of their transit period in the RSA (Table 4.30). The maximum recorded travel speed for an ore carrier in 2021 was 9.8 knots. The maximum recorded speed for a freight / fuel tanker in 2021 was 9.6 knots. The proportional breakdown of vessel travel speed in the RSA during the 2021 shipping season is presented for all vessels combined (ore carriers and cargo/fuel vessels) in Figure 4.14.

- c. Not applicable in 2021 as the Southern Shipping Route is not active.

Table 4.29: Recorded Speeds of Project Vessels transiting along Northern Shipping Route, 2021

Vessel Name	No. of Round Trips	Vessel Type	Max Speed (knots)	Median Speed (knots)	% of travel >9 knots	% of travel >10 knots
ADMIRAL SCHMIDT	3	Ore Carrier	9.4	8.4	5.64	0
AM BUCHANAN	1	Ore Carrier	9.1	7.7	0.06	0
AM HAMBURG	1	Ore Carrier	9	8.1	0	0
AM QUEBEC	1	Ore Carrier	8.8	7.4	0	0
ARKADIA	2	Ore Carrier	9.2	7.8	0.69	0
CONRAD OLDENDORFF	1	Ore Carrier	9	8	0	0
DESPINA V	3	Ore Carrier	9.1	7.8	0.01	0
ELENA VE	1	Ore Carrier	9	7.75	0	0
FLAG METTE	1	Ore Carrier	9	7.5	0	0
GEBE OLDENDORFF	1	Ore Carrier	8.7	8.1	0	0
GISELA OLDENDORFF	1	Ore Carrier	9.4	8.3	0.20	0
GOLDEN AMBER	2	Ore Carrier	8.8	6.6	0	0
GOLDEN BULL	2	Ore Carrier	8.6	7.6	0	0
GOLDEN DIAMOND	2	Ore Carrier	8.9	8.1	0	0
GOLDEN FREEZE	2	Ore Carrier	9.3	8	0.25	0
GOLDEN FROST	2	Ore Carrier	9.1	7.3	0.07	0
GOLDEN ICE	2	Ore Carrier	9	7.7	0	0
GOLDEN OPAL	2	Ore Carrier	8	7.2	0	0
GOLDEN OPPORTUNITY	2	Ore Carrier	9	7.3	0	0
GOLDEN ROSE	1	Ore Carrier	8.7	7.4	0	0
GOLDEN RUBY	2	Ore Carrier	9.1	7.7	0.05	0
GOLDEN STRENGTH	1	Ore Carrier	8.7	7.6	0	0
KAI OLDENDORFF	1	Ore Carrier	9	7.2	0	0
KENDRA OLDENDORFF	1	Ore Carrier	9.4	7.8	1.00	0
M.V.GOLDEN BRILLIANT	2	Ore Carrier	9.3	7.9	1.28	0
NORDIC NULUUJAAK	1	Ore Carrier	8.7	7.7	0	0
NORDIC OASIS	3	Ore Carrier	9.1	8.3	0.02	0
NORDIC ODIN	3	Ore Carrier	9	8.5	0	0

Vessel Name	No. of Round Trips	Vessel Type	Max Speed (knots)	Median Speed (knots)	% of travel >9 knots	% of travel >10 knots
NORDIC ODYSSEY	2	Ore Carrier	9	8.1	0	0
NORDIC OLYMPIC	3	Ore Carrier	8.8	7.9	0	0
NORDIC ORION	3	Ore Carrier	9.4	8.1	0.44	0
NORDIC OSHIMA	3	Ore Carrier	9	8	0	0
NORDIC QINNGUA	3	Ore Carrier	9.1	7.9	0.07	0
NS ENERGY	1	Ore Carrier	9.1	8.3	0.43	0
NS YAKUTIA	2	Ore Carrier	9.2	7.5	0.35	0
PABAL	2	Ore Carrier	9.8	8.2	0.86	0
PABUR	2	Ore Carrier	8.7	7.1	0	0
SAGAR SAMRAT	3	Ore Carrier	8.9	7.8	0	0
SARAH DESGAGNES	3	Cargo/Fuel	9.6	8.4	0.97	0
ACADIA DESGAGNES	1	Cargo/Fuel	9.1	8.7	0.94	0
CLAUDE A. DESGAGNES	3	Cargo/Fuel	8.8	8.4	0	0
BOTNICA	2	Ice Breaker	9.1	8.3	0.01	0
OCEAN TAIGA	1	Tug	9.9	6.1	1.74	0
OCEAN TUNDRA	1	Tug	12.5	6.8	6.68	3.94

Table 4.30: Proportion of Travel Time in RSA Relative to Speed Restriction – 2021 Shipping Season

Project Vessel Type	% of travel in the RSA <9 knots	% of travel in the RSA <10 knots
Ore carriers	99.7	100.0
Cargo / freight vessels	99.8	100.0
Fuel tankers	99.0	100.0
Tugs	95.7	98.0
MSV Botnica	99.9	100.0
Total	99.4	99.8

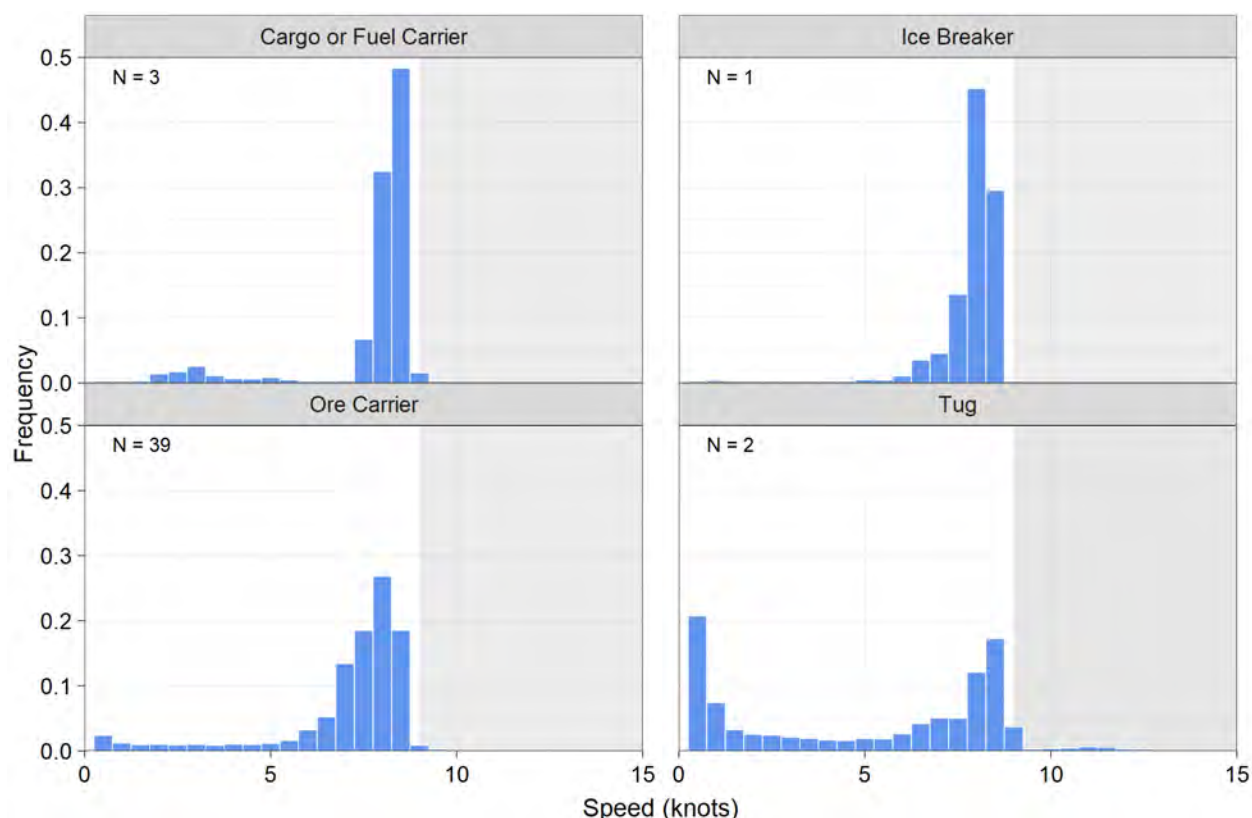


Figure 4.14: Proportional Ship Travel Speed for all Project-related Vessels - 2021 Shipping Season

Notes:

All vessel speeds <0.5 knots were excluded from the analysis as it was assumed vessels were moored/anchored at this time.

TRENDS

- a. Underwater acoustic monitoring results and narwhal behavioural data collected to date have demonstrated that shipping noise in the RSA is lower than predicted in the FEIS and that behavioural effects from shipping on narwhal are limited to low-level disturbance effects that are localized and temporary in nature. This gives Baffinland confidence that its current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits during early shoulder season, etc.) are demonstratively effective at managing Project incremental effects from shipping on narwhal in the RSA.
- b. There has been a marked improvement by Project vessel operators since 2018 in terms of adherence to the 9-knot speed restriction in the RSA. This has been largely the result of better communication between the Port Master/Baffinland Shipping and the vessel owners/operators, substantial updates made to the SITM regarding updated mitigation measures required by all Project vessels, the use of a real-time AIS-based alert system that immediately informs the Port Master and Baffinland Shipping personnel of a non-compliance event such as a speed exceedance so that the issue can be quickly resolved, and the use of shipping monitors in Pond Inlet that actively track Project vessel movements in the RSA in real-time.

Table 4.31 provides the proportion of time Project vessels transited under 9 knots in the RSA for the 2018 to 2021 shipping seasons.

Table 4.31: Proportion of Travel Time in RSA Relative to 9-knot Speed Restriction – 2018 to 2021 Shipping Seasons

Project Vessel Type	2018	2019	2020	2021
Ore carriers	93.7	99.3	98.5	99.7
Cargo / freight vessels	79.0	93.6	99.9	99.8
Fuel tankers	79.0	98.2	100	99.0
Tugs	85.7	94.5	97.4	95.7
MSV Botnica	92.5	99.7	99.8	99.99
TOTAL	92.2	97.8	99.0	99.0

- c. Not applicable in 2021 as the Southern Route is not active.

RECOMMENDATIONS / LESSONS LEARNED

- Results from the 2021 monitoring programs for narwhal (Golder, 2022e, 2022g) following implementation of enhanced mitigation measures during the 2021 shipping season suggest that Project-related icebreaking is not likely to be responsible for the displacement of narwhal from Eclipse Sound to Admiralty Inlet. Despite the removal of both potential anthropogenic causal factors (underwater noise from icebreaking and impact pile driving) in 2021 through adaptive management, results from the 2021 monitoring programs again indicated lower narwhal numbers in Eclipse Sound during the 2021 shipping season. Underwater noise from these sources is therefore not considered to be an influencing factor on narwhal abundance in Eclipse Sound during the 2021 season. Open-water shipping, the other Project contributor of noise in the RSA, is also not considered to be the likely cause of narwhal displacement from the RSA in 2020/2021 based on the available acoustic and behavioural response data collected to date (Austin et al., 2022a, 2022b; Baffinland, 2021o; Golder, 2021d, 2022e, 2022g) and for reasons outlined in Baffinland (2021h).
- Given that the combined stock estimate for Admiralty Inlet and Eclipse Sound indicate that the regional narwhal population remains stable relative to pre-shipping conditions, and in consideration of the available IQ regarding the degree of exchange between narwhal groups on their summering grounds, the observed decrease in narwhal relative abundance in Eclipse Sound most likely reflects natural exchange between the two putative stock areas, or alternatively, that animals, at this point in time, are finding more favourable ecological conditions en route to, and in Admiralty Inlet, due to changing ice conditions, prey availability and/or predation pressure, all of which are known to be influenced by a rapidly changing climate in the Arctic. It is also possible that what is occurring is a combination of the two instances, where a natural exchange of narwhal is being driven by local and temporary ecological differences. To better understand what is occurring additional engagement and monitoring is needed, inclusive of regional scape monitoring that looks at the population dynamics of the Baffin Bay narwhal stock as a whole.
- In 2022, Baffinland plans to resume icebreaking operations in 2022 in conjunction with mitigation measures implemented in 2020 and in concert with the monitoring programs listed below to obtain a fine-scale

analysis of narwhal movement in relation to vessels, as has been done for open water shipping activities and to further evaluate the potential short-term, long-term and cumulative effects of icebreaker noise on narwhal during this period.

The following monitoring programs will be considered, in consultation with the MEWG for implementation in 2022:

- 2022 Early Shoulder Season Narwhal Tagging Study
 - 2022 Marine Mammal Aerial Survey Program Photo-analysis of 2021 aerial survey data for a secondary assessment of the EWI metric
 - 2022 Bruce Head Shore-based Monitoring Program
 - 2022 PAM Program – Underwater Acoustic Monitoring at the Pond Inlet Floe Edge during the Shoulder Season
- d. In 2022, all Project vessels will continue to be provided with standing instructions to travel along the Northern Shipping Route at speeds not exceeding 9 knots. Baffinland will continue to monitor ship tracks and ship speeds using shore-based AIS stations installed at Pond Inlet and Bruce Head, and satellite-based ship tracking using the exactEarth® archive and alerts will be sent to vessels exceeding speed limits.
- e. Not applicable in 2021 as the Southern Shipping Route is not active.

Project Certificate Condition No. 106

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure that interactions with marine mammals and Project shipping activities are effectively monitored.
Term or Condition	The Proponent shall ensure that shipboard observers are employed during seasons where shipping occurs and provided with the means to effectively carry out assigned duties. The role of shipboard observers in shipping operations should be taken into consideration during the design of any ore carriers purpose-built for the Project, with climate controlled stations and shipboard lighting incorporated to permit visual sightings by shipboard observers during all seasons and conditions. Any shipboard lighting incorporated should be in accordance with the Canada Shipping Act, 2001's Collision Regulations, and should not interfere with safe navigation of the vessel.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	As-needed.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Marine Mammal Sightings by Vessel Type, June to October 2020 2018 MEWG Meeting Records (Appendix C.1 in Baffinland, 2019f) 2020 MEWG Meeting Records (Appendix C.1 in Baffinland, 2021f) 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.10

METHODS

Similar to 2020, the Ship-based Observer (SBO) Program could not be implemented in 2021 due to boarding restrictions associated with the COVID-19 Pandemic. These measures were taken to ensure the health and safety of Nunavummiut, Baffinland staff and ship staff. As an alternative, Baffinland partnered again with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sightings program through the participation of vessels contracted by Baffinland, the MSV Botnica, Nordic Bulk Carriers and Oldendorff Carriers (new to program in 2021). The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program (Appendix C.1 in Baffinland, 2019f). In 2021, MMON made available a new whale identification training program to participating vessels through an online link, <https://observers.navigatingwhales.ca/>. Vessel crews unable to take the online training were also provided offline training files to be uploaded directly on vessels' Learning Management System.

Previously, in order to ensure that interactions with marine mammals and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to primarily monitor for potential ship strikes on marine mammals and seabirds in the RSA, and secondarily to collect observational data on the presence, relative abundance and distribution of marine mammals and seabirds within the boundaries of the RSA relative to Project vessel operations. The SBO program is not structured as a systematic behavioural effects study and is not designed for assessing the behaviour of marine mammals around project vessels before, during and after exposure as there is no control. Baffinland has other monitoring programs designed for this purpose, such as the narwhal tagging program and the Bruce Head shore-based monitoring program.

The SBO Program was first run in 2013 to 2015 and was subsequently resumed in 2018 and 2019. The 2013 to 2015 SBO Program took place during the construction phase at Milne Port (2013 and 2014) and during Year 1 of shipping operations (2015). Baffinland has not designed or constructed purpose-built ore carriers as originally envisioned, therefore Baffinland relied on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013 to 2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018 to 2019, the survey platform for the SBO Program was the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level, where Marine Wildlife Observers (MWOs) could comfortably and more effectively observe marine wildlife and environmental conditions (compared to onboard the industry platforms used in 2013 to 2015). Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol (Gjerdrum et al., 2012).

RESULTS

A total of eleven (11) vessels from 3 participating vessel companies participated in the MMON pilot program between July and October 2021 (Table 4.27 in PC Condition No. 103), which is an increase from the 7 (seven) vessels that participated in 2020. The majority of sightings (59%) were made by the MSV *Botnica*. Most sightings consisted of whale (narwhal and unidentified) and seal (ringed, harp and unidentified) species (Table 4.28 in PC Condition No. 103).

Appendix G.10 includes locations of marine mammals sightings in the RSA between months of July to October, 2021.

TRENDS

No ship strikes on marine mammals have been recorded to date through any of the previously run SBO programs. Similarly, no ship strikes on marine mammals have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs, and during reporting year 2021. The only seabird strike reported over six years of monitoring occurred during the 2019 SBO Program (Baffinland, 2020f).

RECOMMENDATIONS / LESSONS LEARNED

Safety concerns that were raised regarding the initial SBO program (that led to the postponement of the program in 2016) were mitigated through the use of the MSV *Botnica* as the survey platform and boarding the vessel in Milne Port in 2018 and 2019. This included on-board accommodation for Inuit observers to allow for regular wildlife

surveys over consecutive days. In doing so, the need to conduct at-sea boarding of observers on different survey vessels throughout the shipping season was no longer considered necessary.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV Botnica will be evaluated for 2022 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. Regardless of boarding restrictions still being in effect during the 2022 shipping season, Baffinland will continue with its incidental marine mammals sightings program in collaboration with MMON.

Project Certificate Condition No. 107

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To determine the presence of, and ensure that interactions with marine mammals, seabirds and seaducks are effectively monitored for, along the northern and southern shipping routes, as applicable.
Term or Condition	The Proponent shall revise the proposed “surveillance monitoring” to improve the likelihood of detecting strong marine mammal, seabird or seaduck responses occurring too far ahead of the ship to be detectable by observers aboard the ore carriers. A baseline study early in the shipping operations could employ additional surveillance to detect potential changes in distribution patterns and behavior. At an ambitious scope, this might be achieved using unmanned aircraft flown ahead of ships, or over known areas of importance for seabirds or haul-out sites in the case of walruses, in accordance with the requirements of their Special Flight Operations Certificate.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 MEWG Meeting Records Draft 2021 Bruce Head Shore-based Monitoring Program (Golder, 2022g) Draft 2021 Marine Mammal Aerial Surveys Report (Golder, 2022e)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.10

METHODS

In order to ensure that interactions with marine wildlife and Project shipping activities are effectively monitored, Baffinland developed the Ship-based Observer (SBO) Program to primarily monitor for potential ship strikes on marine mammals and seabirds in the RSA, and secondarily to collect observational data on the presence, relative abundance and distribution of marine mammals and seabirds within the boundaries of the RSA relative to Project vessel operations. The SBO program is not structured as a systematic behavioural effects study and is not designed for assessing the behaviour of marine mammals around project vessels before, during and after exposure as there is no control.

Similar to 2020, the Ship-based Observer (SBO) Program could not be implemented in 2021 due to boarding restrictions associated with the COVID-19 Pandemic. These measures were taken to ensure the health and safety of Nunavummiut, Baffinland staff and ship staff. As an alternative, Baffinland partnered with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sighting programs through the participation of vessels contracted by Baffinland, the MSV Botnica, Nordic Bulk Carriers and Oldendorff (new to 2021). The

consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program (Baffinland, 2019f). The SBO Program was first run in 2013 to 2015 and was subsequently resumed in 2018 and 2019. The 2013 to 2015 SBO Program took place during the construction phase at Milne Port (2013 and 2014) and during Year 1 of shipping operations (2015). As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013 to 2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018 to 2019, the survey platform for the SBO Program was the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level, where Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013 to 2015) observe marine wildlife and environmental conditions. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol (Gjerdrum et al., 2012).

The establishment of surveillance monitoring programs other than SBO are capable of better understanding potential changes in marine mammal distribution patterns and behaviour, and in so doing improve the likelihood of detecting and understanding potential strong marine mammal responses occurring too far ahead of the ship to be detectable by observers aboard the carriers. These programs include the Bruce Head Shore-based Monitoring Program, the Underwater Acoustic Monitoring Program, and the marine mammal aerial surveys. Additional information is available in PC Condition No. 99, 101, 105, 109, 110, and 111.

In addition to monitoring conducted from vessels, Baffinland has also contributed funding to various research programs seabird ecology led through partnerships with ECCC-CWS and various universities (Baffinland, 2020f). The most recent three-year research initiative, "Using cutting-edge biologging and physiological tools to map environmental sensitivities in the Arctic: application to shipping associated with Baffinland Iron Mines", funded through an Natural Science and Engineering Research Council (NSERC)-Collaborative Research and Development Grant (CRDG) became effective in December 2019 aims, in part, to develop innovative techniques to study the potential impacts of marine shipping on seabirds.

RESULTS

Detailed results for the 2021 Incidental Marine Mammals Sightings Pilot Program are presented as part of Summary Sheet for PC Condition No. 103. A total of eleven (11) vessels participated in the MMON pilot program (Table 4.27 in PC Condition No. 103) between July and October 2021, which is an increase from 2020 where there were seven (7) participating vessels. The majority of reported sightings (59%) were made by the MSV *Botnica*. Most sightings consisted of whale (narwhal and unidentified) and seal (ringed, harp and unidentified; Table 4.28 in PC Condition No. 103).

Seabird sightings using the ECSAS protocol were not possible in 2021 since the SBO program did not run.

Field work related to the NSERC-CRDG research program was not possible due to travel restrictions related to the COVID-19 Pandemic.

Baffinland completed early shoulder season marine mammal aerial surveys just prior, during and after the start of the 2021 shipping season. The aim of these reconnaissance surveys was to collect data on the presence/absence and distribution of marine mammals in the RSA in relation to ice conditions (for additional information refer to Summary Sheet for PC Condition No. 101, and 109). The information gathered on marine mammal distribution was communicated during daily shipping briefings with representatives from Baffinland's Shipping, Sustainable Development, Operations teams, and Fednav (including ice analysts). Sightings information was subsequently relayed to vessel captains so that they were made aware of locations of marine mammals in the area during their transit through the RSA in the presence of ice.

TRENDS

No ship strikes on marine mammals have been recorded to date through any of the previously run SBO or MMON programs. Similarly, no ship strikes on marine mammals have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs, and during reporting year 2020. The only seabird strike reported over six years of monitoring occurred during the 2019 SBO Program.

RECOMMENDATIONS / LESSONS LEARNED

Safety concerns that were raised regarding the initial SBO program (that led to the postponement of the program in 2016) were mitigated through the use of the MSV Botnica as the survey platform and boarding the vessel in Milne Port in 2018 and 2019. This included on-board accommodation for Inuit observers to allow for regular wildlife surveys over consecutive days. In doing so, the need to conduct at-sea boarding of observers on different survey vessels was no longer necessary.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV Botnica will be evaluated for 2022 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. Regardless of boarding restrictions still being in effect during the 2022 shipping season, Baffinland will continue with its incidental marine mammals sightings program in collaboration with MMON.

As work progresses by ECCC-CWS and various university researchers over the next few years on the newly funded seabird ecology and shipping research projects, Baffinland will include seabird data that is relevant to the Project's shipping operations.

Project Certificate Condition No. 108

Category	Marine Environment - Shipboard Observers
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations
Objective	To ensure that interactions with marine mammals, seabirds, and seaducks are effectively monitored for along the southern and northern shipping routes, as applicable.
Term or Condition	The Proponent shall ensure that data produced by the surveillance monitoring program is analysed rigorously by experienced analysts (in addition to being discussed as proposed in the FEIS) to maximize their effectiveness in providing baseline information, and for detecting potential effects of the project on marine mammals, seabirds and seaducks in the Regional Study Area. It is expected that data from the long-term monitoring program be treated with the same rigor.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Southern Route – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1

METHODS

In order to ensure that interactions with marine mammals and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to primarily monitor for potential ship strikes on marine mammals and seabirds in the RSA, and to secondarily collect observational data on the presence, relative abundance and distribution of marine mammals and seabirds within the boundaries of the RSA relative to Project vessel operations. The SBO program is not structured as a systematic behavioural effects study and is not designed for assessing the behaviour of marine mammals around project vessels before, during and after exposure as there is no control.

All data that are collected as part of Baffinland's numerous monitoring programs and subsequent data analysis and interpretation are completed by experienced analysts capable of running statistical analyses and interpreting data. Baffinland hires third-party experts to implement its monitoring programs that are specialized in various topics related to marine wildlife and statistical analysis. Completed reports included credential of lead authors, professional designations (e.g., Registered Professional Biologist) and academic formation (e.g., Master of Science [MSc], Doctorate of Philosophy [PhD]). Additionally, Baffinland has partnered with governmental agencies (e.g., ECCC-CWS) and academic researchers from various universities to complete work, which includes data analysis and interpretation by experienced analysts.

Unlike years prior to 2020 (more details on monitoring programs previously implemented provided below), the SBO Program could again not be implemented in 2021 due to boarding restrictions related to the COVID-19 Pandemic.

As an alternative, Baffinland partnered with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sighting programs through the participation of vessels contracted by Baffinland, the MSV *Botnica*, Nordic Bulk Carriers and Olgendorff. MMON is a network of observer members that include shipping operators and is intended to collect data on whale and seal sightings during their regular in-season activities. Data collection by participating shipping operators are supported by a Training and Responsible Whale-Watching Guide, an initiative led by MMON, WWF and the St. Lawrence Global Observatory, and developed in close collaboration with numerous partners and funded by DFO. A publically available marine mammal visualization tool has been developed with data obtained through all participating members.

The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program (Baffinland, 2019f). The SBO Program was first run in 2013 to 2015 and was subsequently resumed in 2018 and 2019. The 2013 to 2015 SBO Program took place during the construction phase at Milne Port (2013 and 2014) and during Year 1 of shipping operations (2015). As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013 to 2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In 2018 to 2019, the survey platform for the SBO Program was the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level, where Marine Wildlife Observers (MWOs) could comfortably and more effectively (compared to onboard the industry platforms used in 2013 to 2015) observe marine wildlife and environmental conditions. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level, where MWOs could comfortably and effectively observe marine wildlife and environmental conditions. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. Following completion of the field program, the marine mammal and seabird sightings data collected in the RSA as part of the SBO surveillance monitoring program is analysed rigorously by experienced marine mammal and seabird data analysts using industry best practice methodology (Thomas et al., 2010; Gjerdrum et al., 2012; Bolduc and Fifield, 2017; OBIS, 2019).

In addition to monitoring conducted from vessels, Baffinland has also contributed funding to various research programs seabird ecology led through partnerships with ECCC-CWS and various universities (Baffinland, 2020f). The most recent three-year research initiative, "Using cutting-edge biologging and physiological tools to map environmental sensitivities in the Arctic: application to shipping associated with Baffinland Iron Mines", funded through an Natural Science and Engineering Research Council-Collaborative Research and Development Grant became effective in December 2019 (though will be extended due to inability of completing field work in 2020 and 2021 because of COVID-19 Pandemic restrictions) aims, in part, to develop innovative techniques to study the potential impacts of marine shipping on seabirds.

RESULTS

Detailed results for the 2021 Incidental Marine Mammals Sightings Pilot Program are presented as part of Summary Sheet for PC Condition No. 103. A total of eleven (11) vessels participated in the MMON pilot program (Table 4.27 in PC Condition No. 103). The majority of sightings (59%) were made by the MSV Botnica. Most sightings consisted of whale (narwhal and unidentified) and seal (ringed, harp and unidentified (Table 4.28; see Appendix G.10 for locations of sightings).

Seabird sightings using the ECSAS protocol were again not possible in 2021 since the SBO program did not run.

Field work related to the Natural Science and Engineering Research Council (NSERC)-Collaborative Research and Development Grant (CRDG) was not possible due to travel restrictions related to the COVID-19 Pandemic.

TRENDS

No ship strikes on marine mammals have been recorded to date through any of the previously run SBO programs. Similarly, no ship strikes on marine mammals have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs, and during reporting year 2021. The only seabird strike reported over six years of monitoring occurred during the 2019 SBO Program.

RECOMMENDATIONS / LESSONS LEARNED

Safety concerns that were raised regarding the initial SBO program (that led to the postponement of the program in 2016) were mitigated through the use of the MSV *Botnica* as the survey platform and boarding the vessel in Milne Port in 2018 and 2019. This included on-board accommodation for Inuit observers to allow for regular wildlife surveys over consecutive days. In doing so, the need to conduct at-sea boarding of observers on different survey vessels was no longer necessary.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV Botnica will be evaluated for 2022 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. Regardless of boarding restrictions still being in effect during the 2022 shipping season, Baffinland will continue with its incidental marine mammals sightings program in collaboration with MMON.

As work progresses by ECCC-CWS and various university researchers over the next few years on the newly funded seabird ecology and shipping research project, Baffinland will include seabird data that is relevant to the Project's shipping operations. Field work is currently being planned for 2022 with the assumptions that no travel restrictions will be in place related to the ongoing COVID-19 Pandemic. Additional updates will be providing as part of future reporting efforts.

Project Certificate Condition No. 109

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operation
Objective	To prevent impacts to marine mammals from Project shipping activities.
Term or Condition	The Proponent shall conduct a monitoring program to confirm the predictions in the FEIS with respect to disturbance effects from ships noise on the distribution and occurrence of marine mammals. The survey shall be designed to address effects during the shipping seasons, and include locations in Hudson Strait and Foxe Basin, Milne Inlet, Eclipse Sound and Pond Inlet. The survey shall continue over a sufficiently lengthy period to determine the extent to which habituation occurs for narwhal, beluga, bowhead and walrus.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port - Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2020 Underwater Acoustic Monitoring Program (Open-Water Season) – Report (Austin et al., 2022a) 2021 Underwater Acoustic Monitoring Program (Open-Water Season) – Draft Report (Austin et al., 2022b) 2017 - 2018 Integrated Narwhal Tagging Study Report (Golder, 2020e) Draft 2021 Marine Mammal Aerial Survey Program Report (Golder, 2022e) Draft 2021 Ringed Seal Aerial Survey Program Report (Golder, 2022f) Draft 2021 Bruce Head Shore-based Monitoring Report (Golder, 2022g) Early Warning Indicators for Marine Mammals Technical Memorandum (Golder, 2020f) 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.16 Appendix G.25

METHODS

No studies were conducted along the Southern Shipping Route (e.g., Hudson Strait or Foxe Basin), as this phase of the Project is currently inactive.

Monitoring programs conducted along the Northern Shipping Route and corresponding analyses undertaken in 2021 used a ‘multiple lines of evidence’ approach to confirm predictions in the FEIS with respect to disturbance effects from ships noise on the distribution and occurrence of marine mammals along the Northern Shipping Route. In the FEIS, it was predicted that marine mammal behavioural responses to ship noise would be limited to temporary,

short-term avoidance behaviour, consistent with low to moderate severity responses. No large-scale avoidance behaviour, displacement effects, or abandonment of the summering grounds are predicted to occur.

In 2021, monitoring programs used visual, acoustic and remote sensing techniques to assess changes in marine mammal distribution and abundance within the RSA, and behavioural responses of narwhal and other marine mammals to ship noise. The 2021 monitoring programs included the 2021 Bruce Head Shore-based Monitoring Program, the 2021 MMASP, the 2021 Ringed Seal Aerial Survey Program (RSASP), the 2021 Underwater Acoustic Monitoring Program, and the 2021 Incidental Marine Mammals Sightings Pilot Program. No narwhal tagging was conducted in 2021 but results from past narwhal tagging programs continue to inform ongoing monitoring programs and adaptive management for the Project, including information on potential habituation of shipping by narwhal. Collectively, these multi-year monitoring programs provide for a comprehensive evaluation of potential ship noise effects on marine mammals during the entire shipping period and throughout the life of the Project.

Detailed methodology and analytical procedures of the 2021 monitoring programs are available in the respective 2021 annual monitoring reports (Golder, 2022e, f, g; Austin et al., 2022a, b), with a brief overview provided below (by monitoring program).

2021 MMASP

In 2021, marine mammal aerial surveys were conducted in the North Baffin area during the early shoulder season (July), the peak open-water season (August), and the end of the shipping season (late October) as part of the 2021 MMASP. Three different aerial surveys were performed in 2021. Surveys were initially run during the early shoulder season (Leg 1) to collect data on the presence/absence and distribution of marine mammals in the RSA relative to available ice conditions at that time of year and prior to the start of shipping activities. A systematic aerial-based transect survey was then conducted during the open-water season (Leg 2) to obtain abundance estimates of the Eclipse Sound and Admiralty Inlet narwhal summer stocks. A visual clearance survey (Leg 3) was conducted to document if narwhal entrapment events occurred in the RSA following completion of Baffinland's 2021 shipping operations along the Northern Shipping Route.

DFO and other MEWG members were actively consulted on the study design and data collection methods during 2021 MEWG Meetings (Appendix C.1). Input and recommendations provided by these parties were incorporated into the program. Legs 1 and 2 were each extended by 1 week and run back-to-back to ensure continuous aerial monitoring through mid-July and August as an adaptive management response to the low number of narwhal observed during the MMASP in 2020. Detailed methodology and analytical procedures of the 2021 MMASP are presented in Golder (2022e).

2020 Bruce Head Shore-based Monitoring Program

Baffinland undertook a shore-based narwhal monitoring program at Bruce Head from 2013 to 2017⁴ and again from 2019 to 2021⁵. The objective of the Bruce Head shore-based monitoring study is to investigate narwhal response to shipping activities along the Northern Shipping Route in Milne Inlet. During the open-water season of 2021, visual survey data were collected from a cliff-based observation platform at Bruce Head overlooking the nominal shipping route. Data were collected systematically on the RAD, group composition, and behavior of narwhal. Additional data

⁴ 2013 represented a pilot study year for the shore-based monitoring program.

⁵ A Bruce Head vessel-based narwhal monitoring program pilot study was conducted in 2018 instead of a shore-based study due to safety concerns following a damaged observation platform that prevented safe implementation of the land-based program.

were collected on environmental conditions and anthropogenic activities (e.g., shipping and hunting activities) to distinguish between the potential effects of Project-related shipping activities and confounding factors that may also affect narwhal behaviour. Narwhal behavioural data were also collected in 2020 and 2021 using UAV (i.e. drones) to evaluate behavioural responses of narwhal to vessel traffic via focal follow video surveys of individual groups. Detailed methodology and analytical procedures of the 2021 Bruce Head Shore-based Monitoring Program are presented in Golder (2022g).

2021 RSASP

The RSASP was conducted in the North Baffin area during June 2021. The first objective of the survey was to document ringed seal density and distribution along the Northern Shipping Route in the RSA and to allow for a comparison with previous results obtained in 2016 and 2017 by DFO (Young et al. 2019). The second objective of the survey was to identify ringed seal hotspots throughout the RSA and identify overlaps with hotspots identified in 2016 and 2017.

Two types of analyses were performed on the 2021 dataset. Strip-transect analysis of infrared imagery combined with digital photographs was used to calculate densities of ringed seals in the RSA. Density surface modelling was used to identify ringed seal hotspots in the RSA. Detailed methodology and analytical procedures of the 2021 RSASP are presented in Golder (2020f).

2021 Underwater Passive Acoustic Monitoring (PAM) Program

The 2021 PAM Program was developed by JASCO Applied Sciences (JASCO), in collaboration with Golder and Baffinland, to evaluate potential Project-related effects to marine mammals from shipping noise. The main objective of this program was to document and characterize ambient and anthropogenic underwater noise levels recorded in 2021 at three acoustic monitoring stations: one at located along the Northern Shipping Route at Iluvilik (Bruce Head) in Milne Inlet, one near Baffinland's anchorage location at Imilik (Ragged Island), and one offshore of the community of Mittimatalik (Pond Inlet), where a small craft harbour was being constructed. All three recorders were deployed at the beginning of August and were retrieved in mid-September 2021, and recorded continuously.

Additional objectives of the program were: to acoustically identify marine mammal species (notably narwhal) present along the Northern Shipping Route in 2021; to evaluate Project-shipping noise levels in relation to established marine mammal acoustic thresholds for injury and disturbance and to compare measured sound levels from shipping activities to modelled estimates used for environmental effects assessment; and to estimate the extent of Listening Range Reduction (LRR) associated with Project vessels relative to ambient noise levels. Finally, historical mean sound levels, recorded at Bruce Head since 2018, were compared to look for trends of increasing sound levels in the RSA over time.

Detailed methodology on data collection and analytical procedures for the 2021 PAM Program are presented in Austin et. al. (2022b).

2021 Incidental Marine Mammals Sightings Pilot Program

In order to ensure that interactions with marine mammals and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to monitor for potential ship strikes on marine mammals and seabirds in the RSA and to collect observational data on the presence, relative abundance and distribution of marine mammals and seabirds within the boundaries of the RSA relative to Project vessel operations.

The SBO Program was first run in 2013 to 2015 and was subsequently resumed in 2018 and 2019. In 2018 to 2019, the survey platform for the SBO Program was the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level, where Marine Wildlife Observers (MWOs) could comfortably and effectively observe marine wildlife and environmental conditions. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol (Gjerdrum et al., 2012).

Similar to 2020, the Ship-based Observer (SBO) Program could not be implemented in 2021 due to boarding restrictions related to the COVID-19 global Pandemic. As an alternative, Baffinland partnered again with the Marine Mammal Observation Network (MMON) to run a marine mammal incidental sightings program through the participation of vessels contracted by Baffinland, the MSV *Botnica*, Nordic Bulk Carriers and Oldendorff Carriers. The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program (Baffinland, 2019f). In 2021, MMON made available a new whale identification training program to participating vessels through an online link, <https://observers.navigatingwhales.ca/>. Vessel crews unable to take the online training were also provided offline training files to be uploaded directly on vessels' Learning Management System.

Determination of Habituation

With respect to the third component of this condition (PC Condition No. 109), which states that "The survey shall continue over a sufficiently lengthy period to determine the extent to which habituation occurs for narwhal, beluga, bowhead and walrus." This statement implies that shipping will undisputedly trigger an initial measurable reaction in a marine mammal, and that the elicited reaction will either be re-demonstrated during each subsequent exposure or that the reaction will soften over time. As written, there is no consideration of the possibility that the initial reaction of an animal could be either 'no reaction' or minor enough that habituation is not biologically warranted or necessary. The underlying assumption is that habituation is a net benefit to the animal given the nature of the effect, regardless of the type of response marine mammals in the RSA may demonstrate to shipping. If the proposed behavioral response of marine mammals to shipping is limited to a low-level response (i.e., localized and temporary avoidance), as predicted in the FEIS and FEIS Addendum for the Project, and as observed for narwhal in the integrated monitoring programs, then the Project Certificate requirement for a receptor species to demonstrate habituation is unsubstantiated. For example, the upper extent of behavioural response shown by narwhal to shipping based on monitoring results to date consists of a temporary reversible change in movement (limited to several response variables) that only occurs in close proximity to vessels (up to a maximum of 5 km) and occurs over a maximum period of 34 min per vessel transit (Golder, 2020e), and more typically only occurs for a maximum of 28 minutes. Any further 'softening' in this type of low-level behavioural response to shipping would have the potential to introduce a new threat to the animal such as a ship strike because animals would not be moving out of the way of vessels. There is no biological rule that an animal will demonstrate measurable habituation to a given stimulus. One needs to take into account the contextual aspects of the interaction (e.g., the nature of the response observed, the behavioural state of the animal during exposure, the degree of familiarity with the stimuli, the proximity of the source, the overall level of perceived threat presented by the stimuli, etc.). This is consistent with the most current understanding of this topic within the scientific community, that context is an important factor when predicting the

probability of behavioural effects (Williams et al., 2014; Gomez et al., 2016; Southall et al., 2007; 2019; Finneran et al., 2017).

RESULTS

Detailed results of the 2021 monitoring programs are available in the respective 2021 annual monitoring reports (Golder, 2022e, f, g; Austin et al., 2022a, b), with a brief overview provided below (by monitoring program).

2021 MMASP

A total of nine different species of marine mammals were observed during the 2021 aerial surveys: narwhal, bowhead whale, beluga whale, killer whale, ringed seal, harp seal, bearded seal, walrus, and polar bear.

At the beginning of Leg 1 surveys open water was present in the north Navy Board Inlet, Milne Inlet and Pond Inlet strata and by the end of Leg 1 open water was present throughout the RSA. Results from the 2021 Leg 1 survey indicated low narwhal numbers prior to the first vessel transit into the RSA. By the time of the first ore carrier transit in the RSA on 26 July 2021, narwhal relative abundance appeared to have increased and their distribution had moved to be primarily concentrated in Koluktoo Bay and Tremblay Sound and remained concentrated in those areas for the duration of the Leg 1 program. Detailed results for Leg 1 are presented in Golder (2022e).

For the Leg 2 surveys, narwhal summer stock abundance was calculated for the Eclipse Sound stock, Admiralty Inlet stock, and the combined Eclipse Sound and Admiralty Inlet stock. The narwhal abundance estimate for the combined Eclipse Sound and Admiralty Inlet stock during the 2021 open-water season (Leg 2) was 75,177 individuals and statistically higher than the abundance calculated during the previous DFO survey conducted in August 2013, 2019, and 2020. For Eclipse Sound stock alone, the narwhal abundance estimate was 2,595 narwhal, which is statistically lower than the 2016 DFO estimate. The 2021 abundance estimate is also statistically lower than the 2013, 2019, and 2020 abundance estimates. For the Admiralty Inlet stock alone, the narwhal abundance estimate was 72,582 narwhal and was statistically higher than the abundance calculated of the 2013 DFO estimate, and the 2019 and 2020 Baffinland estimates. Detailed results for Leg 2 are presented in Golder (2022e).

Given the ice conditions during the Leg 3 surveys (almost none), the low numbers and location of confirmed narwhal observations (east of Pond Inlet travelling toward Baffin Bay), and input from the community members who participated in the clearance aerial surveys, there was no concern regarding the risk of entrapment of narwhal caused by the Project at the end of the 2021 shipping season. Detailed results for Leg 3 are presented in Golder (2022e).

Results from the 2021 aerial survey indicate that: i) narwhal abundance in Eclipse Sound was statistically lower in 2021 than observed in previous years when aerial surveys were conducted (i.e., 2013, 2016, 2019 and 2020), and ii) the combined narwhal abundance in Eclipse Sound and Admiralty Inlet was statistically higher in 2021 to what was observed in previous years (2013, 2019 and 2020). These results suggest a displacement or shift of a portion of the Eclipse Sound stock to the Admiralty Inlet summering ground during the summer of 2021. They also suggest there is potentially more summer movement between neighbouring summer stocks (i.e., Admiralty Inlet, Somerset Island, and/or East Baffin Island) than previously thought.

2021 Bruce Head Shore-based Monitoring Program

Results from the 2021 Bruce Head Shore-based Monitoring Program are summarized in PC Condition No. 101. Detailed results of the 2021 Bruce Head Shore-based Monitoring Program are presented in Golder (2022g).

2021 RSASP

Results from the 2021 forward-looking infrared (FLIR) survey indicated that ringed seal densities are stable in Eclipse Sound and Navy Board Inlet strata and increased in Milne Inlet stratum compared to surveys flown in 2016.

Ringed seal hotspots were identified in similar geographic areas in 2021 as in 2016 to 2017, with hotspots in western Eclipse Sound, southern Milne Inlet and Tremblay Sound. The eastern Eclipse Sound hotspot identified in 2016 and 2017 was not present in 2021. The northern half of Navy Board Inlet had low sightings of ringed seals in all years (2016, 2017, and 2021).

Detailed results for the RSASP are presented in Golder (2022f).

2021 Underwater Acoustic Monitoring

All underwater recordings were made during the open-water shipping period. Mean broadband sound levels (one-minute averaged) were 112.4, 115.1, and 109.8 decibel (dB) re 1 μ Pa at Bruce Head, Pond Inlet, and Ragged Island, respectively (median levels were 98.2, 101.7, and 97.2 dB re 1 μ Pa). Sound exposure levels (SELs) never exceeded thresholds for acoustic injury to marine mammals (i.e., temporary or permanent hearing loss) at any of the three recording locations in the RSA. The one-minute averaged Sound Pressure Level (SPL) occasionally exceeded the 120 dB re 1 μ Pa marine mammal disturbance threshold at each station; for 2.5 % of the 46 days of recording at Bruce Head, 1.7 % of the 39 days of recording at Pond Inlet, and 0.6 % of the 43 days of recording at Ragged Island.

Historical mean sound levels, recorded at Bruce Head since 2018, were compared to look for trends of increasing levels in the RSA over time. The mean power spectral density curves were comparable across years, with the exception of 2019 when sound levels were louder by 2-5 dB over most frequencies.

Sounds from three marine mammal species (bowhead, beluga, and narwhal) were identified in the acoustic data, in addition to suspected sounds from pinnipeds. Narwhal vocalizations were recorded at Bruce Head and Ragged Island but not at Pond Inlet. Though the timing for narwhal acoustic detections at Bruce Head was consistent with recordings since 2018, the number of acoustic detections were lower compared to an apparent peak number of detections in 2019. This is consistent with the results of Baffinland's marine mammal aerial survey program (Golder, 2022e), which recorded lower numbers of narwhal in the RSA in 2020 and 2021 compared to 2019. Based on this, it is not likely that the decreased number of acoustic detections is a result of changed acoustic behaviour in 2020-2021 compared to 2019, but rather a product of there being fewer narwhal in the area. For the first time in 2021 beluga whale acoustic detections were confidently identified following the methodology of Zahn et al. (2021), indicating that beluga were occasionally present in the region amongst or near narwhal. Bowhead whale vocalizations were acoustically detected (and manually validated) occasionally at the Bruce Head and Ragged Island recorders, which is consistent with visual observations made during the 2021 Bruce Head shore-based monitoring program. Some acoustic signals consistent with those produced by bearded seals and ringed seals were also detected throughout the recordings.

Vessels were acoustically detected on 30%, 36% and 32% of the total recordings at Bruce Head, Pond Inlet, and Ragged Island, respectively. AiS records indicate that all vessel traffic detected on the Bruce Head and Ragged Island recorders were Project-related, while the Pond Inlet recorder mainly experienced noise from non-Project vessels. Listening range reduction (LRR)—the fractional decrease in the available listening range for marine animals—was computed at each recording station for three frequencies, each representative of different narwhal vocalization types: 1 kHz (representative of narwhal burst pulses), 5 Kiloherzt (kHz; representative of whistles and knock trains)

and 25 kHz (representative of clicks and high-frequency buzzes). The LRR results for each of the three frequencies are summarized as follows:

1 kHz (burst pulses):

Greater than 50% LRR for sound at 1 kHz occurred during 5.1%, 8.8%, and 4.7% of the time when vessels were detected (i.e. 1.5%, 3.2%, and 1.5% of the recording period) at the Bruce Head, Pond Inlet, and Ragged Island recorders, respectively. Ambient noise did not cause appreciable LRR at 1 kHz at any recording station, given the hearing threshold for a narwhal at 1 kHz is higher than the median ambient sound level at this specific frequency.

5 kHz (whistles/knock trains):

Greater than 50% LRR for sound at 5 kHz occurred during 22.2%, 29.8% and 33.9% of the time when vessels were detected at the Bruce Head (i.e., 6.7%, 10.7%, and 10.8% of the recording period), Pond Inlet, and Ragged Island recorders, respectively. Ambient noise resulted in greater than 50% LRR for sound at 5 kHz during 21.5%, 31.1% and 31.2% of the recording period without vessel noise (i.e. 15.1%, 19.9%, and 21.2% of the recording period) at the Bruce Head, Pond Inlet, and Ragged Island recorders, respectively.

25 kHz (clicks / high frequency buzzes):

Greater than 50% LRR for sound at 25 kHz occurred during 14.5%, 19.5% and 29.5% of the time when vessels were detected (i.e. 4.4%, 7.0%, and 9.4% of the recording period) at the Bruce Head, Pond Inlet, and Ragged Island recorders, respectively. Ambient noise resulted in greater than 50% LRR for sound at 25 kHz during 14.3%, 29.8% and 31.2% of the recording period without vessel noise (i.e. 10.0%, 19.1%, and 21.1% of the recording period) at the Bruce Head, Pond Inlet, and Ragged Island recorders, respectively.

Overall, the results of 2021 PAM program are consistent with results from previous annual PAM programs conducted by JASCO in the RSA since 2018. The results demonstrate that while noise from Project vessels is detectable in the underwater soundscape, vessel noise exposure is temporary in nature and below sound levels that could cause acoustic injury. Assessed relative to a broadband SPL of 120 dB re 1 μ Pa (i.e., the current noise disturbance threshold standard used by industry and government for assessing disturbance to marine mammals by continuous-type sounds such as vessel noise), sound exposure durations averaged less than 1 hour per day. This is consistent with effects predictions that acoustic impacts would be localized and temporary and that there are substantial periods in each day when marine mammals are not disturbed by Project vessel noise.

2021 Incidental Marine Mammals Sightings Pilot Program

Detailed results for the 2021 Incidental Marine Mammals Sightings Pilot Program are presented as part of Summary Sheet for PC Condition Nos. 103. A total of eleven (11) vessels participated in the MMON pilot program (Table 4.27 in PC Condition No. 103). The majority of sightings (59%) were made by the MSV Botnica. Most sightings consisted of whale (narwhal and unidentified) and seal (ringed, harp and unidentified (Table 4.28; see Appendix G.10 for locations of sightings).

TRENDS

Acoustic monitoring results and narwhal behavioural data available to date have demonstrated that shipping noise in the RSA is lower than predicted in the FEIS and that behavioural effects from shipping on narwhal are limited to low-level disturbance effects that are localized and temporary in nature. This gives Baffinland confidence that its current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits

during early shoulder season, etc.) are demonstratively effective at managing Project incremental effects from shipping on narwhal in the RSA.

However, the observed decrease in narwhal abundance in the RSA during 2020 was of concern to Baffinland, and further investigation was conducted with respect to the potential cause of this observed decrease. Despite the elimination of both potential anthropogenic causal factors (underwater noise from icebreaking and impact pile driving) in 2021 through adaptive management, results from the 2021 monitoring programs again indicated lower narwhal numbers in Eclipse Sound during the 2021 shipping season. Underwater noise from these sources is therefore not considered to be an influencing factor on narwhal abundance in Eclipse Sound during the 2021 season. Open-water shipping, the other Project contributor of noise in the RSA, is also not considered a likely cause of narwhal displacement from the RSA based on the available monitoring results collected to date (Austin et al., 2022a, 2022b, Golder, 2020e, 2022g).

Given that the combined stock estimate for Admiralty Inlet and Eclipse Sound indicate that the regional narwhal population remains stable relative to pre-shipping conditions, and in consideration of the available IQ regarding the degree of exchange between narwhal groups on their summering grounds, the observed decrease in narwhal relative abundance in Eclipse Sound most likely reflects natural exchange between the two putative stock areas, or alternatively, that animals are being displaced from Eclipse Sound due to ecological factors such as changing ice conditions, prey availability and/or predation pressure, all of which are known to be influenced by a rapidly changing climate in the Arctic.

The results of the 2021 RSASP showed ringed seal densities have remained stable with some annual variations since the onset of shipping or ice-breaking activities in the RSA. These results confirmed that mitigation measures were functioning as intended and that these Project activities were managed in a way that has not adversely affected ringed seals.

RECOMMENDATIONS / LESSONS LEARNED

In 2022, Baffinland plans to resume icebreaking operations in 2022 in conjunction with mitigation measures implemented in 2020 and in concert with the monitoring programs listed below to obtain a fine-scale analysis of narwhal movement in relation to vessels, as has been done for open water shipping activities and to further evaluate the potential short-term, long-term and cumulative effects of icebreaker noise on narwhal during this period.

The following monitoring programs will be considered, in consultation with the MEWG, for implementation in 2022:

2022 Early Shoulder Season Narwhal Tagging Study

- 2022 Marine Mammal Aerial Survey Program
- Photo-analysis of 2021 aerial survey data for a secondary assessment of the EWI metric
- 2022 Bruce Head Shore-based Monitoring Program
- 2022 PAM Program – Underwater Acoustic Monitoring at the Pond Inlet Floe Edge during the Shoulder Season

Project Certificate Condition No. 110

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operation
Objective	To prevent impacts to marine mammals from Project shipping activities.
Term or Condition	The Proponent shall immediately develop a monitoring protocol that includes, but is not limited to, acoustical monitoring, to facilitate assessment of the potential short term, long term, and cumulative effects of vessel noise on marine mammals and marine mammal populations. The Proponent is expected to work with the Marine Environment Working Group to determine appropriate early warning indicator(s) that will ensure rapid identification of negative impacts along the southern and northern shipping routes.
Relevant Baffinland Commitment	84
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2020 Underwater Acoustic Monitoring Program (Open-Water Season) – Report (Austin et al., 2022a) 2021 Underwater Acoustic Monitoring Program (Open-Water Season) – Draft Report (Austin et al., 2022b) Draft 2021 Marine Mammal Aerial Survey Program Report (Golder, 2022e) Draft 2021 Bruce Head Shore-based Monitoring Program Report (Golder, 2022g) Draft 2021 Ringed Seal Aerial Survey Program Report (Golder, 2022f) Early Warning Indicators for Marine Mammals Technical Memorandum (Golder, 2020f) 2021 MEWG Meeting Records
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METHODS

Monitoring Protocol

In order to better understand potential short-term, long-term and cumulative effects of vessel noise on marine mammals, Baffinland has implemented since 2014 a number of marine mammal monitoring programs aimed at evaluating the potential effects on vessel noise on marine mammals and marine mammal populations (e.g., Bruce Head Shore-based Monitoring Program, MMASP, Narwhal Tagging Study, SBO Program, Ringed Seal Aerial Survey Program, PAM Program). An overview of all the marine mammal monitoring programs completed by Baffinland to date for the Northern Shipping Route is provided in Table 4.32. A summary of the marine mammal monitoring activities undertaken in 2021 is presented in PC Condition No. 109.

Table 4.32: Baffinland's Marine Mammal Monitoring Programs Undertaken for Northern Shipping Route (2006 to 2021)

Marine Mammal Monitoring Program	Baseline						ERP (4.2 MPTA)			ERP (6 MPTA)			
	2006	2007	2008	2010	2013	2014 ¹	2015 ¹	2016	2017	2018	2019	2020	2021
Bruce Head shore-based study	—	—	—	—	X	X	X	X	X	—	X	X	X
Passive acoustic monitoring	—	—	—	—	—	X	X	—	—	X	X	X	X
Ship-based Observer (SBO) program	—	—	—	—	X	X	X	—	—	X	X	—	—
Aerial surveys – cetaceans	X	X	X	—	X	X	X	X ²	—	—	X	X	X
Aerial surveys - pinnipeds	X	X	X	—	-	X	—	—	—	—	—	—	X
Narwhal tagging study	—	—	—	—	—	—	—	X	X	—	—	—	—

Notes:

¹ 2014 included baseline data collection and initial evaluation of EEM protocols, 2015 was first full year of EEM implementation, post- Milne Port ore dock construction (ERP Phase).

² DFO 2016 aerial survey data analyzed by Baffinland (Golder, 2018g)

Early Warning Indicator

A description of the selection process, including MEWG and Inuit engagement, of the EWI for the Project was provided to the NIRB in response to its 2018–2019 Board Recommendations (Golder, 2020f). The selected EWI is a decrease in the proportion of immature animals. For this purpose, immature animals are being defined as calves and yearling. This was an indicator that was suggested by DFO as part of Baffinland's initial MEWG engagement in the EWI framework and was identified as being of high importance by the MHTO following an in-person meeting in Pond Inlet. This selection is consistent with best available science, is appropriate to the region (IQ indicates that the RSA is an important narwhal calving ground), can be compared to pre-ERP baseline data and can be monitored in parallel with the Bruce Head shore-based narwhal monitoring program by Inuit researchers involved in the program.

In previous years, the EWI threshold used to assess whether marine mammals and marine mammal populations are being affected by the effects of vessel noise was a 10% decrease in the proportion of immatures individuals in the population from the lowest natural variability baseline value available (2014 and 2015). The 10% decrease was used to maintain consistency with the threshold level used in the FEIS and FEIS ERP Addendum marine mammal impact assessment. The lowest available baseline value for the proportion of immature narwhals recorded from Bruce Head

was 0.152 (recorded in 2014). This means that a threshold level of 0.137 (i.e., a 10% decrease from 0.152) would have needed to be reached as a proportion of immature narwhal recorded from Bruce Head to trigger EWI adaptive management practices

In recent MEWG engagements, DFO recommended that an index of variability in the EWI measurement be included, as well as an indication related to the error around the measurement. Therefore, the assessment of variation in the EWI analysis, in relation to the baseline levels (i.e., proportion of immature narwhal in 2014 to 2015), was modified to include an index of variability. For each sampling year at Bruce Head, the number of narwhal groups recorded in that year was divided into 10 bins with equal number of groups per bin. A set of planned contrasts was constructed, so that each sampling year was compared to the average of 2014 to 2015 mean least squares. An effect size was calculated as the difference between each year's least squares mean and the average of 2014 to 2015 least squares mean values, expressed as percentage out of the average of 2014 to 2015 least squares mean values. The revised EWI threshold is deemed to have been exceeded if a statistically significant difference was observed between each year's least squares mean and the average of 2014 to 2015 least squares mean values.

RESULTS

Monitoring Protocol

Detailed results of the 2021 marine mammal monitoring programs are available in the respective 2021 annual monitoring reports (Golder, 2022e, f, g; Austin et al., 2022a, b), with a brief overview provided (by monitoring program) in PC Condition No. 109.

Early Warning Indicator

During 2021, a total of 80 narwhal groups (comprising 263 individuals) were observed in the Behavioural Study Area, including 19 calves and 7 yearlings. The combined annual proportion of immatures relative to the total number of narwhal observed in 2021 was 0.102. This represented a 24% decrease from the 2014 to 2015 baseline condition but did not statistically significantly differ from the 2014 to 2015 baseline ($p=0.13$) (Table 4.33).

Table 4.33: Change in the Annual Proportion of Immature Narwhal Compared to the 2014 to 2015 Baseline Condition

Year	P-value	Effect Size (%)	
		Mean	95% Confidence Interval
2016	0.508	10.4	-20.7 to +41.5
2017	0.602	8.1	-23.0 to +39.2
2018	Not applicable	Not applicable	Not applicable
2019	0.578	8.7	-22.4 to +39.8
2020	0.641	-7.3	-38.4 to +23.8
2021	0.130	-23.9	-55.0 to +7.2

TRENDS

Monitoring Protocol

Data trends from marine mammal monitoring programs undertaken to date in the RSA are provided in PC Condition No. 109.

Early Warning Indicator

The EWI threshold for narwhal has not been exceeded to date. The effect size observed in 2021 (24% decrease in the proportion of immatures relative to all narwhal observed) may be the result of a low sample size in 2021 which may also explain the absence of power to detect a statistically significant decrease in the EWI.

RECOMMENDATIONS / LESSONS LEARNED

Monitoring Protocol

Acoustic monitoring results and narwhal behavioural data available to date have demonstrated that shipping noise in the RSA is lower than predicted in the FEIS and that behavioural effects from shipping on narwhal are limited to low-level disturbance effects that are localized and temporary in nature. This gives Baffinland confidence that its current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits during early shoulder season, etc.) are demonstratively effective at managing Project incremental effects from shipping on narwhal in the RSA.

In 2022, Baffinland plans to resume icebreaking operations in 2022 in conjunction with mitigation measures implemented in 2020 and in concert with the monitoring programs listed below to obtain a fine-scale analysis of narwhal movement in relation to vessels, as has been done for open water shipping activities and to further evaluate the potential short-term, long-term and cumulative effects of icebreaker noise on narwhal during this period. The following monitoring programs are recommended to be implemented in 2022:

- 2022 Early Shoulder Season Narwhal Tagging Study
- 2022 Marine Mammal Aerial Survey Program
- Photo-analysis of 2021 aerial survey data for a secondary assessment of the EWI metric
- 2022 Bruce Head Shore-based Monitoring Program
- 2022 PAM Program – Underwater Acoustic Monitoring at the Pond Inlet Floe Edge during the Shoulder Season

Early Warning Indicator

The proportion of immature narwhal will continue to be monitored as part of the 2022 Bruce Head Shore-based Monitoring Program and/or the 2022 MMASP.

Project Certificate Condition No. 111

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operation
Objective	To prevent impacts to marine mammals from Project shipping activities.
Term or Condition	<p>The Proponent shall develop clear thresholds for determining if negative impacts as a result of vessel noise are occurring. Mitigation and adaptive management practices shall be developed to restrict negative impacts as a result of vessel noise. This shall include, but not be limited to:</p> <ol style="list-style-type: none"> Identifications of zones where cumulative noise could be mitigated due to biophysical features (e.g., water depth, distance from migration routes, distance from overwintering areas etc.) Vessel transit planning, for all seasons, to determine the degree to which cumulative sound impacts can be mitigated through the seasonal use of different zones
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	<p>Steensby Port – Not Active</p> <p>Milne Port – Active</p>
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	<p>2020 Underwater Acoustic Monitoring Program (Open-Water Season) – Report (Austin et al., 2022a)</p> <p>2021 Underwater Acoustic Monitoring Program (Open-Water Season) – Draft Report (Austin et al., 2022b)</p> <p>Draft 2021 Marine Mammal Aerial Survey Program Report (Golder, 2022e)</p> <p>Draft 2021 Ringed Seal Aerial Survey Program Report (Golder, 2022f)</p> <p>Draft 2021 Bruce Head Shore-based Monitoring Report (Golder, 2022g)</p> <p>2021 MEWG Meeting Records</p>
Ref. Document Link	<p>https://www.baffinland.com/media-centre/document-portal/</p> <p>Appendix C.1</p> <p>Appendix G.16</p> <p>Appendix G.25</p>

METHODS

Project Indicators

Baffinland's marine mammal monitoring programs include a number of monitoring indicators and thresholds for determining if adverse impacts on marine mammals are occurring as a result of vessel noise. These include, but are not limited to, the following:

- change in underwater noise level relevant to established acoustic thresholds and ambient (i.e., background) noise levels
- change in absolute abundance (e.g. stock size) relative to pre-shipping numbers and previous survey years

- change in relative abundance and distribution relative to pre-shipping numbers and previous survey years
- change in group composition relative to pre-shipping numbers and previous survey years
- change in reproductive output (i.e., proportion of immature narwhal in the population) relative to pre-shipping numbers and previous survey years
- change in behaviour (e.g., for which many different response variables are used as monitoring indicators such as change in animal orientation, travel speed, dive behaviour, etc.) - compared to previous survey years and relative to established behavioural severity indexing (Southall et al., 2007, 2021; Finneran et al., 2017).
- Occurrence of ship strikes

For those indicators where established guidelines exist, such as underwater noise (e.g., marine mammal acoustic injury and disturbance criteria), these are used for the basis of the threshold (e.g., proportion of time in a day the disturbance threshold is exceeded, referred to as the daily disturbance period). Where established guidelines do not exist, comparisons are typically made to pre-project baseline years where possible, or to previous monitoring years, with the threshold being statistical significance that is suggestive of a pattern of a Project or shipping-induced effect.

Early Warning Indicator

A description of the selection process, including MEWG and Inuit engagement, of the EWI for the Project was provided to the NIRB in response to its 2018–2019 Board Recommendations (Golder, 2020f). The selected EWI is a decrease in the proportion of immature animals. For this purpose, immature animals are being defined as calves and yearling. This was an indicator that was suggested by DFO as part of Baffinland's initial MEWG engagement in the EWI framework and was identified as being of high importance by the MHTO following an in-person meeting in Pond Inlet. This selection is consistent with best available science, is appropriate to the region (IQ indicates that the RSA an important narwhal calving ground), can be compared to pre-ERP baseline data and can monitored in parallel with the Bruce Head shore-based narwhal monitoring program by Inuit researchers involved in the program.

In previous years, the EWI threshold used to assess whether marine mammals and marine mammal populations are being affected by the effects of vessel noise was a 10% decrease in the proportion of immatures individuals in the population from the lowest natural variability baseline value available (2014 and 2015). The 10% decrease was used to maintain consistency with the threshold level used in the FEIS and FEIS ERP Addendum marine mammal impact assessment. The lowest available baseline value for the proportion of immature narwhals recorded from Bruce Head was 0.152 (recorded in 2014). This means that a threshold level of 0.137 (i.e., a 10% decrease from 0.152) would have needed to be reached as a proportion of immature narwhal recorded from Bruce Head to trigger adaptive management practices

In recent MEWG engagements, DFO recommended that an index of variability in the EWI measurement be included, as well as an indication related to the error around the measurement. Therefore, the assessment of variation in the EWI analysis, in relation to the baseline levels (i.e., proportion of immature narwhal in 2014 to 2015), was modified to include an index of variability. For each sampling year at Bruce Head, the number of narwhal groups recorded in that year was divided into 10 bins with equal number of groups per bin. A set of planned contrasts was constructed, so that each sampling year was compared to the average of 2014 to 2015 mean least squares. An effect size was calculated as the difference between each year's least squares mean and the average of 2014 to 2015 least squares mean values, expressed as percentage out of the average of 2014 to 2015 least squares mean values. The revised EWI threshold is deemed to have been exceeded if a statistically significant difference was observed between each year's least squares mean and the average of 2014 to 2015 least squares mean values.

RESULTS

Project Indicators

Detailed results associated with each of these monitoring indicators are provided in the Draft Marine Mammal Aerial Survey Program, Draft Bruce Head Shore-based Monitoring Report, Draft Ringed Seal Aerial Survey Program and the Draft PAM Report (Golder, 2022e, f, g; Austin et al., 2022a, b).

Early Warning Indicators

During 2021, a total of 80 narwhal groups (comprising 263 individuals) were observed in the Behavioural Study Area, including 19 calves and 7 yearlings. The combined annual proportion of immatures relative to the total number of narwhal observed in 2021 was 0.102. This represented a 24% decrease from the 2014 to 2015 baseline condition but did not statistically significantly differ from the 2014 to 2015 baseline ($p=0.13$) (see Table 4.33).

TRENDS

Project Indicators

Acoustic monitoring results and narwhal behavioural data available to date have demonstrated that shipping noise in the RSA is lower than predicted in the FEIS and that behavioural effects from shipping on narwhal are limited to low-level disturbance effects that are localized and temporary in nature. This gives Baffinland confidence that its current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits during early shoulder season, etc.) are demonstratively effective at managing Project incremental effects from shipping on narwhal in the RSA. However, the observed decrease in narwhal abundance in the RSA during 2020 is of concern to Baffinland, and further investigation was conducted with respect to the potential cause of this observed decrease. Despite the elimination of both potential anthropogenic causal factors (underwater noise from icebreaking and impact pile driving) in 2021 through adaptive management, results from the 2021 monitoring programs again indicated lower narwhal numbers in Eclipse Sound during the 2021 shipping season. Underwater noise from these sources is therefore not considered to be an influencing factor on narwhal abundance in Eclipse Sound during the 2021 season. Open-water shipping, the other Project contributor of noise in the RSA, is also not considered a likely cause of narwhal displacement from the RSA based on the available monitoring results collected to date.

Given that the combined stock estimate for Admiralty Inlet and Eclipse Sound indicate that the regional narwhal population remains stable relative to pre-shipping conditions, and in consideration of the available IQ regarding the degree of exchange between narwhal groups on their summering grounds, the observed decrease in narwhal relative abundance in Eclipse Sound most likely reflects natural exchange between the two putative stock areas, or alternatively, that animals are being displaced from Eclipse Sound due to ecological factors such as changing ice conditions, prey availability and/or predation pressure, all of which are known to be influenced by a rapidly changing climate in the Arctic.

The results of the 2021 RSASP showed ringed seal densities have remained stable with some annual variations since the onset of shipping or ice-breaking activities in the RSA. These results confirmed that mitigation measures were functioning as intended and that these Project activities were managed in a way that has not adversely affected ringed seals.

Overall, detection of an adverse effect on narwhal in the RSA demonstrates that the indicators and thresholds presently in place for marine mammals are functioning as intended (i.e., are capable at measuring effects on marine mammals in the RSA, whether these are Project-induced or not), and that Baffinland's current adaptive management process is also demonstrating to be effective (i.e., has triggered new and appropriate precautionary-based mitigation measures while the source of the impact is being more thoroughly investigated), as described further below.

Early Warning Indicators

The EWI threshold for narwhal has not been exceeded to date despite an increase in year-over-year shipping associated with the Project. The effect size observed in 2021 (24% decrease in the proportion of immatures relative to all narwhal observed) may be the result of a low sample size in 2021 which may also explain the absence of power to detect a statistically significant decrease in the EWI.

RECOMMENDATIONS/LESSONS LEARNED

Acoustic monitoring results and narwhal behavioural data available to date have demonstrated that shipping noise in the RSA is lower than predicted in the FEIS and that behavioural effects from shipping on narwhal are limited to low-level disturbance effects that are localized and temporary in nature. This gives Baffinland confidence that its current mitigation measures (e.g., 9 knot speed restriction, 40-km buffer area at entrance of RSA, limited transits during early shoulder season, etc.) are demonstratively effective at managing Project incremental effects from shipping on narwhal in the RSA.

In 2022, Baffinland plans to resume icebreaking operations in 2022 in conjunction with mitigation measures implemented in 2020 and in concert with the monitoring programs listed below to obtain a fine-scale analysis of narwhal movement in relation to vessels, as has been done for open water shipping activities and to further evaluate the potential short-term, long-term and cumulative effects of icebreaker noise on narwhal during this period.

The following monitoring programs will be considered, in consultation with the MEWG, for implementation in 2022:

2022 Early Shoulder Season Narwhal Tagging Study

- 2022 Marine Mammal Aerial Survey Program
- Photo-analysis of 2021 aerial survey data for a secondary assessment of the EWI metric
- 2022 Bruce Head Shore-based Monitoring Program
- 2022 PAM Program – Underwater Acoustic Monitoring at the Pond Inlet Floe Edge during the Shoulder Season

Early Warning Indicator

The proportion of immature narwhal will continue to be monitored as part of the 2022 Bruce Head Shore-based Monitoring Program and/or the 2022 MMASP.

Project Certificate Condition No. 112

Category	Marine Environment - Ship Noise
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction and Operation
Objective	To prevent impacts to marine mammals from Project shipping activities.
Term or Condition	<p>Prior to commercial shipping of iron ore, the Proponent, in conjunction with the Marine Environment Working Group, shall develop a monitoring protocol that includes, but is not limited to, acoustical monitoring that provides an assessment of the negative effects (short and long term cumulative) of vessel noise on marine mammals. Monitoring protocols will need to carefully consider the early warning indicator(s) that will be best examined to ensure rapid identification of negative impacts. Thresholds shall be developed to determine if negative impacts as a result of vessel noise are occurring. Mitigation and adaptive management practices shall be developed to restrict negative impacts as a result of vessel noise. This shall include, but not be limited to:</p> <ul style="list-style-type: none"> a. Identification of zones where noise could be mitigated due to biophysical features (e.g., water depth, distance from migration routes, distance from overwintering areas etc.). b. Vessel transit planning, for all seasons. c. A monitoring and mitigation plan is to be developed, and approved by the Department of Fisheries and Oceans prior to the commencement of blasting in marine areas.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	Draft 2021 Marine Mammal Aerial Survey Report (Golder, 2022e) Draft 2021 Bruce Head Shore-based Monitoring Report (Golder, 2022g) Draft 2021 Ringed Seal Aerial Survey Report (Golder, 2022f) 2020 Underwater Acoustic Monitoring Program (Open-Water Season) – Report (Austin et al., 2022a) 2021 Underwater Acoustic Monitoring Program (Open-water Season) – Draft Report (Austin et al. 2022b) 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.16 Appendix G.25

METHODS

Refer to summary for PC Conditions No 109, 110 and 111.

RESULTS

Refer to summary for PC Conditions No. 109, 110 and 111.

TRENDS

Refer to summary for PC Conditions No. 109, 110 and 111.

RECOMMENDATIONS/LESSONS LEARNED

Refer to summary for PC Conditions No. 109, 110 and 111.

Project Certificate Condition No. 113

Category	Marine Environment - Arctic Char
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet
Term or Condition	The Proponent shall conduct monitoring of marine fish and fish habitat, which includes but is not limited to, monitoring for Arctic char stock size and health condition in Steensby Inlet and Milne Inlet, as recommended by the Marine Environment Working Group
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	2020 MEEMP and AIS Monitoring Program Report (Golder, 2021b) Draft 2021 MEEMP and NIS/AIS Monitoring Program (Golder, 2022a) DFO Review of Pond Inlet Emerging Arctic Char Fishery Application. Submission to the Nunavut Wildlife Management Board (NWMB; DFO, 2013) Exploratory Fishery Protocol - Nunavut and Northwest Territories anadromous Arctic Char (DFO, 2010) 2021 MEWG Meeting Records Concordance to NIRB Recommendations
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix E

METHODS

Monitoring of stock size of arctic char is not undertaken for the Project as this is beyond the current scope of the marine-based monitoring programs. See 'Recommendations and Lessons Learned' section below for more information.

In support of the Project, fish monitoring in the marine environment is undertaken annually during the open-water season to assess fish health condition in the marine receiving environment and to provide a general characterization of the fish community in this area during this period, including Arctic char. The marine fish program was initially developed based on traditional fishing areas (i.e., IQ) and sites adjacent to the Milne Port facility.

Marine fish and fish habitat surveys in the Milne Port area were first conducted in 2010 with monitoring occurring annually from 2013 to 2021. Modifications incorporated to the marine fish program in 2021 (as part of Baffinland's 2021 MEEMP and AIS Monitoring Program) in response to recommendations and feedback provided by the MEWG, DFO, and Inuit stakeholders, included the following:

- Trialing long line fishing methods to target large bodied demersal fish species (e.g. Cod species).
- Continuing bottom trawls as a fish sampling method to target deeper dwelling species (e.g. Arctic cod) with methodology adjustments to reduce impacts to bottom habitat.
- Revising the calculation of the CPUE to correct for the number of rods used during angling, the length of the gill nets, or the number of traps in a set.
- Designated five distinct fishing areas within Milne Port to better compare CPUE between areas of effect and survey years and better standardize the methodology.
- Trial fishing efforts at Tugaat River in order to determine the viability of the site for a reference area for fishing studies.

Detailed information on study design and sampling methodology is available in the annual monitoring reports for the MEEMP program (SEM, 2016a, 2017a; Golder, 2018d, 2019a, 2020c, 2021b, 2022a)

RESULTS

Detailed sampling results are available in the annual monitoring report for the Draft 2021 MEEMP and NIS/AIS monitoring programs (Golder, 2022a). An overview summary is provided below.

Fish Community

In 2021, a total of 671 fish belonging to thirteen (13) arctic species groups were captured during active fish sampling undertaken in 2021. As in previous survey years, arctic char (*Salvelinus alpinus*), Fourhorn Sculpin (*Myoxocephalus quadricornis*) and Shorthorn Sculpin (*M. Scorpius*) were among the most abundant fish species caught. The remaining fish species captured were as follows; Arctic Sculpin (*Myoxocephalus scorpioides*), Greenland Cod (*Gadus ogac*), Ribbed Sculpin (*Triglops pingelii*), Shorthorn Sculpin (*Myoxocephalus Scorpius*), Arctic Staghorn Sculpin (*Gymnocanthus tricusps*), Arctic Alligatorfish (*Aspidophoroides olriki*), Atlantic Poacher (*Leptagonus decagonus*), and Saddled Eelpout (*Lycodes mucosus*), unidentified cod (*Gadidae* indet.), unidentified sculpin (*Myoxocephalus* sp.), and unidentified snailfish (*Liparis* sp.).

Fishing efforts in 2021 yielded lower fish captures than in 2020, but greater than all pre-2020 sampling years, likely a reflection of the greater sampling effort performed in 2020 and 2021. A change in the relative taxonomic composition of fish captures was apparent compared to previous sampling years (2010 through 2019), where Fourhorn Sculpin, Shorthorn Sculpin and arctic char generally comprised approximately 99% of the total catch. In 2021, these species comprised only 69% of the total catch, similar to 2020 (71%). As in 2020, it is assumed this difference reflects the change in fish sampling effort and methodology that led to higher fish captures which included species that previously unobserved during pre-2020 fishing efforts. Greenland Cod had only been previously caught in Milne Port in low numbers in 2010 and 2014. However, starting in 2020, increased angling effort targeting coarse rock habitat as well as the introduction of deep-set hoop nets led to a total catch of 57 Greenland Cod in 2020 and 48 in 2021. Trawling efforts in 2021 resulted in the most species caught by any fishing method (nine species), including three previously unobserved species in Milne Port: Arctic Alligatorfish (*Aspidophoroides olrikii*), Atlantic Poacher (*Leptagonus decagonus*) and Ribbed Sculpin (*Triglops pingelii*).

Fish Health and Tissue Chemistry

Size

In 2020, Fourhorn Sculpin, Arctic Char and Arctic Sculpin were the dominant species captured during the fish community survey. Arctic Char were the largest of these species, ranging in length from 128 mm to 750 mm and

ranging in weight from 10 g to 4,990 g, with similar sizes observed in 2018 through 2020. Fourhorn Sculpin ranged in length from 115 mm to 345 mm and ranged in weight from 10 g to 370 g, with similar sizes observed in 2019 and 2020. Arctic Sculpin were caught in higher numbers than in previous years (50 in 2021 compared to 0-13 in 2018 through 2019). Arctic Sculpin ranged in length from 89 mm to 246 mm and ranged in weight from 10 g to 180 g.

Length-frequency distributions for Arctic Char were relatively similar among years, with median lengths of 440 mm in 2018, 435 mm in 2019, 409 mm in 2020, and 409 mm in 2021. Fourhorn Sculpin were also relatively similar among years, with median lengths of 228 mm in 2018, 211 mm in 2019, 194 mm in 2020, and 218 mm in 2021. Arctic Sculpin were caught in low numbers or were absent in previous surveys, and therefore comparison between sample years was limited between 2020 and 2021. Data suggests Arctic Sculpin populations have higher abundances of smaller bodied fish, with a median length of 132 mm in 2020, and a median length of 129 mm in 2021.

Condition (i.e., relative weight) of Arctic Char, Fourhorn Sculpin and Arctic Sculpin were relatively similar for each species over time, despite significant differences among years. For Arctic Char, significant differences in condition were observed among years ($p_{\beta 3} = 0.003^6$; $p = 0.001$), with mean relative weights of 712 g in 2018, 731 g in 2019, 750 g in 2020, and 706 g in 2021. For Fourhorn Sculpin, significant differences in condition were also observed among years ($p_{\beta 3} = 0.001^4$; $p < 0.001$), with mean relative weights of 82 g in 2018, 81 g in 2019, 79 g in 2020, and 86 g in 2021. For Arctic Sculpin, low sample sizes prior to 2020 led to the exclusion of those data from analysis, and therefore relative weight was compared only between 2020 and 2021. There was no significant difference in relative weight ($p_{\beta 3} = 0.555$; $p = 0.293$) between 2020 and 2021 for Arctic Sculpin, with mean relative weights of 36 g in 2020 and 38 g in 2021.

Age

In 2021, Arctic Char ranged in age from 4 to 17 years ($n = 25$), with a median age of 8 years. Ages were similar to fish processed in 2020 ($n = 43$), 2019 ($n = 46$), and 2018 ($n = 26$), which ranged from 2 to 16 with a median age of 11, 4 to 19 years with a median age of 12, and 5 to 17 years with a median age of 11, respectively. In 2021, ages for Fourhorn Sculpin ($n = 42$) ranged from 3 to 12 years, with a median age of 6. These were similar to results observed in 2020 ($n = 44$) and 2019 ($n = 30$) for Fourhorn Sculpin which ranged in age from 4 to 9 with a median age of 5, and 4 to 8 with a median age of 6, respectively. Age data were not available from 2018 for comparison.

Stomach Contents

An analysis of stomach contents for Arctic Char captured from the Milne Port Area in 2021 ($n = 18$) identified a total of 23 separate taxa. Stomach contents were predominantly composed of indeterminate stage fishes, accounting for 43% of stomach contents by weight. Approximately 20% of indeterminate fishes were identified from the Family Cottidae. Other major constituents included the amphipod *Themisto libellula* (26%) as well as indeterminate amphipods of the Family Hyperiidea (8%). In general, Arctic char were primarily piscivorous in 2021 (47%), supplementing their diet with small crustaceans (38%). These results are similar to those from 2020, but contrast observations made in 2019, where indeterminate crustaceans were the primary constituent of Arctic Char stomach contents, accounting for 41% of contents by weight, while fish only comprised 4% (Golder, 2020c). This suggests that the diet of Arctic Char in the Milne Port Area varies over time, and the fish feed opportunistically, influenced by relative prey abundance and catchability. For example, the stomach contents of one Arctic Char caught in 2021 were

⁶ Although a significant interaction was observed, the difference in the R^2 values between the full and reduced models was less than 2%, and the slopes were considered practically similar and suitable for ANCOVA (Barrett et al 2010).

comprised entirely of insect taxa, some of which live only in freshwater (Golder, 2022a; Appendix 7A; Table 7A-3), potentially indicating a variable and opportunistic feeding strategy encompassing freshwater and marine habitats.

Stomach contents of Fourhorn Sculpin captured from the Milne Port Area ($n = 15$) contained a total of 18 separate taxa, primarily consisting of indeterminate fishes (36%) and indeterminate invertebrates of the Family Tipulidae (34%). Other constituents included indeterminate amphipods (16%), and amphipods of the genus *Gammarus* (5%). The diet of Fourhorn Sculpin consisted of Tipulid invertebrates (34%), fishes (36%), and crustaceans (27%) by weight. These results contrast previous observations from 2020 and 2019, where crustaceans (specifically amphipod *Anonyx sp.*, 52%) and fishes (27%) were the primary constituents of stomach contents by weight, respectively. As with Arctic Char, these results indicate that the diet of Fourhorn Sculpin varies over time and these fish feed opportunistically.

Fish Health

A total of 40 Fourhorn Sculpin were processed from the Milne Port area during the 2021 fish health assessment, including 20 females and 20 males. Female Fourhorn Sculpin were of larger median size (Relative Percent Difference (RPD) 8%) at the time of sampling than male Fourhorn Sculpin with greater energy investment but lower reproductive investment, based on comparisons of median Liver Somatic Index (LSI; RPD 63%) and Gonadal Somatic Index (GSI; RPD 14%). Both sexes had median ages of 6, with females ranging from 3 to 10 years and males ranging from 3 to 12 years. Female Fourhorn Sculpin ranged in length from 205 mm to 344 mm and in weight from 79 g to 352 g. Female condition factor ranged from 0.82 to 1.14. The LSI ranged from 2.48 to 7.45 and GSI ranged from 1.78 to 24.38. Male Fourhorn Sculpin ranged in length from 209 mm to 281 mm and in weight from 74 g to 197 g. Male condition factor ranged from 0.71 to 1.01. The LSI ranged from 1.49 to 5.53 and GSI ranged from 2.51 to 6.40. Length-frequency distributions for lethally sampled female and male Fourhorn Sculpin were left-skewed and bimodal. Female Fourhorn Sculpin had a significantly greater relative weight compared with male Fourhorn Sculpin (p -value = 0.058). Mean age of Fourhorn sculpin were not significantly different between 2020 and 2021. Size at age was greater for both male and female Fourhorn Sculpin in 2021 compared to 2020. Body condition metrics for Fourhorn Sculpin were not significantly different, aside from relative liver weight in males, with larger relative weights observed in 2020. Overall, Fourhorn Sculpin in 2021 were considered healthy and comparable to endpoints observed in 2020.

In 2021, a total of 36 *H. arctica* were processed for fish health endpoints. The collected individuals ranged in length from 17.5 mm to 35.1 mm and ranged in total weight from 0.48 g to 8.13 g. Length data were approximately bimodal and left skewed and exhibited a strong relationship with total weight (p -value < 0.001; $R^2 = 0.90$). Gonad weights ranged from 0.0023 g to 0.0798 g, with a median value of 0.0360 g; GSI ranged from 0.90 to 6.13 with a median value of 1.97. *Hiatella arctica* sampled from the Milne Port Area ranged in age from 1 to 39 years, with a median age of 19. Median condition factor in 2021 was 1.41. Relative weight (total weight-at-length) differed between 2020 and 2021, with significantly lower relative tissue weights in 2021, although the difference between years was comparatively small. Given the lack of multi-annual data on *H. arctica* in Milne Inlet, it is unknown whether this difference represents typical variability within the species or indicate potential effects of localized stressors.

Fish Tissue Chemistry

Fish tissue chemistry results for arctic char sampled in 2021 were generally similar to historic data collected for the Milne Port area since 2010. Results for Fourhorn Sculpin and *H. arctica* were also similar to data collected in recent

years for most metals⁷. Statistically significant increases were observed for some contaminants of potential concern in arctic char and *H. arctica* (e.g., aluminum and magnesium). Differences were small and often inconsistent between survey years, likely reflecting natural variability in both the bioavailability and subsequent uptake of metals, reflected in the reported tissue concentrations.

All tissue samples for Arctic Char, Fourhorn Sculpin and *H. arctica* collected from 2018 to 2020 were below Health Canada's Maximum Levels for Chemical Contaminants in Foods mercury consumption guideline (Health Canada, 2015) and below the British Columbia Ministry of Environment fish tissue guidelines for selenium (BC MOE, 2014). A single Arctic Char was captured with notably higher concentrations of several metals (including aluminum, iron, magnesium, chromium, lead, and nickel), relative to other Arctic char sampled in 2021. This fish was the youngest and smallest of all Arctic char samples, and notably had stomach contents exclusively containing freshwater species. Based on the age, size, and diet, it is assumed that this was a smolt recently transitioned to the marine environment and the elevated metals are reflective of the freshwater environment in which it developed. As the closest systems with populations of anadromous Arctic char are the Tugaat and Koluktoo (i.e., Robertson River) watersheds, it is not anticipated that elevated metal concentrations in the rearing environment of this fish are attributable to mine operations.

To date, construction and operation of the Milne Port does not appear to have negatively affected fish health or tissue chemistry in the Milne Port area.

Detailed information on results is available in the annual monitoring report for the MEEMP program (Golder, 2022a).

TRENDS

Fish Community

- To date, construction and operation of the Milne Port do not appear to have negatively affected fish community structure or body condition.
- Presence and diversity data collected in 2021 was comparable to previous years.
- Weight-length relationships indicated that while statistically significant differences were observed among years (2018 to 2021) for the species examined, this likely reflect temporal variability in these populations.
- Monitoring results align with original FEIS predictions, which forecasted that the Project would have no significant effects on marine fish habitat nor would it affect the size of arctic char populations

Fish Health

- Detailed fish health data were collected for Fourhorn Sculpin and *H. arctica* in 2021 for the second consecutive year and are anticipated to provide baseline dataset for future interannual comparisons under the Metal & Diamond Mine Effluent Regulations (MDMER).
- Based on internal and external examinations, Fourhorn Sculpin from the Milne Port area appeared to be healthy at the time of sampling with few abnormalities observed.
- Sample timing appeared to be appropriate for future assessments of reproductive endpoints for Fourhorn Sculpin with all individuals assessed observed to be in the late stages of gonadal recrudescence.

⁷ The term metals is used throughout this report and includes non-metals (e.g., selenium) and metalloids (e.g., arsenic).

- Fourhorn Sculpin from the Milne Port area appeared to be healthy at the time of sampling with few abnormalities observed. The magnitude and direction of differences in length and weight between survey years suggest the Project has not affected condition of fishes in the Milne Port area.

Tissue Chemistry

- Monitoring results remain within original FEIS predictions, which indicated the potential for non-significant, low magnitude effects on arctic char health and condition that are expected to be reversible.
- For arctic char, tissue concentrations of metals in 2020 were similar to previous concentrations observed for the Milne Port area since 2010. For CoPCs, statistical differences were observed between years for aluminum, magnesium and selenium; however, effect sizes were generally small with concentrations similar to historic data. The differences were small in magnitude and likely are reflective of natural variability as concentrations remain similar to baseline years.
- For Fourhorn Sculpin, metal concentrations were generally similar between survey years; however, some interannual variability was observed. For CoPCs, a significant decrease was observed between 2019 and 2021 for aluminum. Iron and selenium concentrations were comparable to 2020, with 2020 and 2021 concentrations significantly decreased compared to 2019.
- For *H. arctica*, concentrations of metals were generally similar among years with a few exceptions, such as chromium, nickel and tin that exhibited more variability. For CoPCs, significant differences were observed among years for aluminum, iron, magnesium, and selenium; however, effect sizes were generally small (i.e., <100%).
- Significant differences in concentrations of CoPCs for Arctic char, Fourhorn Sculpin and *H. arctica* between 2018 and 2021 were generally small and appear to reflect natural variability in these metals. Therefore, differences were not considered to be Project-related.
- As observed in 2019 and 2020, metals concentrations were typically greater in *H. arctica* relative to Arctic char and Fourhorn Sculpin, occasionally by orders of magnitude. These differences likely reflect species specific differences in bioaccumulation processes and difference in the tissue types analyzed (i.e., whole body versus muscle), with molluscs accumulating greater concentrations of some metals compared to fish. There is no indication that these concentrations of metals are affecting fish health.
- All tissue samples for Arctic Char, Fourhorn Sculpin and *H. arctica* collected from 2018 to 2021 were below Health Canada's Maximum Levels for Chemical Contaminants in Foods mercury consumption guideline of 0.5 mg/kg wet weight and Arctic Char and Fourhorn were below BC MOE fish tissue guidelines of 4 mg/kg dry weight for selenium. *H. arctica* exceeded selenium guidelines in most specimens, however, these guidelines are not intended for use with bivalve tissues and are of limited relevance due the naturally higher accumulation of some metals in mollusc tissues. Tissue chemistry results were within FEIS predictions, which indicated the potential for non-significant, low magnitude effects on arctic char fish health and condition.

RECOMMENDATIONS / LESSONS LEARNED

Overall, MEEMP results do not show any major changes to marine fish assemblages near Milne Port or on fish health as a result of construction and operational activities at Milne Port. The MEEMP study design and data collection methodologies are reviewed yearly with the MEWG. Recommendations from the MEWG assist in refinement of the fish and fish habitat program.

The MEEMP results will continue to be presented to the MEWG on an annual basis, and recommended adjustments to the fish and fish habitat program will be considered by Baffinland and implemented as deemed necessary and relevant for detecting potential Project-related impacts to fish stocks and health conditions in Milne Inlet.

Arctic Char Stock Monitoring

Monitoring of stock size of for Arctic Char is not recommended as part of future monitoring studies in Milne Port as it is considered beyond the current scope of the marine-based monitoring programs. A rationale is provided below.

Anadromous Arctic Char are common in many river systems feeding into Milne Inlet and Eclipse Sound on North Baffin Island. It is presently unknown if individual river systems in this region represent genetically discrete stocks or if there is a high degree of migration (gene flow) between these systems (DFO, 2013). Most river system fisheries on North Baffin Island, especially during the open-water season, have the potential to harvest a mixture of Arctic char stocks from proximate systems (i.e., these likely represent mixed-stock fisheries). The Tugaat, Koluktoo (i.e., Robertson River), Ikaluit and Satuut watersheds are examples of river systems in Milne Inlet that are inhabited by anadromous Arctic char and these fish are an important local resource for residents of Pond Inlet. It is important to note however, that the management of Arctic char fisheries in the Canadian Arctic (co-managed by DFO and NWMB) is based on the assumption that each river system supports a discrete fish stock which has a high-fidelity rate to the population stock (Kristofferson et al. 1984).

Baffinland's EEM program (i.e., monitoring designed for detection of potential Project-related effects) does not include tracking of Arctic char stocks. Effects monitoring for this receptor species is accomplished through monitoring of incidental mortalities of Arctic char for health, habitat quality (water and sediment quality, productivity) and habitat use (relative abundance). Other sentinel species are monitored more specifically with targeted lethal sampling to assess fish health in Milne Port for potential Project-related changes in fish health. To date, the extensive monitoring completed in both the marine environment at Milne Port and in the freshwater environment near the operating mine has not demonstrated any evidence of adverse effects of the Project on Arctic char via these pathways (Golder, 2022a). The rationale follows that if we are not observing Project effects on fish health, fish habitat quality or fish habitat use near Milne Port where impacts from the Project are greatest, then it is highly unlikely that the Project is resulting in adverse effects on Arctic Char stock sizes in the local receiving environment. For example, each year as part of the Marine Environmental Effects Monitoring Program (MEEMP), we monitor multiple receptors in the marine environment that collectively reflect the habitat quality, food availability, and health of Arctic Char; specifically, we measure concentrations of metals and other contaminants in marine waters and sediments (habitat quality), abundance of benthic invertebrates (prey availability), and assess body condition and muscle tissue concentrations (fish health). Following multiple years of monitoring in the Milne Port area, there is no evidence that Arctic char habitat, their prey base, or their health condition has been compromised by the Project. Concentrations of contaminants in sediments and fish tissues are consistent with baseline and the number of Arctic char caught in the MEEMP annual surveys has remained consistent through time (Golder, 2022a).

More recently, there has been feedback provided by some community members suggesting that the Mary River Project is responsible for lower Arctic char numbers observed in recent years within the local waterways of Milne Inlet and Eclipse Sound, in addition to reports of Arctic Char in poor health conditions in these areas. In specific response to these concerns, Baffinland has expanded its Arctic char health monitoring program in 2021 such to include both Tugaat River and Qurluktuk Lake (both waterbodies identified as target study areas by the MHTO for

ongoing fish monitoring). For example, Baffinland and its contractor Minnow Environmental designed and implemented a field program that looked specifically at Arctic Char body condition and fish health in the Tugaat River during the 2021 open-water season. The Tugaat River Arctic Char Health Monitoring Program was developed in close consultation with the MHTO. Fish data collected during this program is still presently being analyzed but it will include a comparison of Arctic Char body condition and growth metrics between 2021 and sampling conducted prior to Milne Port construction (e.g., historical studies from 1992 and 1996). Any evidence of Project impacts on Arctic Char health or growth parameters in these waterbodies would serve to trigger future monitoring of fish stock sizes in the corresponding freshwater systems. Similarly, a lack of evidence of adverse effects of the Project on Arctic Char health in this waterway would rationale why a stock size assessment would not be a reasonable Project monitoring requirement.

Given the recommendation, it is important to remind the Board that DFO is the responsible authority for assessing the status of Arctic Char stocks in the North Baffin Region and to provide advice on the sustainability of these fisheries. For example, before a fishery is licenced as a commercial operation, the sustainability of the harvest on the stock must be evaluated (DFO, 2010). This is typically done by operating a fishery under an exploratory licence for five or more consecutive years. The specific objective of the exploratory fishery stage is to determine whether the harvested stock or population can sustain a commercially viable operation by collecting and analysing biological and catch and effort data. Essentially the resilience of a stock to sustained fishing pressure is assessed and if resilience to the level of harvest is demonstrated, the stock may be considered for designation as a commercial waterbody. The Robertson River (i.e., Koluktoo River) in Milne Inlet and the Satuut River in Eclipse Sound (south end of Navy Board Inlet) are two such waterbodies that are presently being assessed by DFO for the feasibility of a sustainable fishery (DFO, 2013; NWRTF, 2020), as detailed below.

In 2013, Mr. Charlie Inuarak submitted to the co-management board (DFO and NWMB) an application requesting an exploratory license to fish for Arctic Char from a total of 16 locations (i.e., points, coves, river outlets and lakes) in the Pond Inlet area, as outlined in Figure 4.15 below, such to support regulatory approval for a commercial Arctic Char fishery in the region (DFO, 2013). This application was formally recognized by the NWMB and DFO as the 'Pond Inlet Emerging Arctic Char Fishery Program'. As outlined in the application, the proposed fishery program requested a harvest of 500 char from each of the 16 harvest locations. According to the application, Mr. Inuarak consulted with the MHTO and received their support for the proposed fishery program. It is worth noting that Koluktoo Bay (#15) was the only waterbody identified in this plan that had been previously fished under an exploratory licence (i.e., 95/96, 96/97, 97/98) and received past DFO Science advice that supported a harvest level of 2,500 kg (DFO, 2013). According to the application and previous correspondence with Mr. Inuarak, arctic char are abundant in the Pond Inlet area, especially at the points and coves identified in the figure below. As per his application, Mr. Inuarak proposed to spread out the exploratory fishing effort in an attempt to minimize impacts on local subsistence fishers. Mr. Inuarak was of the opinion that all 16 locations identified below offered the potential to develop into a viable commercial fishery (DFO, 2013).

DFO Science conducted a review of the application and provided NWMB with scientific advice (i.e., recommendations) for the program (DFO, 2013). DFO recommended that a modified version of the proposed fisheries program be approved in order to ensure that the fishery remain sustainably harvested and that exploratory fishing pressure will not have a negative impact on Arctic Char stocks and subsistence fisheries in the Pond Inlet Area. Specifically, DFO recommended the following:



Figure 4.15: Map of Proposed Arctic Char Exploratory Fishing Sites Near Pond Inlet, Nunavut (DFO, 2013)

- DFO recommended approving the fisheries program in two separate phases, with Phase 1 beginning in the summer of 2013, and Phase II initiated as early as 2014 based on the 2013 results and based on follow-up discussions with DFO and the NWMB as co-management partners.
- DFO recommended harvesting only occur at some of the locations recommended by Mr. Inuarak, namely those sites considered low or moderate risk of harm from fishing. DFO noted that several of the sites recommended by Mr. Inuarak were previously identified as sites considered as ‘high risk’ of harm from fishing based on previous studies and scientific advice on record (i.e., they represented compromised char fisheries). This included the three proposed harvest locations associated with the Tugaat watershed including Tugaat Lake/River (#17; Schedule V; PI006); Tuapak (#13) and Nasaarjuaq (# 14); as well as the one sampling location associated with the Phillips Creek watershed, namely Qinnuat Milne Inlet (proposed location 16; Schedule V PI022). Based on the past Science advice, the Tugaat River is advised to remain as a subsistence fishery only, with no commercial quota. This is due to fact that the stock was unable to sustain both commercial and subsistence fisheries in the past. Arctic char from the Tugaat River are recognized by the Pond Inlet community as a superior stock compared to other areas, and consequently the subsistence fishing pressure is higher from this system (Read, 2004). For Qinnuat Milne Inlet (i.e., Phillips Creek), the

sampling location coordinates are the same as the Phillips Creek source stock (PI022), which is a Schedule V waterbody under the Northwest Territories Fishery Regulations. The most recent Science Advice indicates that this waterbody remains closed (Cosens et al. 1995).

- DFO Stock Assessment Science advice is structured to be provided on a stock-by-stock basis, not by fishing location. For many of the fishing locations proposed, there is limited or no science information available; specifically, for locations #1 to 12. One of the major information gaps is that DFO does not know the source stocks for some of these fishing locations. The problem this presents is as follows: many of the closely located fishing sites may have one or multiple source stocks (DFO, 2013). It is probable that on the summer feeding grounds, Arctic Char from Tugaat Lake/River, Phillips Creek and Koluktoo (i.e., Robertson River) are mixing. In order to err on the side of caution and avoid overharvesting from any one stock, DFO advised that the exploratory harvest levels for some locations be grouped together in Phase I of the proposed fishing plan, as per Table 4.34 below. DFO notes that they expect that future meetings with the MHTO and Pond Inlet elders would help fill in some of the gaps in DFO's current knowledge (as of 2013) and help move forward with Phase II of the proposed fishery program.
- DFO recommended that Mr. Inuarak follow a five-year exploratory protocol of collecting biological and catch-effort information that would allow DFO Science to evaluate sustainable harvest levels. DFO recommended that the exploratory fishery begin with the first year of the 5-year approach (as Phase I) due to the limited information currently available. DFO committed to work with Mr. Inuarak to provide support for the data collection requirements. The five-year exploratory fishery protocol is intended to provide information on the viability of a fishery in a particular waterbody. The protocol requires effort be taken to annually harvest the full quota over the five-year period; the collection of biological characteristics of the fish (i.e., individual fork length, round weight, sex and sagittal otoliths for a minimum of 200 Arctic Char); CPUE; and total harvest data should also be collected every year for five years before stocks are assessed and recommendations are made. Permit requirement of employing a minimum gillnet mesh-size of 5 ½ inches for all fish collection. Changes to the population structure following continuous harvest of the maximum quota may indicate that the harvest level is not sustainable. However, if the harvest over that period does not change indicators of population health, then the existing level of harvest is likely sustainable. Harvest of the full quota annually is necessary for this approach. Each fishery should follow the exploratory fisheries five-year approach, with all samples and data being submitted annually to DFO Resource Management.
- DFO provided their technical / recommendations to the Nunavut Wildlife Management Board (NWMB) in the form of a briefing note with a formalized fishing plan (referred to as the Pond Inlet Emerging Arctic Char Fishery Plan – Phase I) for NWMB's decision (DFO, 2013). NWMB approved the program in accordance with DFO advice, and the program was formally recognized as the 'Pond Inlet Arctic Char Fishery Development Research Program'.
- DFO representatives were identified as 'Project Leaders' for the above program – this included Dr. Ross Tallman (DFO Winnipeg) and Zoya Martin (DFO Iqaluit). The latter representative was subsequently replaced by Erin O'Dell (DFO Iqaluit).

Table 4.34: DFO Recommended Harvest Locations And Annual Harvest Levels For The Pond Inlet Arctic Char Fishery Program (DFO, 2013)

Fishing Location	Coordinates	Exploratory Harvest Level
Igluluarjuit (1) and/or Tullukaat (2) and/or Tikiraalukjuaq Qanigijaani (3)	1) 72°35'38"N 78°24'26"W 2) 72°33'12"N 78°27'51"W 3) 72°27'02"N 78°33'08"W	1,500 kg total
Qimmivik (4)	72°23'31"N 79°03'30"W	1,500 kg
Aulitiviik Illua (5)	72°21'06"N 79°29'27"W	1,500 kg
Tuqajaat (6) and/or Tuqajaat Illuani (7) and/or Sulukuluk (8)	6) 72°30'22"N 79°48'19"W 7) 72°28'31"N 79°51'42"W 8) 72°24'34"N 79°59'32"W	1,500 kg total
Saatut (9) and/or Qaunirq (10)	9) 72°43'29"N 80°13'47"W 10) 72°41'18"N 80°21'56"W	1,500 kg total
Saviit Nuvua (11)	72°23'20"N 80°30'07"W	1,500 kg total
Ipiutalik (12)	72°11'11"N 80°21'31"W	1,500 kg
Koluktoo Bay – PI035 (15)	72°05'27"N 80°59'49"W	2,500 kg

Currently available annual reporting for the 'Pond Inlet Arctic Char Fishery Development Research Program' indicates that sampling over the five-year study period has largely been limited to two locations (Koluktoo River and Satuut River) with recent interruptions incurred in the sampling program due to COVID-19-related constraints. Following is a high-level summary of program success to date based on the limited information publicly available (note that more detailed information is available in the annual NWMB summary reports).

- Year 2 of the 5-year program occurred in 2017. Data was only collected at one location (Koluktoo River Mouth) (NWRTF, 2017)
- Year 3 of the program occurred in 2018. Char harvesting occurred at Koluktoo Bay and Saatut locations. Koluktoo Bay was fully sampled (n = 213) while Saatut was not as successfully sampled (n = 33; NWRTF, 2018)
- Year 4 of the program occurred in 2020 (NWRTF, 2020). Delays in the program occurred due to COVID-19 restrictions with respect to field sampling etc. For instance, no char harvests were possible during the summer 2020 due to COVID-19 limitations.
- Year 5 of the program was assumed to be completed in 2021. To our knowledge, no information is currently publicly available on Year 5 of the program.

Baffinland also feels it is important for the Board to be aware that concerns of compromised char stocks in the local waterways of Milne Inlet and Eclipse Sound have been expressed by the communities well before the Mary River Project began. For example, DFO undertook a stock assessment of the Ikaluit River Arctic Char stock in 1989 in direct response to concerns expressed by the community of Pond Inlet regarding lower char numbers and impacts on their local subsistence fishery, as summarized in Cosens et al. (1995). An overview summary extracted from this report is provided below:

- The Ikaluit River is located approximately 90 km southeast of the community of Pond Inlet (feeding into Tay Sound). Anadromous Arctic Char are known to migrate up this river system to overwinter and spawn. Char from this system have traditionally been an important source of food for the Inuit of the Pond Inlet area and,

since the early 1960s, have supported a mixed subsistence and commercial fishery. Commercial harvest may have occurred as early as 1961 when 3,468 kg of char were harvested from rivers and lakes in the Pond Inlet area. A total of 10,306 kg of char were reportedly harvested by the commercial fishery in 1969 and undoubtedly unreported commercial harvests occurred between 1961 and 1969. The annual commercial harvest of char averaged 2,536 kg in the 1970's and 3,364 kg in the 1980's. In the early 1980's, the community of Pond Inlet expressed concerns about the size and abundance of char in their traditional fishing areas including the Ikaluit River system. In 1989, an assessment of the Ikaluit River char stock was conducted in response to these concerns.

- Stock definition of Arctic Char in the Ikaluit River system was unknown at the time of study.
- Stock size: In 1989, a total of 282,564 Arctic Char were enumerated as they migrated upstream in the Ikaluit River (estimated biomass 283,000 kg). The weir was located upstream of the northern tributary so any char returning from sea to this possible spawning and overwintering area were not included in the count.
- Major issues identified: The community of Pond Inlet, the major user of the resource, expressed concerns in the early 1980's that the anadromous Arctic Char they were harvesting from the Ikaluit River were becoming smaller in size and less abundant. In response, DFO conducted a stock assessment project in 1989, to gather data as a basis for future fishery management recommendations. The subsistence harvest, which represented 83 % of the 1989 harvest, remains basically unmanaged. Presently, there are no reliable harvest statistics for this important component of the fishery. Apparently, the mixing of subsistence fishing with the commercial fishery continues, with the probable use of gillnets less than the commercial mesh size of 139 mm.
- Stock prognosis: Exploitation of the Ikaluit River Arctic Char stock has been in the light to moderate range and the stock did not appear to have been overexploited at the time of the study in 1989. The run appears to be large. The estimated annual exploitation rate of 6.1 % based on the 1989 study is within the limits of presently accepted sustainable harvest levels. Arctic char in this run are relatively small as reported by the Pond Inlet harvesters. Larger, less abundant Arctic Char have apparently been removed from the population due to their greater vulnerability to the fishing gear. Reduction of size and age may have increased the productive capacity of this population, however in the absence of multi-year biological and harvest data this stock should be managed conservatively.
- A "Safe Harvest Level" (SHL) of no more than the 1989 total harvest of 13,872 kg is recommended. Allocation to the subsistence, commercial and sports fisheries should fall within this SHL. With the provisional commercial quota of 2,300 kg, a maximum subsistence harvest of 11,572 kg is recommended.

Another example of Inuit historical concerns of local Arctic Char stock sizes in Milne Inlet prior to the existence of the Mary River Project was for Arctic Char belonging to the Tugaat River system. In 1992, DFO undertook a weir assessment of the Tugaat River in order to address concerns expressed by Pond Inlet fishers regarding the declining size and relative abundance of the Tugaat River Arctic Char stock. The specific objective of the study was to determine if the Tugaat River Arctic Char stock could sustain the local subsistence/commercial fishing pressure. Data collected from the weir study, as well as from a 1980 tagging program, were presented in a report by Read (2004), including a summary of historical fisheries data collected in this system to monitor changes in the local char stock over time. Monitoring data was collected from 1975 to 2000, primarily by the Pond Inlet Wildlife Officer, Department of Sustainable Development (DSD), Government of Nunavut (formerly Government of the Northwest Territories). Results of this study indicated that the Tugaat River stock was stable and that the low fish count of 1992 may have

been the result of yearly fluctuations in migration into Tugaat River, or due to the lack of overwintering capacity, suggesting that the Tugaat River population is, and always was, relatively small (Read, 2004).

In summary, Baffinland is not currently undertaking Arctic Char stock size assessments in the RSA for the following reasons:

- Baffinland extensively monitors several Arctic Char metrics in the Project zone of influence (including fish health and body condition, fish habitat quality, fish habitat use, prey availability) which would effectively capture the applicable Project effects pathway (e.g., effect of iron ore dust emissions on fish health). If we are seeing no adverse effects in fish health or other char effect indicators (i.e., fish habitat) from the Project, there is no reasonable justification to conduct a stock assessment for Arctic Char for the same pathway of concern. Baffinland has recently expanded on its Arctic Char fish health monitoring program in other local waterways in direct response to recent community concerns on this topic.
- Stock size is not assessed in the marine environment, given that Arctic Char are only resident in the marine environment for a limited period during the open-water season and there are multiple Arctic Char stocks mixing in the marine at this time. Given current data gaps on stock definition, stock size would be undertaken in the corresponding river or lakes systems. This work is ongoing by the responsible parties (as outlined above).
- It is the responsibility of DFO to assess the status of local Arctic Char stocks in the Canadian arctic and to manage these stocks accordingly. To this effect, there has been limited study undertaken to date in the North Baffin region to inform this process, although there is some work in progress under the direction of DFO and the NWMB to fill these existing data gaps (i.e., exploratory fishery in Milne Inlet and Eclipse Sound). There is little justification for redundancy in this effort (i.e., multiple parties conducting equivalent char population/stock investigations), particularly when several of these stocks are considered high risk from prior commercial and subsistence harvesting, including those belonging to the Tugaat River watershed (DFO, 2013).

Project Certificate Condition No. 114

Category	Marine Environment – Arctic Char
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.
Term or Condition	In the event of the development of a commercial fishery in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas, the Proponent, in conjunction with the Marine Environment Working Group, shall update its monitoring program for marine fish and fish habitat to ensure that the ability to identify arctic char stock(s) potentially affected by Project activities and monitor for changes in stock size and structure of affected stocks and fish health (condition, taste) is maintained to address any additional monitoring issues identified by the MEWG relating to the commercial fishery.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister
Status of PC Condition	Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

In the event a commercial fishery is developed in Steensby Inlet area or Milne Inlet-Eclipse Sound areas, Baffinland will update the MEEMP 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.

No commercial fishery / Schedule V waterbody operated in the vicinity of Milne Port or Steensby Port during 2021.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will adapt its monitoring programs accordingly in the event a commercial fishery is developed in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas.

Project Certificate Condition No. 115

Category	Marine Environment - Arctic Char
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.
Term or Condition	The Proponent is encouraged to continue to explore off-setting options in both the freshwater and marine environment to offset the serious harm to fish which will result from the construction and infrastructure associated with the Project.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Fisheries and Oceans Canada (DFO), Marine Environment Working Group (MEWG)
Reference	2020 Milne Ore Dock Fish Offset Monitoring Report (Golder, 2020a) Year 2 Freight Dock Offset Habitat Monitoring Report (Golder, 2022c). TSD No. 23: Conceptual-level Marine Offsetting Plan (Golder, 2018h) 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.11

METHODS

Baffinland has engaged and conducted comprehensive consultation on the Project as a whole with the five North Baffin communities (Arctic Bay, Clyde River, Sanirajak, Igloolik, and Pond Inlet) prior to, during, and following the environmental reviews of the Project by the NIRB. Specific to fisheries offsetting in the marine environment, Baffinland (with DFO participation) consulted with the community of Pond Inlet in regard to the Ore Dock proposed at Steensby Port and the habitat off-set design for the existing Ore dock and Freight dock at Milne Port for the Early Revenue Phase of the Project (ERP). Early engagement was initiated during the consultation process on the ERP when Baffinland met with members of the MHTO and other community members to discuss the design, offsetting measures, and proposed monitoring with respect to construction of the Ore Dock at Milne Port. Since then, consultation efforts have focused largely on offsetting habitat effectiveness monitoring associated with in-water marine infrastructure.

Baffinland was issued a Fisheries Authorization (Ref No. 14-HCAA-00525) from DFO in 2014 for construction of the Ore Dock at Milne Port. A fish habitat offsetting plan was included with Baffinland's application for an authorization under the *Fisheries Act*. This included fish habitat enhancement measures constructed around the Ore Dock.

Similarly, Baffinland was issued a Fisheries Authorization (Ref No. 18-HCAA-00160) on March 21, 2019 for construction of the Freight Dock at Milne Port. A separate offsetting plan for the Freight Dock was developed which included the addition of coarse rock substrates as offsetting materials around the perimeter of the Freight Dock.

With regards to future expansion plans such as the proposed Phase 2 proposal, Baffinland continues to explore potential offsetting options in both freshwater and marine environments to address potential losses in fish habitat associated with permanent habitat alteration or destruction of fish habitat, which includes community consultation activities in order to help refine candidate offset locations. For freshwater, offsetting may be required to offset proposed in-water infrastructure along the proposed North railway (water crossings, pond encroachment, and stream diversions) and additional water crossings on Tote Road realignments and quarry access roads, in addition to waterbodies identified for water withdrawal. Exploration of potential marine offsetting options are aimed at offsetting in-water works associated with the proposed construction of the second Ore Dock.

Various options are being considered for fish habitat offsetting in the freshwater environment including improving lake or stream fish rearing habitat. For marine habitat, enhancement and/or creation of habitat (e.g., rocky reefs) and complementary measures (e.g., financial contributions in-lieu of constructing habitat) are being explored.

Consultation activities related to offsetting in 2021 were delayed in part from logistical and operational restrictions associated with the COVID-19 Pandemic. Focus was geared towards desktop-based exercises and the collection of baseline data in order to gather data for consideration during future consultation efforts.

RESULTS

A number of potential offsetting options were identified for the marine environment as part of Phase 2 conceptual offsetting planning (Golder, 2018h). Numerous potential freshwater offsetting options located in both lake (e.g., rearing habitat creation and/or improvements to existing) and stream (e.g., rearing habitat creation, removal of natural barriers, improvements to upstream passage) habitats were also identified and further investigated during summer field programs in 2019 and 2020.

TRENDS

Results from the six-years of post-construction monitoring of the Milne Port Ore Dock offsetting works have shown the offsetting habitat is effective in supporting biological activity, providing support for the addition of coarse substrates as an effective approach for successful offsetting. The FAA for the Milne Port Ore Dock was closed by DFO in 2021 as monitoring results demonstrated the effectiveness of the offsetting habitat.

Year 2 of post-construction monitoring for the Freight Dock offset habitat occurred in 2021. Year 2 of monitoring indicated that macroalgae, motile invertebrates and fish continue to colonize the Freight Dock offset habitat, and that it appears to be providing a suitable and stable substrate for continued colonization and growth of marine organisms.

Over the long term, as existing datasets are expanded upon with results from recent offsetting monitoring programs implemented in the region, the suitability of constructing rocky reefs and/or addition of three-dimensional substrates as offset habitat capable of providing stable and functional fish habitat over time will be further validated.

RECOMMENDATIONS / LESSONS LEARNED

In 2021, DFO closed the *Fisheries Act* Authorization (FAA) for the Milne Port Ore Dock, based on their review of the results of the 6-year Ore Dock offset monitoring program which was completed in 2020. Based on the results collected over the 6 years, the offset habitat remained stable; colonization of aquatic vegetation and benthic invertebrates was observed, with percent cover, species richness and abundances generally increasing over the monitoring period from 2015 to 2020, reflecting natural succession patterns. Fish were also shown to use the

constructed offset habitat. The results of this monitoring help to further validate the suitability of substrate additions for fish habitat offset measures in the region.

Baffinland will continue to monitor the success of fish habitat offsetting measures associated with the construction of the recently constructed Freight Dock. Baffinland will also continue to provide the results of the annual monitoring program to DFO, the MEWG and other interested parties, as requested.

Baffinland remains committed to exploring potential offsetting options in both freshwater and marine environments to address potential losses in fish habitat associated with permanent habitat alteration or destruction of fish habitat associated with future permitting requirements, as needed. Although engagement activities were not possible in 2021 due to the COVID-19 Pandemic, Baffinland intends to move forward with engagement activities in 2022 in order to get feedback on the progress it has made for identifying suitable locations for the construction of future offset measures.

Project Certificate Condition No. 116

Category	Marine Environment – Blasting
Responsible Parties	The Proponent, the Department of Fisheries and Oceans
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives.
Term or Condition	Prior to construction, the Proponent shall develop mitigation measures to minimize the effects of blasting on marine fish and fish habitat, marine water quality and wildlife that includes, but is not limited to compliance with the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) as modified by the Department of Fisheries and Oceans for use in the North and as revised from time to time.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

In the event blasting is required, Baffinland will provide operational control procedures in consultation with the MEWG and DFO that prescribe the requirements for the use of explosives in or near marine water bodies to ensure the activity is carried-out in accordance with DFO guidance and best practice.

RESULTS

No blasting occurred in the marine environment or in nearshore areas during 2020.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 117

Category	Marine Environment – Blasting
Responsible Parties	The Proponent, Fisheries and Oceans Canada
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives.
Term or Condition	The Proponent shall ensure that blasting in, and near, marine water shall only occur during periods of open water. Blasting in, and near, fish-bearing freshwaters shall, to the greatest degree possible, only occur in open water. If blasting is required during ice-covered periods, it must meet requirements established by Fisheries and Oceans Canada.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not Active
Status of Compliance	Not applicable
Stakeholder Review	Fisheries and Oceans Canada (DFO), Marine Environment Working Group (MEWG)
Reference	Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2021e) Environmental Protection Plan (Baffinland, 2021d) Quarry Blasting Operations Management Plan (Baffinland, 2013b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Not Applicable in 2021. Blasting in the marine environment has not occurred on site to date. In the event it is required, Baffinland will provide operational control procedures in consultation with the MEWG that prescribe the requirements for the use of explosives in or near marine water bodies to ensure the activity is carried-out in accordance with DFO guidance and best practice, including the requirement that blasting in, and near, marine water shall only occur during periods of open water.

For freshwaters, Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP) and Quarry Blasting Operations Management Plan have been developed to include the requirements for the use of explosives (blasting) in or near freshwater bodies. The requirements were developed in accordance with DFO guidance, including the *Guidelines for Use of Explosives In or Near Canadian Fisheries Water, 1998* (Wright and Hopky, 1998), in order to mitigate possible effects on fish habitat and fish health.

RESULTS

Blasting in the marine and freshwater environment has not occurred on site to date.

TRENDS

To date, no blasting has occurred within the required setback distances at the Project.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 118

Category	Marine Environment – Blasting
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To prevent impacts to marine fish and fish habitat from explosives.
Term or Condition	The Proponent shall incorporate into the appropriate mitigation plan prior to construction, thresholds for the use of specific mitigation measures meant to prevent or limit marine wildlife disturbance, such as bubble curtains for blasting, and nitrate removal.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Milne Port – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

No marine construction activity occurred at Steensby or Milne Port in 2020.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 119

Category	Marine Environment - Ringed Seals
Responsible Parties	The Proponent, Marine Environment Working Group
Project Phase(s)	Construction
Objective	To prevent impacts to ringed seals from icebreaking associated with Project shipping.
Term or Condition	The Proponent shall, in conjunction with the Marine Environment Working Group, monitor ringed seal birth lair abundance and distribution for at least two years prior to the start of icebreaking to develop a baseline, with continued monitoring over the life of the Project as necessary to test the accuracy of the impact predictions and determine if mitigation is needed. Monitoring shall also include a control site outside of the Project's zone of influence.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Not applicable
Status of Compliance	Not applicable
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 Ringed Seal Aerial Survey Monitoring Program (Golder, 2022f)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.16

METHODS

Winter shipping has not been required in the Early Revenue Phase of the Project. Baffinland's shipping-related management and mitigation measures takes into consideration key sensitive periods of ringed seal. Specifically, shipping and icebreaking will be conducted outside of key sensitive periods including pupping, nursing and mating periods (i.e., January to May, no temporal overlap with Project-related shipping). Despite this, Baffinland undertook ringed seal aerial surveys along the Northern Shipping Route Study Area in June 2021 in response to concerns raised by the MHTO that ringed seal abundance and distribution has changed since Project shipping began, and more acutely since icebreaking activities in the shoulder season commenced in 2018.

Prior to 2021, seal aerial surveys were completed in the Regional Study Area in years 2006 (exploratory only), 2007 and 2008 to characterize baseline conditions in support of the FEIS (Baffinland, 2012). Surveys completed in 2007 and 2008 focused on Milne Inlet and Koluktoo Bay. Baffinland later completed surveys in 2014 to update baseline data on ringed seal density and distribution. DFO subsequently completed surveys in 2016 and 2017 to assess spring distribution and density of ringed seal in Eclipse Sound and Milne Inlet areas (Young et al., 2019; Yurkowski et al., 2019).

In 2021, ringed seal aerial surveys took place over a two-week period with flights occurring between 8 to 14 June 2021. The survey team consisted of two biologists with marine mammal survey experience, two pilots, and one mechanic.

The study area for the survey was based on the boundaries used by DFO. The aerial surveys were designed to characterize ringed seal distribution and density in the RSA during the period when ringed seals were hauled out on the ice during the peak moulting period and to allow for comparison with past surveys. Aerial surveys were

conducted in four strata within the RSA: Eclipse Sound (ES), Milne Inlet (MI), Tremblay Sound (TS), and Navy Board Inlet.

Survey design and data collection methodology followed the preferred method identified by Young et al. (2019), using the strip-transect analysis of infrared imagery, coupled with digital photographs. Surveys were flown during June 2021 using a de Havilland Twin Otter (DHC-6) fixed-wing aircraft equipped with a ventral camera port. Surveys planned for ES, MI, TS, and NB consisted of 36, 13, 2, and 23 transects, respectively. Four to six transects on the eastern end of the ES stratum were not flown at the request of the Mittimatalik Hunters & Trappers Organization (MHTO) to avoid potential interference with the community harvesters along the Pond Inlet floe edge.

RESULTS

Results from the 2021 forward-looking infrared (FLIR) survey indicated that ringed seal densities are stable in ES and NB strata and increased in MI stratum compared to surveys flown in 2016. A comparison in the ES stratum of the highest estimate in 2021 (1.04 seals/km², CV = 0.08) with the highest estimate in 2016 (0.92 seals/km², CV = 0.09) indicated no statistically significant difference in density estimates in ES stratum (z-score = 1.02, p = 0.31). Similarly, a comparison in the NB stratum of the highest estimate in 2021 (0.83 seals/km², CV = 0.12) with the highest estimate in 2016 (0.74 seals/km², CV = 0.43) indicated no statistically significant difference in density estimates in NB stratum (t-test = 0.27, p = 0.79). In the MI stratum ringed seal densities were higher in 2021 compared to previous surveys in 2016 and 2017. A comparison of the highest estimate in 2021 (2.84 seals/km², CV = 0.15) with the highest estimate in 2016 (1.40 seals/km², CV = 0.12) indicated a statistically significantly higher ringed seal density observed in 2021 in the MI stratum (t-test = 3.14, p = 0.007). However, surveys flown prior to 2016 indicated MI stratum varies in ringed seal densities annually.

Results from the visual strip-transect analysis found similar ringed seal density estimates in ES stratum between 2014 and 2016. A comparison of the highest estimate in 2014 (0.60 seals/km², CV = 0.07) with the highest estimate in 2016 (0.52 seals/km², CV = 0.10) indicated no statistically significant difference in ringed seal densities (z-score = 1.25, p = 0.21). In the MI stratum ringed seal densities appeared higher in 2014 compared to subsequent surveys in 2016. A comparison of the highest estimate in 2014 (1.45 seals/km², CV = 0.14) with the highest estimate in 2016 (0.31 seals/km², CV = 0.17) indicated a statistically significantly higher density observed in 2014 in the MI stratum (t-test = 5.49, p < 0.001).

The MI stratum appeared to fluctuate in ring seal density annually. Ringed seal surveys flown in 2008 and 2014 saw high densities of ringed seal in MI (1.44 seals/km² and 1.45 seals/km², respectively; Baffinland, 2012) whereas ringed seal surveys flown in 2007 and 2016 observed lower densities of ringed seal in MI (0.27 seals/km² and 0.31 seals/km², respectively; Baffinland, 2012; Young et al., 2019). Based on visual strip-transect surveys flown in 2007, 2008, 2014, and 2016, ringed seal densities appeared to be stable in ES and variable in MI strata.

Results from the line-transect analysis found in the ES stratum ringed seal densities were higher in 2014 (ranged from 1.07 to 1.27 seals/km²) compared to 2016 (ranged from 0.57 to 0.79 seals/km²) surveys. A comparison of the highest estimate in 2014 (1.27 seals/km², CV = 0.09) with the highest estimate in 2016 (0.79 seals/km², CV = 0.11) indicated a statistically significantly higher ringed seal density observed in 2014 in the ES stratum (t-test = 3.36, p = 0.008). Similarly, in the MI stratum, ringed seal densities were higher in 2014 (ranged from 1.14 to 2.13 seals/km²) compared to 2016 (ranged from 0.93 to 1.27 seals/km²) surveys. A comparison of the highest estimate in 2014 (2.13 seals/km², CV = 0.12) with the highest estimate in 2016 (1.27 seals/km², CV = 0.16) indicated a statistically significantly higher ringed seal density observed in 2014 in the MI stratum (t-test = 2.66, p = 0.03).

Comparing 2021 infrared strip-transect densities (1.04 seals/km² in ES and 2.84 seals/km² in MI) to 2014 line-transect distance analysis densities (1.27 seals/km² in ES and 2.13 seals/km² in MI), no statistical difference was observed between the two years (t-test = 1.63, p = 0.013 and t-test = 1.44, p = 0.017, respectively). These results indicated ring seal densities have not changed in the RSA since the onset of shipping operations in 2015, and since Project icebreaking activities began in the shoulder seasons in 2018.

TRENDS

The results of the 2021 RSASP showed ringed seal densities have overall remained stable with some annual variations since the onset of shipping operations in 2015, and since Project icebreaking activities began in the shoulder seasons in 2018. since the onset of shipping or ice-breaking activities in the RSA. These results confirmed that mitigation measures were functioning as intended and that these Project activities were are being managed in a way that has not adversely affected ringed seals.

RECOMMENDATIONS / LESSONS LEARNED

Mitigation measures in place for ringed seal have been carefully developed to completely avoid shipping impacts on ringed seal during periods when they are “grouped up” (i.e., the winter and spring) when group behaviour is critical to reproductive activities such as mating. The timing of the shipping season protects seals during the basking period, and aims to avoid impacts on seals at the time when they start maintaining breathing holes during initial ice freeze-up. Results from the 2021 surveys demonstrate that mitigations are functioning as intended. Baffinland’s technical marine mammal experts have recommended that the results from 2021 indicate that follow-up surveys in 2022 are not required.

Project Certificate Condition No. 120

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operation, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals associated with Project shipping.
Term or Condition	<p>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:</p> <ol style="list-style-type: none"> Wildlife will be given right of way. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	<p>Steensby Port – Not Active</p> <p>Milne Port – Active</p>
Status of Compliance	In Compliance
Stakeholder Review	Marine Environmental Working Group (MEWG)
Reference	<p>2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)</p> <p>Standing Instructions and General Information for Masters of Vessels Loading at Milne Inlet Port (Fednav, 2021)</p> <p>2021 MEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/Appendix C.1

METHODS

Several mitigations, including those relevant to shipping operations and icebreaking activities associated with the current Project committed to by Baffinland to avoid and/or minimize adverse effects from shipping on marine mammals along the Northern Shipping Route are adhered to by Baffinland and identified in Baffinland's Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) including:

- Defined shipping lane throughout RSA.
- Maintain constant speed and course when possible.
- No breaking of landfast ice.
- Between the period of 01 July and 30 July, a maximum of one icebreaker transit (with escorted vessels) will occur per 24-hour period where ice concentrations of 6/10 or greater cannot be avoided along the shipping route.

- Between the period of 01 July and 30 July, a maximum of two icebreaker transits (with escorted vessels) will occur per 24-hour period where ice concentrations of 3/10 or greater cannot be avoided along the shipping route.
- All Project vessels will reduce speeds to a voluntary maximum of 9 knots when travelling within the RSA.
- Establishment of a 40-km buffer zone (set-back area) at the floe-edge (extending from the Nunavut Settlement Boundary).
- All icebreaking activities will be conducted outside of the period of ringed seal denning, pupping, nursing and breeding/mating periods.
- When marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows).
- All Project vessels will be provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice.
- All Project vessels will be provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group.
- COVID-19 restrictions allowing, Baffinland will place Marine Wildlife Observers (via the SBO Program) on icebreaking vessels during the shoulder season that will be responsible for recording relative abundance, group composition and behavior of marine mammals, and if relevant any incidences of marine mammal strike of near misses with Project vessels.
- Posting of ice analyst on board icebreaking vessels.
- Project aircrafts (helicopter and airplanes) will maintain an altitude of 450 m over marine waters when possible.
- Establishment of restricted “no-go” zones to avoid key sensitive areas and hunting camp areas (Koluktoo Bay, Tremblay Sound, western shoreline of Milne Inlet).
- No drifting in Eclipse Sound.
- Maximum of three (3) vessels anchored at Ragged Island.
- Limiting vessel idling.

It is important to note that several of these mitigation measures have been implemented on a voluntary basis by Baffinland and exceed any applicable regulatory requirements in Canada. This suite of measures represents a more conservative practice of vessel traffic management than is demonstrated by any other industrial/commercial shipping operator or government vessel in the RSA (i.e., Canadian Coast Guard, DFO).

Additionally, since receiving approval from the NIRB on the Extension Request, Baffinland has worked with DFO to update Baffinland’s commitments on the transit restrictions mitigations, which were applied beginning in summer 2021. The commitments are as follows:

1. Apply spring transit restriction mitigations as long as ice concentrations, as defined by the Canadian Ice Service, of greater than 3/10 persist along the Northern Shipping Route, or meet the obligations of applicable commitments to others if more conservative, to determine the earliest date for commencing the shipping season. Initiation of this commitment began in 2021.

2. As a temporary measure for 2021, Baffinland committed to avoid icebreaking during the 2021 early shoulder season; that is, shipping was not to commence until a continuous path of 3/10^{ths} or less ice concentrations was shown to be present between the entrance of Eclipse Sound and Milne Port.
3. Beginning in 2021, the following transit restriction mitigations were applied during the fall shoulder season:
 - When a continuous sailing route of open water and/or new ice (<10 cm) occurs between the entrance of Pond Inlet and Milne Port, then icebreaker transits and other unescorted vessels in the RSA may proceed under open-water operating conditions.
 - A maximum of two (2) transits or four (4) half transits will occur per day (24-h period) where grey ice (10 to 15 cm) cannot be avoided along the shipping route.

No breaking of landfast ice along the shipping route.

It is important to note that several of these mitigation measures have been implemented on a voluntary basis by Baffinland and exceed any applicable regulatory requirements in Canada. This suite of measures represents a more conservative practice of vessel traffic management than is demonstrated by any other industrial/commercial shipping operator or government vessel in the RSA (i.e., Canadian Coast Guard, the Department of Fisheries and Oceans).

Project-related vessel tracks and associated speeds along the Northern Shipping Route are recorded throughout the shipping season using the Automatic Identification System (AIS), which tracks the movement of each vessel using an onboard AIS transceiver with integrated Global Positioning System (GPS). The AIS signals in the Project area are recorded by base stations set up at Pond Inlet and Bruce Head; and when out of range of the base stations, through satellite based AIS receivers (exactEarth® AIS archive). Vessel tracks are publicly accessible through the Baffinland website during the shipping season and at the Baffinland office located in the Baffinland/MHTO building on a large wall-mounted monitor, COVID-19 restrictions allow. No daily maps were prepared showing Project vessel tracks on days when ice concentrations were 1/10 or greater since no icebreaking activities occurred in 2021.

RESULTS

Project vessel tracks from 2021 are plotted in Figure 4.13. The Project vessel tracks shown approaching and departing Pond Inlet in 2021 are from the MSV *Botnica*, which was the research vessel used to deploy and retrieve an acoustic monitoring device near Pond Inlet (see Figure 4.13). Apart from these instances, there were no Project vessel deviations from the nominal shipping route in the RSA during the 2021 shipping season

Table 4.29 presents vessel speed information for all Project-related vessels calling at Milne Port in 2021. A total of 74 ore carrier voyages (comprising 39 ore carrier vessels), seven (7) freight vessels/tanker voyages (comprising three (3) vessels), two (2) tugs, and one (1) icebreaker called to Milne Port during the 2021 shipping season. Project vessels traveled below the 9 knot speed limit for 99.4% of their transit period in the RSA (Table 4.30). The maximum recorded travel speed for an ore carrier in 2021 was 9.8 knots. The maximum recorded speed for a freight / fuel tanker in 2021 was 9.6 knots. The proportional breakdown of vessel travel speed in the RSA during the 2021 shipping season is presented for all vessels combined (ore carriers and cargo/fuel vessels) in Figure 4.14. (see PC Condition No. 105).

TRENDS

No unplanned major deviations from the nominal Northern Shipping Route have occurred by Project vessels in the RSA during the first seven (7) years of iron ore shipping in this area (2015 to 2021).

No ship strikes on marine mammals have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs. A single seabird strike was recorded over the five years of SBO monitoring conducted in the RSA. This occurred during the 2019 SBO Program (long-tailed duck).

RECOMMENDATIONS / LESSONS LEARNED

To ensure adherence to the SMWMP, Baffinland will continue to monitor vessel tracks and associated speeds using shore-based AIS stations at Pond Inlet and Bruce Head, and satellite-based vessel tracking using the exactEarth® archive.

In 2021, all Project vessels (ore carriers, fuel tankers, cargo ships, tugs, icebreaker) will be subject to the mitigation measures outlined above (as part of the annually updated SITM) when under contract to Baffinland, including standing instructions to travel through Eclipse Sound and Milne Inlet at speeds of no greater than 9 knots and to avoid deviating from the nominal Northern Shipping Route. Baffinland will continue to maintain active vessel tracking using AIS notification alerts.

Project Certificate Condition No. 121

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent, Fisheries and Oceans Canada, Environment Canada
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.
Term or Condition	<p>The Proponent shall immediately report any accidental contact by project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada, respectively, by notifying the appropriate regional office of the:</p> <ul style="list-style-type: none"> • Date, time and location of the incident; • Species of marine mammal or seabird involved; • Circumstances of the incident; • Weather and sea conditions at the time; • Observed state of the marine mammal or sea bird colony after the incident; and, • Direction of travel of the marine mammal after the incident, to the extent that it can be determined.
Relevant Baffinland Commitment	80, 83
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	<p>Steensby Port – Not Active</p> <p>Milne Port – Active</p>
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC)
Reference	2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland's Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) mandates the recording of any contact that occurs between Project vessels and marine mammals or seabird colonies.

In order to ensure that interactions with marine wildlife and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to monitor for potential ship strikes on marine mammals and seabirds in the RSA and implemented this program in 2018 to 2019 by deploying Marine Wildlife Observers on the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. Unfortunately, due to boarding restrictions related to the COVID-19 Pandemic, the SBO program could again not be implemented as planned in 2021.

As an alternative, Baffinland partnered with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sighting program through the participation of the MSV *Botnica*, Nordic Bulk Carriers and

Olgendorff. The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program. Training was made available to participating vessel representatives through a new platform developed by MMON.

RESULTS

There were no marine mammal or seabird strikes reported in 2021, and therefore no notification was required.

TRENDS

From 2013 through 2021, no notifications of accidental contact with marine mammals or seabirds were required, with the exception of the recent seabird strike that occurred in October 2019. Given that this is the first seabird strike to occur since 2013, there is insufficient data to undertake any type of trend analysis.

RECOMMENDATIONS / LESSONS LEARNED

Given that only one (1) seabird strike has been recorded to date (from 2019), no additional mitigation measures are deemed necessary based on the very low frequency of occurrences. Additional recommendations will be considered should this be observed on a recurring basis.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV *Botnica* will be evaluated for 2021 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. The implementation of the incidental sighting program in collaboration with MMON is also expected to continue into 2022, regardless of whether activities through the SBO monitoring program resumes.

Project Certificate Condition No. 122

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.
Term or Condition	The Proponent shall summarize and report annually to the NIRB regarding accidental contact by project vessels with marine mammals or seabird colonies through the applicable monitoring report.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be provided in the Annual Report to the NIRB.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland's Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) mandates the recording of any contact that occurs between Project vessels and marine mammals or seabird colonies.

In order to ensure that interactions with marine wildlife and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to primarily monitor for potential ship strikes on marine mammals and seabirds in the RSA, implemented this program in 2018 to 2019 by deploying Marine Wildlife Observers on the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol. Unfortunately, due to boarding restrictions related to the global COVID-19 Pandemic, the SBO program could again not be implemented in 2021.

As an alternative, Baffinland partnered with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sighting program through the participation of the MSV *Botnica*, Nordic Ore Carriers and Olgendorff. Training was made available to participating vessel representatives through a new platform developed by MMON.

RESULTS

There were no notifications of marine mammal or seabird strikes in 2021.

TRENDS

From 2013 through 2021, no notifications of accidental contact with marine mammals or seabirds were required, with the exception of the recent seabird strike that occurred in October 2019. Given that this is the first seabird strike to occur since 2013, there is insufficient data to undertake any type of trend analysis.

RECOMMENDATIONS / LESSONS LEARNED

Given that only one (1) seabird strike has been recorded to date (from 2019), no additional mitigation measures are deemed necessary based on the very low frequency of occurrences. Additional recommendations will be considered should this be observed on a recurring basis.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV *Botnica* will be evaluated for 2022 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. The implementation of the incidental sighting program in collaboration with MMON is also expected to continue into 2022, regardless of whether activities through the SBO monitoring program resumes.

Project Certificate Condition No. 123

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.
Term or Condition	The Proponent shall provide sufficient marine mammal observer coverage on project vessels to ensure that collisions with marine mammals and seabird colonies are observed and reported through the life of the Project. The marine wildlife observer protocol shall include, but not be limited to, protocols for marine mammals, seabirds, and environmental conditions and immediate reporting of significant observations to the ship masters of other vessels along the shipping route, as part of the adaptive management program to address any items that require immediate action.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

In order to ensure that interactions with marine mammals and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to primarily monitor for potential ship strikes on marine mammals and seabirds in the RSA, and secondarily to collect observational data on the presence, relative abundance and distribution of marine mammals and seabirds within the boundaries of the RSA relative to Project vessel operations.

The SBO Program was first run in 2013 to 2015 and was subsequently resumed in 2018 and 2019. The 2013 to 2015 SBO Program took place during the construction phase at Milne Port (2013 and 2014) and during Year 1 of shipping operations (2015). As Baffinland had not designed or constructed purpose-built ore carriers as originally planned, there was reliance on placing the observers aboard market vessels in order to conduct the monitoring. Fuel tanker and sealift vessel traffic in and out of Milne Port served as the SBO observation platform during the 2013 to 2015 program. Observers boarded the ship in Pond Inlet, disembarked at Milne Port and returned to Pond Inlet via community charter flight for the subsequent vessel boarding. The SBO Program was put on hold in 2016 due to concerns regarding safe onboarding of the observers on the vessels in Pond Inlet (as boarding occurred at sea).

In order to ensure that interactions with marine wildlife and Project shipping activities are effectively monitored, Baffinland developed the SBO Program to monitor for potential ship strikes on marine mammals and seabirds in the RSA and implemented this program in 2018 to 2019 by deploying Marine Wildlife Observers on the MSV *Botnica*, an icebreaker that was commissioned by Baffinland to serve as an escort vessel to ore carriers at the beginning and end of the shipping season. The MSV *Botnica* provided a safe climate-controlled viewing platform 20 m above sea level,

where Marine Wildlife Observers (MWOs) could comfortably and effectively observe marine wildlife and environmental conditions. Seabirds were monitored using the Canadian Wildlife Service (CWS)'s Eastern Canada Seabirds at Sea (ECSAS) protocol (Gjerdrum et al., 2012). Unfortunately, due to boarding restrictions related to the global COVID-19 Pandemic, the SBO program could not be implemented in 2021, as was the case in 2020.

As an alternative, Baffinland partnered with the Marine Mammal Observation Network (MMON) to pilot a marine mammal incidental sighting program through the participation of the MSV *Botnica*, Nordic Bulk Carriers and Olgendorff (new 2021 participant). The consideration of Baffinland partnering with MMON was first suggested during a MEWG meeting on June 6, 2018 since Groupe Desgagnés Inc. (including subsidiary Nunavut Sealink & Supply Inc.), a cargo sealift contractor to Baffinland, had been an active member of the program. Virtual training was provided to participating vessel representatives in collaboration with Green Marine and MMON, which included instructions on how to report whale strikes should they occur.

In years when Baffinland undertakes marine mammal aerial surveys during the shoulder season, data collected by marine mammal observers is communicated with vessel captains through Baffinland's daily shipping calls.

RESULTS

Detailed results for the 2021 Incidental Marine Mammals Sightings Pilot Program are presented as part of Summary Sheet for PC Condition No. 103 and 106.

Similar to 2020, seabird sightings using the ECSAS protocol were not possible in 2021.

Baffinland completed early shoulder season marine mammal aerial surveys just prior, during and after the start of the shipping season in 2021. The aim of these reconnaissance surveys was to collect data on the presence/absence and distribution of marine mammals in the RSA in relation to ice conditions (for additional information refer to Summary Sheet for PC Condition No. 101, and 109). The information gathered on marine mammal distribution was communicated during daily shipping briefings with representatives from Baffinland's Shipping, Sustainable Development, Operations teams, and Fednav (including ice analysts). Sightings information was subsequently relayed to vessel captains so that they were made aware of locations of marine mammals in the area during their transit through the RSA in the presence of ice.

TRENDS

No ship strikes on marine mammals have been recorded to date through any of the previously run SBO programs. Similarly, no ship strikes on marine mammals have been reported by ship operators since the start of the Project, including ore carriers, fuel/cargo ships and support tugs, and during reporting year 2021. The only seabird strike reported over six years of monitoring occurred during the 2019 SBO Program.

RECOMMENDATIONS / LESSONS LEARNED

Safety concerns that were raised regarding the initial SBO program (that led to the postponement of the program in 2016) were mitigated through the use of the MSV *Botnica* as the survey platform and boarding the vessel in Milne Port in 2018 and 2019. This included on-board accommodation for Inuit observers to allow for regular wildlife surveys over consecutive days. In doing so, the need to conduct at-sea boarding of observers on different survey vessels was no longer necessary.

Given the success of the SBO program in prior years, continuation of the program utilizing the MSV *Botnica* will be evaluated for 2022 should COVID-19 Pandemic-related vessel boarding restrictions be lifted. Irrespective of potential

boarding restrictions still being in effect during the 2022 shipping season, Baffinland will continue with its incidental marine mammals sightings program in collaboration with MMON and participating bulk carriers.

Project Certificate Condition No. 124

Category	Marine Environment - Marine Mammal Interactions
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To prevent impacts to marine mammals and marine fish populations from increased harvesting pressures in Project areas.
Term or Condition	The Proponent shall prohibit project employees from recreational boating, fishing, and harvesting of marine wildlife in project areas, including Steensby Inlet and Milne Inlet. The Proponent is not directed to interfere with harvesting by the public in or near project areas, however, enforcement of a general prohibition on harvesting in project areas by project employees during periods of active employment (i.e. while on site and between work shifts) is required.
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Fisheries and Oceans Canada (DFO), Crown Indigenous Relations and Northern Affairs Canada (CIRNAC), Qikiqtani Inuit Association (QIA), Terrestrial Environment Working Group (TEWG)
Reference	Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022) Hunting and Fishing (Harvesting) Policy (Baffinland, 2013c) Environmental Protection Plan (Baffinland, 2021d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

As part of the Site orientation and training on the Environmental Protection Plan (EPP) individuals coming onto site participate in cultural awareness training and are provided with an overview of the policies outlined in the Hunting and Fishing (Harvesting) Policy (Baffinland, 2013c). Baffinland does not interfere with rights of public hunting or fishing near or on the Project Development Area. All visitors that check in with site security and visitor activities reported to security are tracked through a Hunter and Visitor Log.

Upon approval from DFO, fishing activities and fish population health surveys occur annually for the collection of environmental data and fish population health metrics by trained contracted professionals for aquatic effects assessment. Required scientific permits are applied for and received before sampling or fish population health programs occur. Results are published under various annual reports. Scientific collection permits are intended for non-lethal programs.

RESULTS

No incidences of Project personnel hunting or fishing within Impact Area lands leased to Baffinland and/or the PDA occurred in 2021.

Consulting groups Minnow Environmental Inc., North South Consultants and Golder Associates Inc. completed various fish surveys over the course of 2021 to collect environmental data and fish population health metrics. The purpose was to gather information on distribution, relative abundance, size distribution and other biological

characteristics to evaluate potential mine related effects as required under *Fisheries Act* Authorizations, licences and applicable management plans.

In 2021, a total of 199 land use visitor person-days were recorded at Project sites, which is a 40% decrease from 2020. The low number of visitor check-ins in 2021 was most likely due to the ongoing COVID-19 Pandemic. Visitors frequenting the area were often hunting, resting, stopping for food, or having snowmobiles serviced. Baffinland provided food, beverages, transportation, tools, construction supplies, fuel and mechanical assistance to hunters and other visitors as requested and as available.

TRENDS

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

Baffinland continues to accommodate all hunting parties and other visitors that travel to the Project. However, to prevent potential transfer of the COVID-19 virus to Nunavummiut, all visits to Project facilities by non-project staff were temporary halted during 2021. As a result of the temporary closure, all camps and accommodations were closed to non-Project staff, however, the HTO Cabins and Visitor Communication Centers remained available for use by hunters/visitors.

To eliminate any potential contact with site personnel during COVID-19, a non-contact Visitor Communication Center was established in 2020 at each work site (Mary River and Milne Inlet), eliminating the necessity for visitors and Baffinland employees to interact closely, and was continued to be used in 2021. The Visitor Communication Center includes a radio with a dedicated channel for hunters/visitors to contact Security directly. Requests for food and other goods were dropped off at the Visitor Communication Centers at a predetermined drop off time.

The BCLOs continued to advise Nunavummiut of the COVID-19 protocols in place at the Project. Baffinland continued to maintain COVID-19 signage at the MHTO hunting cabins and Visitor Communication Centers. Hunter and visitor supply requests continued to be accommodated in 2021 based upon supplies available on site.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to monitor and implement the policy banning all employees and contractors from hunting and fishing within the Project Development Area and accommodating all hunting parties.

Project Certificate Condition No. 125

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assess acceptability of acoustic deterrent devices for the general public.
Term or Condition	Prior to use of acoustic deterrent devices, the Proponent shall carry out consultations with communities along the shipping routes and nearest to Steensby Inlet and Milne Inlet ports to assess the acceptability of these devices. Feedback received from community consultations shall be incorporated into the appropriate mitigation plan.
Relevant Baffinland Commitment	41
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable. No acoustic deterrents have been required and therefore considered for use on the Project to date.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 125 (a)

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure public acceptability of project vessel anchor sites and reduce potential conflicts between project marine shipping and local harvesting.
Term or Condition	The Proponent shall consult with potentially-affected communities and groups, particularly Hunters' and Trappers' Organizations regarding the identification of project vessel anchor sites and potential areas of temporary refuge for project vessels along the shipping routes within the Nunavut Settlement Area. Feedback received from community consultations shall be incorporated into the most appropriate mitigation or management plans.
Relevant Baffinland Commitment	35
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Mittimatalik Hunters and Trappers Organization (MHTO)
Reference	Northern Shipping Corridor Anchorage Locations (Baffinland, 2020j) Marine Shipping and Vessel Management Report (Baffinland, 2020k) Marine Shipping and Vessel Management Report (Baffinland, 2021p) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) Standing Instructions and General Information for Masters of Vessels Loading at Milne Inlet Port (Fednav, 2021) 2021 Community Engagement Records 2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.1

METHODS

Baffinland continues to interact with the Hamlet of Pond Inlet and the MHTO to better understand potential concerns associated with its shipping operations, and includes discussions related to anchorage sites. The evaluation on the suitability of alternative anchorage sites for Project-related vessels considers a number of safety, ecological and logistical factors. Accordingly, Baffinland completed an alternative anchorage options analysis in early 2020 that included locations suggested by the MHTO (e.g., Guy's Bight, Erik Harbour; see Figure 1 in Attachment 1 of Baffinland (2020j) submitted to NIRB on June 8, 2020 (NIRB Registry. No. 327657; Baffinland, 2019g) through previous engagement efforts and discussed these results during the End of 2019 Shipping season meeting in Pond Inlet. Baffinland also presented its analysis during the 2020 Pre-shipping season held in July 2020 (Baffinland, 2020k). As indicated in Baffinland (2020j), alternate locations within the shipping corridor will need to meet the following aspects to be considered a suitable alternative to Ragged Island: (i) is within close proximity to Milne Port, (ii) where

depth is no greater than 100 m, (iii) where width allows for safe maneuverability, (iv) that provides refuge during weather events, (v) that allows for three (3) vessels to be safely anchored at the same time, and (vi) is not considered to be of heightened ecological importance (e.g., Koluktoo Bay or Tremblay Sound).

As indicated previously and again in Baffinland (2021h), Baffinland intends to continue to utilize the existing anchorage and drifting zone with the limitation of no more than three (3) vessels present until other acceptable alternatives can be identified in consultation with the MHTO.

RESULTS

As indicated in Baffinland (2020j), alternate locations within the shipping corridor will need to meet the following aspects to be considered a suitable alternative to Ragged Island: (i) is within close proximity to Milne Port, (ii) where depth is no greater than 100 m, (iii) where width allows for safe maneuverability, (iv) that provides refuge during weather events, (v) that allows for three (3) vessels to be safely anchored at the same time, and (vi) is not considered to be of heightened ecological importance (e.g., Koluktoo Bay or Tremblay Sound).

To minimize community concerns expressed, Baffinland limits the number of ships anchored at Ragged Island or drifting in Eclipse Sound to a maximum of three (3) Project-related vessels. Baffinland also commits to restricting vessels drifting to the extent possible in Eclipse Sound (unless warranted for safety reasons) since the 2019 shipping season. These management practices continued to be implemented in 2021.

Concerns in 2021 were also raised regarding the drifting of ore carriers to the south of Ragged Island following an observation made by hunters on August 1 of a vessel sailing inbounds very slowly after releasing anchor. Due to safety reasons, the vessel captain made the decision after releasing anchor to drift slowly southwards to allow passage of an outbound ore carrier after it had cleared Stephens Island as the vessel captain was not comfortable passing under these conditions. Baffinland intends to further workshop this issue to minimize future occurrences as it is preferred that once vessels release anchor at Ragged Island, that they do not drift.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to consult with the MHTO and other key stakeholders throughout the life of the Project to mitigate Project effects on local communities and other resource users to the fullest extent practicable. Baffinland will provide updates as warranted through future annual reporting efforts.

Project Certificate Condition No. 126

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To incorporate local input into monitoring data collection.
Term or Condition	The Proponent shall design monitoring programs to ensure that local users of the marine area in communities along the shipping route have opportunity to be engaged throughout the life of the Project in assisting with monitoring and evaluating potential project-induced impacts and changes in marine mammal distributions.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Responsible Party	Baffinland
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland's ongoing development and refinement of monitoring programs and protocols considers input from local community members (e.g., concerns that are communicated through community workshops) as well as discussions with the MEWG, in which Inuit organizations actively participate. For example, the Qikiqtani Inuit Association (QIA) has been a member of MEWG since its inception and the Mittimatalik Hunter and Trapper Organization (MHTO) joined the MEWG in 2016.

Unlike previous years, most in-person engagements with the MHTO continued to be limited in 2021 due to various public health restrictions related to the COVID-19 Pandemic from March 2020 onwards. In response, Baffinland has continued to rely on a written exchange of information in the form of written summaries (Inuktitut and English) of planned annual surveys via email and by providing hard copies to the MHTO through the BCLO for their review. Baffinland also makes numerous meeting requests to the MHTO to seek feedback on program plans, to further share program details, and to provide opportunity for questions to be answered.

In a non-Pandemic scenario, Baffinland's monitoring programs strive to actively involve local Inuit participation and take into account community concerns as well as discussions with the MEWG, in which Inuit organizations actively participate prior to program implementation.

Baffinland has also implemented since 2019 a Pond Inlet-based Shipping Monitor Program, which consists of hiring a minimum of two full-time employees to actively track daily Project vessel movements in the RSA through the use of a tracking software exactEarth®, and in relation to reported marine mammal sightings (as shared by residents of Pond Inlet through marine VHF radio and Baffinland monitoring teams). Shipping Monitors track any feedback they receive over the shipping season and answer questions as needed, and provide direct liaison between the

community of Pond Inlet, hunters and Baffinland's headquarters, including the Shipping and Sustainable Development departments).

RESULTS

Input on the design of the 2021 monitoring programs was sought through a number of mechanisms in 2021, in addition to building upon previous years' programs. The MEWG via a teleconference meeting held on May 13, 2021 discussed preliminary 2020 marine mammal monitoring results and aerial ringed seal surveys planned for spring 2021. Additional discussions on 2021 marine programs were held on June 29, 2021 (refer to Appendix C.1). Monitoring results are reviewed annually by MEWG members, and by Inuit participants through in-person meetings and actively during participation in monitoring programs such as the Bruce Head Shore-based Monitoring, aerial surveys and Marine Environmental Effects Monitoring Program and Aquatic Invasive Species programs, unless prohibited due to COVID-19 restrictions.

A teleconference call was also held by Baffinland and representatives of the MHTO, Hamlet of Pond Inlet on May 28, 2021 to discuss the 2020 and 2021 seasons and anticipated field programs. Materials distributed as part of this meeting including minutes, and corresponding slide decks, as well as relevant follow-up items provided via email are included in Appendix G.4.

A total of seven (7) individuals were employed from either Pond Inlet or Arctic Bay to participate in the 2021 marine monitoring programs (aerial surveys, Bruce Head Shore-based Monitoring, MEEMP and AIS Monitoring and baseline Fish and Fish Habitat Program based in Steensby Inlet). The hiring of Inuit was made possible mid-summer when travel restrictions to the Mine Site from communities was approved by Nunavut Public Health.

A total of ten (10) Shipping Monitors (full-time, part-time and summer students) were hired to support the shipping season in 2021 (see Photo 27 in Appendix D). Shipping Monitors can be reached by local residents up to 24 hours a day, and are also actively tracking shipping activity. Overall, the inclusion of local Inuit land users in the marine monitoring programs has proven to be a successful example of community-based environmental monitoring providing tangible results that contribute to Baffinland's overall marine environment monitoring efforts. The MHTO has also provided invaluable advice regarding marine mammal behaviour through various discussions with Baffinland staff and through formal MEWG meetings.

TRENDS

Inuit have been involved in marine monitoring studies at all levels since the inception of the program. The addition of the MHTO as members of the MEWG in 2016 and the hiring of Inuit participants from Inuit outfitting companies based in Pond Inlet has increased the participation of Inuit in this process. Inuit participation in Baffinland's monitoring programs increased in 2019 compared to 2017 and 2018 (from 2,265 hours / 12 participants in 2017 and 1,610 hours / 9 participants in 2018 to 6,500 hours / 23 participants in 2019). In 2019, an Inuit participant from Pond Inlet was also involved in the analysis and reporting of the 2019 marine mammal monitoring program. In 2020, Inuit participation was limited in comparison to prior years due to access restrictions related to the COVID-19 Pandemic public health measures. Due to the lifting of restrictions in summer 2021, Baffinland was able to hire more Inuit than in 2020, (2,122 hours/7 participants), but fell short of the high numbers achieved in 2019. Baffinland is looking forward to its Inuit workforce returning to Mary River as COVID-19 restrictions are lifted throughout Nunavut and Canada.

RECOMMENDATIONS / LESSONS LEARNED

Marine monitoring programs will be reviewed with the MEWG and MHTO in 2022 in consideration of increasing Inuit involvement if possible to do so. Shipping monitors will also continue to be hired to provide a direct liaison between the community of Pond Inlet, hunters and Baffinland's headquarters including its Shipping and Sustainable Development departments.

Project Certificate Condition No. 127

Category	Marine Environment – Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To promote public awareness and engagement with Project shipping activities.
Term or Condition	The Proponent shall ensure that communities and groups in Nunavik are kept informed of Project shipping activities and are provided with opportunity to participate in the continued development and refinement of shipping related monitoring and mitigation plans.
Relevant Baffinland Commitment	27,28
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Mittimatalik Hunter and Trappers Organization, Marine Environment Working Group (MEWG)
Reference	Baffinland website
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/

METHODS

Although this condition is specific to Steensby which is currently not active, Baffinland stills ensures that the public is made aware of shipping-related activities. Accordingly, Baffinland has enlisted exactEarth®, a global vessel monitoring and tracking service based on Automatic Identification System (AIS) data from polar orbiting satellites to track and report on vessel movements. The information is readily available on the Baffinland website over its entire shipping season.

Information on ships such as last reported coordinates of the vessel, whether the vessel is moving, the direction of vessel movement and destination of the vessel are provided.

The vessel locations plotted on the online map provide regularly updated snapshots of vessel movement in the North Baffin region approximately every 30 minutes. Baffinland encourages all land and water users to continue to practice safe boating, hunting, and other travel activities, and be aware of your surroundings at all times.

Although the Steensby portion is currently not active, Makivik is a member of the Marine Environment Working Group where any proposed changes to shipping activities would be discussed.

RESULTS

Baffinland has made vessel routing accessible to the public via the Baffinland website. Baffinland also installed an AIS tracker system in Baffinland's Shipping Monitor office located on the second floor of the MHTO building on a dedicated laptop and wall-mounted monitor for viewing the live continuous exactEarth® feeds of vessels active in the Northern Shipping Route by all visitors during Baffinland's regular office hours (8 am to 5 pm). In 2020, access to the office was limited due to public health restrictions associated with the COVID-19 Pandemic.

In 2021, Baffinland trained and hired 10 full-time and part-time shipping monitors (inclusive of summer students), from Pond Inlet to maximize coverage of daily vessel activity up to 24 hours per day over the length of the shipping season (see Photo 27 in Appendix D). Shipping Monitors provided updates on Baffinland shipping activity to residents of Pond Inlet via local public radio, marine VHF radio (for hunters on the water) and through social media.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth® to be beneficial in providing information related to ship routing to the public. Baffinland will continue to use this service. Furthermore, it is Baffinland's intent to continue hiring Shipping Monitors based in Pond Inlet and to providing live viewing of vessel tracks through the Baffinland office in 2021. Baffinland Shipping Monitors will also continue to inform residents about shipping activities through the use of marine VHF radio, local public radio, and Facebook posts on the dedicated Baffinland Shipping Facebook group page. Information on project shipping activities will also continue to be shared with the MEWG and the MHTO through the sharing of MEWG Meeting Records and invitation for participation at MEWG meetings.

Project Certificate Condition No. 128

Category	Marine Environment - Public Engagement
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure habitat compensation is acceptable to local communities.
Term or Condition	The Proponent shall consult with local communities as fish habitat off-setting options are being considered and demonstrate its incorporation of input received into the design of the Fish Habitat Off-Setting Plan required to offset the Harmful Alteration, Disruption or Destruction of Fish and Fish Habitat (HADD).
Relevant Baffinland Commitment	27, 28
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Fisheries and Oceans Canada, Mittimatalik Hunter and Trapper Organization, Pisiksik Working Group
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland has engaged and conducted comprehensive consultation on the Project as a whole with the five North Baffin communities (Arctic Bay, Clyde River, Sanirajak, Igloolik, and Pond Inlet) prior to, during, and following the environmental reviews of the Project by the NIRB. Specific to fisheries offsetting in the marine environment, Baffinland (with DFO participation) consulted with the community of Pond Inlet in regard to the Ore Dock proposed at Steensby Port and the habitat off-set design for the existing Ore dock and Freight dock at Milne Port for the Early Revenue Phase of the Project (ERP). Early engagement was initiated during the consultation process on the ERP when Baffinland met with members of the MHTO and other community members to discuss the design, offsetting measures, and proposed monitoring with respect to construction of the Ore Dock at Milne Port. Since then, consultation efforts have focused largely on offsetting habitat effectiveness monitoring associated with in-water marine infrastructure.

Baffinland was issued a Fisheries Authorization (Ref No. 14-HCAA-00525) from DFO in 2014 for construction of the Ore Dock at Milne Port. A fish habitat offsetting plan was included with Baffinland's application for an authorization under the *Fisheries Act*. This included fish habitat enhancement measures constructed around the Ore Dock.

Similarly, Baffinland was issued a Fisheries Authorization (Ref No. 18-HCAA-00160) on March 21, 2019 for construction of the Freight Dock at Milne Port. A separate offsetting plan for the Freight Dock was developed which included the addition of coarse rock substrates as offsetting materials around the perimeter of the Freight Dock.

With regards to future expansion plans such as the proposed Phase 2 proposal, Baffinland continues to explore potential offsetting options in both freshwater and marine environments to address potential losses in fish habitat associated with permanent habitat alteration or destruction of fish habitat, which includes community consultation

activities in order to help refine candidate offset locations. For freshwater, offsetting may be required to offset proposed in-water infrastructure along the proposed North railway (water crossings, pond encroachment, and stream diversions) and additional water crossings on Tote Road realignments and quarry access roads, in addition to waterbodies identified for water withdrawal. Exploration of potential marine offsetting options are aimed at offsetting in-water works associated with the proposed construction of second Ore Dock.

Various options are being considered for fish habitat offsetting in the freshwater environment including improving lake or stream fish rearing habitat. For marine habitat, enhancement and/or creation of habitat (e.g., rocky reefs) and complementary measures (e.g., financial contributions in-lieu of constructing habitat) are being explored.

Consultation activities related to offsetting in 2021 were delayed in part from logistical and operational restrictions associated with the COVID-19 Pandemic. Focus was geared towards analysis of baseline data and development of conceptual offsetting plans for consideration during future consultation efforts.

RESULTS

A number of potential offsetting options were identified for the marine environment as part of Phase 2 conceptual offsetting planning (Golder, 2018h). Numerous potential freshwater offsetting options located in both lake (e.g., rearing habitat creation and/or improvements to existing) and stream (e.g., rearing habitat creation, removal of natural barriers, improvements to upstream passage) habitats were also identified and further investigated during summer field programs in 2019 and 2020.

TRENDS

Results from the six-years of post-construction monitoring of the Milne Port Ore Dock offsetting works have shown the offsetting habitat is effective in supporting biological activity, providing support for the addition of coarse substrates as an effective approach for successful offsetting. The FAA for the Milne Port Ore Dock was closed by DFO in 2021 as monitoring results demonstrated the effectiveness of the offsetting habitat.

Year 2 of post-construction monitoring for the Freight Dock offset habitat occurred in 2021. Year 2 of monitoring indicated that macroalgae, motile invertebrates and fish continue to colonize the Freight Dock offset habitat, and that it appears to be providing a suitable and stable substrate for continued colonization and growth of marine organisms.

Over the long term, as existing datasets are expanded upon with results from recent offsetting monitoring programs implemented in the region, the suitability of constructing rocky reefs and/or addition of three-dimensional substrates as offset habitat capable of providing stable and functional fish habitat over time will be further validated.

RECOMMENDATIONS / LESSONS LEARNED

In 2021, DFO closed the FAA for the Milne Port Ore Dock, based on their review of the results of the 6-year Ore Dock offset monitoring program which was completed in 2020. Based on the results collected over the 6 years, the offset habitat remained stable; colonization of aquatic vegetation and benthic invertebrates was observed, with percent cover, species richness and abundances generally increasing over the monitoring period from 2015 to 2020, reflecting natural succession patterns. Fish were also shown to use the constructed offset habitat. The results of this monitoring help to further validate the suitability of substrate additions for fish habitat offset measures in the region.

Baffinland will continue to monitor the success of fish habitat offsetting measures associated with the construction of the recently constructed Freight Dock. Baffinland will also continue to provide the results of the annual monitoring program to DFO, the MEWG and other interested parties, as requested.

Baffinland remains committed to exploring potential offsetting options in both freshwater and marine environments to address potential losses in fish habitat associated with permanent habitat alteration or destruction of fish habitat associated with future permitting requirements, as needed. Although engagement activities were not possible in 2021 due to the COVID-19 Pandemic, Baffinland intends to move forward with engagement activities in 2022 in order to get feedback on the progress it has made for identifying suitable locations for the construction of future offset measures.

4.7 PERFORMANCE ON SOCIO-ECONOMIC CONDITIONS

4.7.1 Population Demographics (PC Conditions 129 through 134)

Six (6) PC conditions are listed in the Population Demographics section of the Project Certificate. Three (3) of these describe the NIRB's expectations with respect to working with the Qikiqtaaluk Socio-Economic Monitoring Committee and establishing a Project-specific working group. The remaining three (3) PC conditions relate to mitigating the potential for demographic changes, and the monitoring and reporting of demographic change within the North Baffin communities as a result of Project employment.

Inuit & Stakeholder Feedback

Key stakeholders who provide input related to the socio-economic monitoring program for the Project include the five (5) North Baffin communities, the QIA, various departments of the GN, and CIRNAC. These agencies are active members of the Mary River Socio-economic Monitoring Working Group (SEMWG). While the potential for in-migration of non-Inuit into the North Baffin communities and out-migration of Inuit from the North Baffin were raised as concerns by the GN and by communities during the environmental assessment, it has not been raised as a concern in recent engagement activities in 2021.

Monitoring

The Local Study Area (LSA) is defined by the five (5) North Baffin communities. Baffinland conducts monitoring of population demographics in the LSA by reviewing government population statistics, tracking employee origin information, and the tracking of changes to an employee(s) address. Table 4.35 provides an evaluation of Project impacts on population demographics, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the SEMWG and QSEMC. Reporting on each PC condition follows.

Table 4.35: Population Demographics Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Mine Employment	Migration of non-Inuit Project employees into the North Baffin LSA	Baffinland's 2021 Socio-economic Monitoring Report includes a review of population statistics and BCLO tracking of worker changes in home community. Due to COVID-19, the Baffinland administered Employee Information Survey was not conducted in the 2021 calendar year. Cumulative Baffinland data since 2015 indicates a net of one non-Inuit employee/contractor is known to have in-migrated to the North Baffin LSA. This is not a significant effect. Cumulative Baffinland data (i.e. Baffinland Human Resources data and BCLO survey) since 2015 indicates a net negative migration (out-migration) of 24 Inuit workers	Effects may be occurring
	Out-migration from North Baffin		

Component	Effects	Monitoring Program	Impact Evaluation
		<p>from the North Baffin LSA, which includes five (5) Inuit employees/contractors in 2021.</p> <p>This is significantly lower than the lower end of the out-migration estimate from the EIS. While a small number of Project workers have moved out of the North Baffin LSA, the effect has been smaller than predicted. It is also impossible to determine whether out-migration from the North Baffin LSA might have been any different if the Project was not there.</p>	

Project Certificate Condition No. 129

Category	Population Demographics - Qikiqtaaluk Socio-Economic Monitoring Committee
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Description of the general monitoring framework to be developed in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee.
Term or Condition	The Proponent is strongly encouraged to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee along with other agencies and affected communities, and it should endeavour to identify areas of mutual interest and priorities for inclusion into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities, and the North Baffin region as a whole.
Relevant Baffinland Commitment	41, 43, 45, 46
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (SEMR; Aglu and Stratos, 2022) 2021 North Baffin Community Economic Development Officer Meeting Record (Baffinland, 2021q). Draft Socio-Economic Monitoring Plan (Baffinland, 2019h). May 14 2021 Memo RE: Planning for Possible Temporary Closure of the Mary River Project (Baffinland, 2021r) 2021 SEMWG Meeting Records and Correspondence 2021 QSEMC Correspondence
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3 and C.4 Appendix G.13

METHODS

Baffinland continues to engage with the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and the Mary River Socio Economic Monitoring Working Group (SEMWG), a sub-set of the QSEMC whose members include Baffinland (Lead), the Government of Nunavut, the Government of Canada, and the QIA. A Terms of Reference for the SEMWG (which identifies socio-economic monitoring priorities and objectives for the Project, as well as the responsibilities of the Parties) has been developed and is provided in the Socio-Economic Monitoring Plan (Baffinland, 2019h). Baffinland has also incorporated feedback from SEMWG members while developing the Project's socio-economic monitoring program and continues to welcome feedback on the program from the SEMWG and QSEMC.

RESULTS

On September 14, 2021 the GN informed Baffinland it was cancelling the planned QSEMC meeting, set for October 27 to 28, 2021, due to the detection of a COVID-19 case in Iqaluit. No alternative date was set in 2021, however, Baffinland has confirmed the GN does intend to hold a QSEMC meeting again in 2022. Baffinland did maintain engagement with QSEMC members through written correspondence regarding the planning for possible temporary closure of the Mary River Project (Baffinland, 2021r). Discussion regarding this topic was also held with several North Baffin Community Economic Development Officers via teleconference (Baffinland, 2021q). The SEMWG was also engaged through the year to discuss the 2020 SEMP Report and the composition of the Inuit Employee Survey.

Baffinland's Socio-Economic Monitoring Report assesses the socio-economic performance of the Project on an annual basis. Performance of the Project is assessed using socio-economic indicators for Valued Socio-Economic Components (VSECs) considered in the FEIS (Baffinland, 2012). The report has identified various positive effects of the Project and presents information that is consistent with several FEIS predictions. In other cases, monitoring data have revealed unclear, inconsistent, or otherwise negative trends (but not necessarily due to the Project). Long-term monitoring will be necessary to track Project outcomes more fully over time and may contribute to an improved understanding of observed trends and causality. Baffinland's compliance with various Project Certificate Terms and Conditions pertaining to socio-economic monitoring are also discussed throughout this report.

TRENDS

Where appropriate, trends have been described for the indicators assessed in the Socio-Economic Monitoring Report. These trends demonstrate whether an indicator has exhibited change and describes the direction of that change. Trends are identified at various scales, which include:

- North Baffin LSA (i.e. Arctic Bay, Clyde River, Igloolik, Pond Inlet, Sanirajak);
- Iqaluit;
- The Qikiqtani Region;
- Nunavut; or,
- Project Level

Additional information on these trends including pre-development average, 3-year average, last-year value, and the change from previous periods are outlined in the Executive Summary of the 2021 SEMR (Aglu and Stratos, 2022).

RECOMMENDATIONS / LESSONS LEARNED

The socio-economic monitoring report is in alignment with the Mary River Environmental Impact Statement's predictions, Project Certificate's Terms and Conditions and Socio-Economic Monitoring Program. Going forward, successful socio-economic monitoring for the Project will require appropriate long-term data, the regular input of Project stakeholders, and a focus on continual improvement. Baffinland is committed to using adaptive management as a tool to identify and make necessary improvements to the Project's socio-economic performance in the future.

Baffinland plans to engage with the QSEMC throughout 2022. In the event the meeting of the QSEMC is postponed again in 2022, Baffinland will work with the GN to deliver our regular presentation by another means in Q3 or Q4 of the current calendar year.

Project Certificate Condition No. 130

Category	Population Demographics - Project-specific monitoring
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Recognizing that some Project-specific socio-economic monitoring initiatives may be best addressed in smaller more focused working groups, this is encouraged where possible.
Term or Condition	The Proponent should consider establishing and coordinating with smaller socio-economic working groups to meet Project specific monitoring requirements throughout the life of the Project.
Relevant Baffinland Commitment	41, 43, 46
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 SEMWG Meeting Records and Correspondence 2021 QSEMC Correspondence Draft Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3 and C.4 Appendix G.13

METHODS

Baffinland continues to engage with the QSEMC and the SEMWG on the Project's socio-economic monitoring program. In addition, Baffinland regularly engages North Baffin community members through its community engagement program, and other committees that operate under provisions of the Inuit Impact and Benefit Agreement (IIBA), on various socio-economic topics. A complete community engagement record for the 2021 year is provided in Appendix B of this report. Topics discussed during the two (2) SEMWG meetings held in 2021 are listed in Table 2.5.

RESULTS

Baffinland continues to engage the SEMWG, whose members include Baffinland, the Government of Nunavut, the Government of Canada, and the QIA. A Terms of Reference for the SEMWG (which identifies socio-economic monitoring priorities and objectives for the Project) has been developed and is provided in the Socio-Economic Monitoring Plan (Baffinland, 2019h). Baffinland has incorporated feedback from SEMWG members while developing the Project's socio-economic monitoring program and continues to welcome feedback on the program from working group members. In 2021, Baffinland received feedback from SEMWG members on the Inuit Employee Survey. The survey has been updated and is reflective of input received. The updated survey will be administered by Q4 of 2022.

TRENDS

See trend reporting for Project Certificate Condition No. 129.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to engage with the QSEMC, SEMWG and North Baffin LSA communities on the Project's monitoring program and will consider establishing smaller, focused socio-economic working groups to address specific community issues or Project challenges if deemed appropriate.

Project Certificate Condition No. 131

Category	Population Demographics - Monitoring demographic changes
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor demographic changes affecting the North Baffin communities and the territory as a whole in order to understand changes and to evaluate the Proponent's predictions as related to population demographics.
Term or Condition	The Qikiqtaaluk Socio-Economic Monitoring Committee is encouraged to engage in the monitoring of demographic changes including the movement of people into and out of the North Baffin communities and the territory as a whole. This information may be used in conjunction with monitoring data obtained by the Proponent from recent hires and/or out-going employees in order to assess the potential effect the Project has on migration.
Relevant Baffinland Commitment	45
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 SEMWG Meeting Records and Correspondence 2021 QSEMC Correspondence Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland has provided demographic change information in the Socio-Economic Monitoring Report. This includes data on population estimates, known in-migrations of non-Inuit Project employees and contractors, known out-migrations of Inuit and non-Inuit Project employees and contractors, percentage of Inuit vs. non-Inuit residents in the North Baffin Local Study Area (LSA), and Nunavut annual net migration. Baffinland also regularly administers an Inuit Employee Survey, which collects information related to employee changes of address, housing status, and migration intentions. Due to the COVID-19 Pandemic, Baffinland was not able to administer the 2021 Inuit Employee Survey at Mary River or in the North Baffin LSA communities.

RESULTS

Demographic change indicator trends are provided in Table 4.36. Detailed results are presented in the Socio-Economic Monitoring Report.

Table 4.36: 2021 Monitoring of Indicators of Demographic Change

Indicator / Topic	Summary
Known in-migrations of non-Inuit Project employees and contractors	Cumulative Baffinland data (i.e. Baffinland Human Resources data and BCLO survey) since 2015 indicates a net of one non-Inuit employee/contractor is known to have in-migrated to the North Baffin LSA.
In-migration of non-Inuit to the North Baffin LSA	While LSA-level migration data is not available, the proportion of Inuit to non-Inuit in LSA communities has remained relatively similar to pre-development levels.
Known out-migrations of Inuit Project employees and contractors	Cumulative Baffinland data (i.e. Baffinland Human Resources data and BCLO survey) since 2015 indicates a net negative migration (out-migration) of 24 Inuit workers from the North Baffin LSA, which includes 8 Inuit employees/contractors in 2021.
Out-migration of Inuit from the North Baffin LSA	While LSA-level migration data is not available, the proportion of Inuit to non-Inuit in LSA communities has remained relatively similar to pre-development levels.
Population estimates	The average annual population growth rates over the post-development period for North Baffin LSA communities was 2.2%, Iqaluit 2%, and Nunavut 1.4%, higher than the Canadian average growth rate of 1.2%. The rate of growth does not appear to have been affected by the Project.
Nunavut net migration	Nunavut net migration was -88 people in 2019, continuing a negative trend over the past 5 years.
Employee and contractor changes of address, housing status, and migration intentions	Due to COVID-19 restrictions, Baffinland did not administer the Inuit Employee Survey in 2021. The company will administer the survey in Q4 of 2022. Information relating to changes of address, housing status, and migration intentions will be captured for the next reporting season. With regard to 2020 Inuit Employee Survey results, declared migration intentions for 2021 align with the past several years of movement, with nine respondents expressing an intention to move in the next year.

TRENDS

Where appropriate, trends have been described for the indicators assessed in the Socio-Economic Monitoring Report.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide demographic change information in its Socio-Economic Monitoring Report. However, only limited government data are currently available for the indicators 'in-migration of non-Inuit to the North Baffin LSA' and 'out migration of Inuit from the North Baffin LSA'. For this reason, Baffinland continues to present data from various non-government sources (e.g. Inuit Employee Survey, Baffinland Community Liaison Officer (BCLO) survey) to help better understand this topic.

Project Certificate Condition No. 132

Category	Population Demographics - Training programs
Responsible Parties	The Proponent, North Baffin Hamlets, Municipal Training Organization, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To develop training programs in ways which contribute to limiting the potential for migration to occur as North Baffin residents seek training and employment opportunities in the larger centre of Iqaluit.
Term or Condition	The Proponent is encouraged to partner with other agencies such as Hamlet organizations in the North Baffin region, the Municipal Training Organization, and the Government of Nunavut in order to adapt pre-existing, or to develop new programs which encourage Inuit to continue living in their home communities while seeking ongoing and progressive training and development. Programs may include driver training programs offered within Hamlets, providing upgraded equipment to communities for use in municipal works, providing incentives for small businesses to remain operating out of their community of origin, or supplementing existing recreational facilities and programming in North Baffin communities.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 SEMWG Meeting Records and Correspondence 2021 QSEMC Correspondence Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h) Qikiqtani Skills and Training for Employment Partnership (Q-STEP) Project Advisory Committee (PAC) Quarterly Reports Baffinland IIBA Quarterly Reports
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3 and C.4 Appendix G.13 and G.18

METHODS

In 2021, Baffinland partnered with local and regional governmental agencies and educational institutions to support local communities and develop training programs for residents while limiting the potential for out migration. Baffinland's priority in training is to train people to work at the mining operation. Training provided can benefit local communities should an employee chose to change jobs and return to work in the community. The skill set learned at Baffinland is transferrable for life long benefit of the individual and their home communities.

In September 2019, the Government of Nunavut through Nunavut Arctic College announced that they will set up a mine training centre in Rankin Inlet. Baffinland has continued to engage with Nunavut Arctic College over the last

two years. Baffinland was selected to participate in an industry survey and feedback portal to provide information around the types of training and certification required in trades and heavy equipment operation. Through the NWT/Nunavut Chamber of Mines education working group Baffinland participated in a presentation and review by Nunavut Arctic College on their plans for setup and implementation of the new training center. Baffinland was advised on Nunavut Arctic college's staffing plans and on their efforts to serve regional centers throughout Nunavut. More recently, Nunavut Arctic College has presented on training and implementation plans now that the training center is scheduled to be in operation.

Baffinland also serves as a partner with the Northwest Territories/Nunavut Chamber of Mines Mine Education working group. Baffinland attends a regular meeting to discuss opportunities to engage with students and youth and share opportunities in mining including employment, scholarships, education and training. Different industry partners present to the larger working group regularly exploring unique and new approaches to many of the common challenges faced by the mining industry. There is an opportunity to network, ask questions, and share experiences through this venue. In addition to hearing about Nunavut Arctic College's mine training center, other presenters included Voisey's Bay (Indigenous relationships), Mining Matters (student engagement), and Origin (indigenous learning and training) amongst others. Baffinland will present on Inuit success, Q-STEP, and learning and training that occurred in 2021.

RESULTS

In 2021, in community training was increased in each of the impacted communities. This included continued Work Readiness Training as well as in community driving training, Tuttarvik 101 Financial Literacy Training, and Pre-Trades Training. This was overall quite successful and will be continued in future years. The relationship that has been built between Nunavut Arctic College, QIA and Baffinland is strong and this should ensure the continued ability to highlight additional training opportunities in each of the impacted communities. Initial work has been done to provide partnership to Nunavut Skills Canada in order to continue to support youth that are engaging in trade related competitions at the local, territorial and National Level. This is an opportunity to engage with youth early as they are exploring their career goals, and to ensure they understand about the various careers available in mining. Initial work has been completed with Mining Matters to deliver workshops in various school classrooms and communities again to build knowledge and understanding with relation to mining and the various career opportunities within mining. All of these opportunities would enable youth and community members to remain in their home communities and have a successful career if they chose to do that.

TRENDS

Not applicable.

RECOMMENDATIONS/LESSONS LEARNED

Recognizing the need to engage with students early in order to increase student's knowledge and understanding of careers and opportunities in mining, Baffinland has engaged with Mining Matters to explore a combination of in school structured training as well as public outreach in impacted communities. Programs for grade 7 students would focus on planet earth science and resource development. Programs for grade 9 students would focus on environmental chemistry including groundwater, water testing, and mine water. Programs for grade 11 students would focus on mineral resource development cycle and careers in mining. Implementation of Mining Matters training in the communities has been impacted by COVID-19 and is currently on hold due to travel restrictions and safety precautions. Once restrictions are reduced, the Mining Matters training will be planned to resume accordingly.

Baffinland has also engaged with Skills Canada Nunavut to explore ways that the company could support the Nunavut territorial competitions as well as the national competitions. Skills Canada Nunavut brings youth from across the territory who are interested in skilled trades together to compete and show what they have learned. Baffinland views this as an ideal opportunity to both engage with and support these youth encouraging them to pursue a career in skilled trades.

Q-STEP

Baffinland and the Qikiqtani Inuit Association (QIA) as well as the government of Nunavut, Kakivak Association and the Government of Canada have partnered in the \$19 million Q-STEP training program, the objective of which is to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Training under the Q-STEP program includes work readiness training as well as targeted training programs directed at apprenticeships, skills development, and formal certification in heavy equipment operation.

The Q-STEP has proven to be the most successful employment and training program currently offered at Baffinland. The Q-STEP Charter from Employment and Service Development Canada was scheduled to end on March 31st, 2021. Due to COVID-19, it has been extended until March 31st, 2022 and the QSTEP teams were authorized to spend remaining funds within the program charter. The Q-STEP teams at Baffinland and QIA are seeking third party funding to ensure that this successful training program can continue into the future.

Project Certificate Condition No. 133

Category	Population Demographics - Monitoring demographic changes
Responsible Parties	The Proponent, members of QSEMC, Government of Nunavut, Nunavut Housing Corporation
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Training programs may be developed with the goal of limiting the potential for migration to occur as North Baffin residents may choose to seek employment and therefore move from smaller North Baffin communities to the larger centre of Iqaluit.
Term or Condition	The Proponent is encouraged to work with the Qikiqtaaluk Socio-Economic Monitoring Committee and in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders, design and implement a voluntary survey to be completed by its employees on an annual basis in order to identify changes of address, housing status (i.e. public/social, privately owned/rented, government, etc.), and migration intentions while respecting confidentiality of all persons involved. The survey should be designed in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders. Non-confidential results of the survey are to be reported to the Government of Nunavut and the NIRB.
Relevant Baffinland Commitment	43, 45
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	Non Compliant
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 SEMWG Meeting Records and Correspondence 2021 QSEMC Correspondence 2020 Inuit Employee Survey Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland regularly administers a voluntary Inuit Employee Survey, which collects information on employee changes of address, housing status, and migration intentions. In 2021, the survey underwent modification based on feedback received by the SEMWG. Updates are summarized in the 2021 SEMWG meeting records. Due to COVID-19 restrictions employed in Nunavummiut communities and at the Mary River mine site, Baffinland was unable to administer the updated Inuit Employment Survey in Q4 of 2021. Results from the 2020 Inuit Employee Survey are discussed below.

Baffinland will continue to discuss the survey with the SEMWG and the QSEMC and will continue to engage on the Project's socio-economic monitoring program. The company commits to administering the survey by Q4 of 2022.

RESULTS

Site-based survey administration occurred at Mary River between September 7 to October 16, 2020 (Table 4.37). A six-week administration period was used in order to accommodate Inuit employee shift changes associated with a 28-day rotation implemented due to COVID-19 precautions. In-community survey administration generally occurred over a two-week period from September 8-22, 2020 and was led by a team of Baffinland Community Liaison Officers (BCLOs) and Northern Affairs staff. Both site and community-based survey locations were utilized in order to address challenges associated with accessing employees during the implementation of the COVID-19 Pandemic precautions. At the time of survey administration, all Nunavut-resident employees had been placed on paid administrative leave in their home communities. However, non-Nunavut resident employees and employees of contractors (both Inuit and non-Inuit) were still permitted to work at the Project via fly-in/fly-out rotations. Multiple survey locations were required to engage the largest number of Inuit Project employees possible. Various health and safety protocols were utilized by Baffinland during in-community survey administration to manage transmission risks associated with COVID-19 (e.g. use of local survey administrators only, physical distancing, mask wearing, hand washing and enhanced cleaning measures, and options for contactless survey pick up and drop-off).

**Table 4.37: Changes in Inuit Employee and Contractor Residence and Community
(2020 Inuit Employee Survey Results)**

Type of Change	Number of Respondents	Percentage of Respondents
All survey respondents (n=82)		
Residence changed in the past 12 months, within existing community	10	12.2%
Residence changed in the past 12 months, moved to new community	4	4.9%
Residence did not change in the past 12 months	67	81.7%
Unknown	11	1.2%
Total	82	100.0%
If you answered 'Yes, from one community to another community', which community did you move from? (n=4)		
Clyde River	1	25%
I Don't know	1	25%
I'm originally from Hall Beach	1	25%
Quebec to Nunavut	1	25%
Total	4	100.0%

Notes:

Source: 2020 Inuit Employee Survey

Table 4.38 pertains to current Inuit employee and contractor housing status. Regarding homeownership (n=82), 43.9% of respondents said they have considered purchasing a home in their community, 48.8% had not considered

purchasing a home in their community, 4.9% already owned their own home, and results were unknown for 2.4% of respondents.

Table 4.38: Current Inuit Employee and Contractor Housing Status (2020 Inuit Employee Survey Results)

Current Housing Status	Number of Respondents	Percentage of Respondents
What type of housing do you currently live in? (n=82)		
Government of Nunavut staff housing	2	2.4%
Other	6	7.3%
Privately owned - Owned by another individual	14	17.1%
Privately owned - Owned by you	5	6.1%
Public housing	45	54.9%
Renting from a private company	9	11.0%
Unknown	1	1.2%
Total	82	100.0%
Have you ever considered purchasing a home in your community? (n=82)		
I already own my own home	4	4.9%
No	40	48.8%
Unknown	2	2.4%
Yes	36	43.9%
Total	82	100.0%

Notes:

Source: 2020 Inuit Employee Survey.

Table 4.39 summarizes results pertaining to Inuit employee and contractor migration intentions (n=82).

Table 4.39: Inuit Employee and Contractor Migration Intentions (2020 Inuit Employee Survey Results)

Migration Intentions	Number of Respondents	Percentage of Respondents
All survey respondents (n=82)		
Plan to move residences in the next 12 months, within existing community	6	7.3%
Plan to move residences in the next 12 months, to a new community	4	4.9%
Do not plan to move residences in the next 12 months	66	80.5%
Unknown	6	7.3%
Total	82	100.0%
If yes, which community are you planning to move to? (n=3)		
Iqaluit	1	33.3%
Alberta or BC	1	33.3%
Unsure	1	33.3%
Total	8	100.0%

Notes:

Source: 2020 Inuit Employee Survey.

TRENDS

Like previous surveys, some respondents to the 2020 Inuit Employee Survey indicated they had moved to a different community in the past 12 months (4.9% in 2020, 3.6% in 2019, 9.9% in 2018, and 7.0% in 2017) or planned to move to a different community in the next 12 months (4.9% in 2020, 13.8% in 2019, 17.6% in 2018, and 16.3% in 2017). The proportion of employees living in public housing appears to be trending downwards (66.7% in 2017, 60.7% in 2018 and 54.9% in 2020). Due to a survey administration error in 2019, data on the type of housing respondents lived in were unable to be collected and compared to current survey results. Baffinland will continue to track employee changes of address, housing status, and migration intentions through an Inuit Employee Survey to see if future trends emerge.

RECOMMENDATIONS / LESSONS LEARNED

Due to COVID-19 restrictions, Baffinland was unable to administer the updated Inuit Employee Survey either on site or in the North Baffin LSA. Baffinland will explore different methods to administer the updated survey to Inuit employees, either through a hybrid (i.e. in-person and virtually) or fully virtual approach in 2022. Either approach will allow Baffinland to administer the survey during a situation where COVID-19 restrictions, or other unforeseen circumstances are occurring.

Baffinland will continue to look for ways to expand survey administration to ensure the survey aims to attract responses from the largest segment of the Inuit workforce at the Project.

Project Certificate Condition No. 134

Category	Population Demographics - Employee origin
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Project-specific information regarding employee origin is important to comparing predictions of labour availability and employment opportunities with actual levels of employment from various demographic segments over different geographic areas.
Term or Condition	<p>The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows:</p> <ul style="list-style-type: none"> 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.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Data on the origin, number, and ethnicity of employees and contractors who worked on the Project are presented in the Socio Economic Monitoring Report, and summarized in the below Table 4.40. This information was obtained from internal Baffinland records.

RESULTS

The results of employee origin information is presented by Full-Time Equivalents (FTEs), as opposed to headcount. One FTE represents 2,016 hours, which is the approximate time one person works on a full-time basis each year. Headcount, on the other hand, provides a ‘snapshot’ of who is working at a specific point in time (e.g. the end of a quarter).

Using FTEs to present employee origin provides a good indication of where employees and contractors are being hired from, on average, over the year.

Table 4.40: Detailed Baffinland and Contractor Employment Full-Time Equivalents (FTEs) 2021

Location	Baffinland			Contractor			All workers		
	Inuit	Non-Inuit	Total	Inuit	Non-Inuit	Total	Inuit	Non-Inuit	Total
LSA Communities									
Arctic Bay	27	1	28	10	-	10	37	1	38
Clyde River	21	-	21	8	-	8	29	-	29
Pond Inlet	25	-	25	9	-	9	34	-	34
Igloolik	10	-	10	6	-	6	16	-	16
Iqaluit	28	1	29	23	-	23	51	1	52
Sanirajak	19	-	19	9	-	9	28	-	28
LSA total	130	2	132	65	-	65	195	2	197
Other Qikiqtaaluk Communities									
Cape Dorset	1	-	1	-	-	-	1	-	1
Kimmirut	1	-	1	-	-	-	1	-	1
Pangnirtung	2	-	2	-	-	-	2	-	2
Qikiqtarjuaq	-	-	-	-	-	-	-	-	-
Resolute	-	-	-	-	-	-	-	-	-
Sanikiluaq	-	-	-	-	-	-	-	-	-
Other Qikiqtaaluk	-	-	-	2	-	2	2	-	2
Other Qikiqtaaluk total	4	-	4	2	-	2	6	-	6
Other Nunavut									
Rankin Inlet (Kivalliq)	1	-	1	-	-	-	1	-	1
Unknown	-	-	-	1	1	2	1	1	2
Other Nunavut total	1	-	1	1	1	2	2	1	3
Other provinces and territories									
Alberta	-	92	92	1	143	144	1	236	237
British Columbia	1	40	41	-	43	43	1	83	84
Manitoba	2	21	23	-	31	31	3	51	54
New Brunswick	3	74	77	-	46	46	3	119	122
Newfoundland & Labrador	-	189	189	-	157	157	-	347	347
Northwest Territories	-	1	1	-	3	3	-	4	4
Nova Scotia	1	154	155	1	79	80	1	233	234
Ontario	19	325	344	7	164	171	26	489	515
Prince Edward Island	-	10	10	-	5	5	-	15	15
Quebec	2	57	59	2	82	84	4	139	143
Saskatchewan	1	27	28	1	21	22	2	49	51
Yukon	-	1	1	-	1	1	-	2	2
Other provinces and territories total	29	991	1,020	12	775	787	41	1,767	1,808
Other									
International	-	-	-	-	-	-	-	-	-

Location	Baffinland			Contractor			All workers		
	Inuit	Non-Inuit	Total	Inuit	Non-Inuit	Total	Inuit	Non-Inuit	Total
Unknown	-	-	-	-	43	43	-	43	43
Other total	-	-	-	-	43	43	-	43	43
Totals	164	992	1157	80	819	899	245	1812	2056

Note:

Due to issues associated with rounding, numbers presented – most notably with regard to FTEs – may not add up precisely to the totals provided and percentages may not precisely reflect the absolute figures. This is due to presenting FTE data broken down across a number of dimensions (e.g., by community, region, Inuit status and gender).

TRENDS

There were 245 Inuit FTEs at the Project in 2021 (including direct and contractor employees), including 144 from North Baffin LSA communities and 51 from Iqaluit. This represents an increase of 81 Inuit FTEs (an approximate 49%) since operation began in 2015. There was an initial drop in Inuit FTEs from 2014 to 2016, likely caused by a shift away from the large amount of labour used during construction. Inuit FTEs have experienced a general increase since 2016; however, a slight decline in Inuit FTEs has been observed over the past two years (i.e. 2020, 2021). The drop in Inuit FTEs can be attributed to the COVID-19 Pandemic. Acting in line with Government of Nunavut Public Health Orders, Baffinland demobilized Nunavummiut employees and contractors from site from January to July 2021. Standby wages were paid to Inuit employees who were demobilized from site. A total of \$5,008,386 in standby wages was paid to Inuit in 2021.

The number of directly employed Inuit from LSA communities was 130 (FTEs) in 2021, representing a slight decrease from 2020 figures (i.e. 137 FTEs). Similarly, the number of Inuit contractor FTEs decreased to 65 in 2021, representing a decrease of 3 when compared to the 2020 reporting year.

The remainder of Inuit FTEs were residing either elsewhere in Nunavut, or in other Canadian provinces or territories, with the majority living in Ontario.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide information regarding employee origin in future Socio-Economic Monitoring Reports. The Socio-Economic Monitoring Report (SEMR) provides detailed Baffinland and contractor employment data, including Inuit and non-Inuit employment by North Baffin communities, other Nunavut regions, outside Nunavut, and internationally (see Table 3 in the Socio-Economic Monitoring Report).

4.7.2 Education and Training (PC Conditions 135 through 141)

Seven (7) PC conditions relate to education and training, mostly encouraging Baffinland to maximize education and training benefits to Nunavummiut in the local communities. This includes the development of recognizable and transferable skills that can be used outside of the mining industry. The NIRB required Baffinland to conduct a labour market analysis, which was updated for the Early Revenue Phase.

Inuit & Stakeholder Feedback

As noted in Section 4.7.1, the key stakeholders focused on the socio-economic environment include the communities, the QIA, various departments of the GN, and CIRNAC. There is an inherent relationship between the education and training initiatives and objectives implemented by Baffinland and the Government of Nunavut, which is responsible for delivering most education and training programs in Nunavut. Commitments for Baffinland to provide education and training opportunities are contained in the IIBA. The SEMWG and QSEMC also regularly discuss this element of the Project. Aside from employment (discussed in Section 4.7.3), Baffinland's stakeholders have viewed education and training opportunities as a key benefit of the Project (Appendix B).

Monitoring

Baffinland tracks and reports on the amount of training delivered each year (including the amount of training delivered to Inuit workers), government educational attainment statistics, and results from an Employee Information Survey. Table 4.41 provides an evaluation of the Project's impacts on education and training, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.41: Education and Training Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Life Skills	Training of workers and contractors, resulting in improved life skills amongst LSA residents. Training in 2021 is described in PC Condition No. 137. The elder-in-residence counsels Inuit workers as requested.	All Inuit training hours for Baffinland staff are tracked and reported quarterly and annually to the QIA. Baffinland reports on its training programs annually in its socio-economic monitoring report.	Positive effects consistent with FEIS predictions
Education and Skills	Training programs as described above; incentives related to school attendance and success (i.e., laptop program, scholarships); opportunities to gain skills on the job	In 2021, Inuit training hours totalled 32,974.25 hours which is 27.2% of the total training provided by Baffinland.	Positive effects consistent with FEIS predictions

Positive effects with respect to life skills and to education and work skills have occurred as a result of the Project.

Path Forward

Baffinland will continue to implement and refine its training programs, in consultation with the SEMWG, QSEMC, and the Project's workforce. Reporting on each PC condition follows.

Project Certificate Condition No. 135

Category	Education and Training - Employee work/study programs
Responsible Parties	The Proponent, Qikiqtani Inuit Association
Project Phase(s)	Construction and Operations
Objective	Recognizing the 12-hour work days inherent with work at the Project site, it is not clear how employees would successfully engage in a work/study program offered by the Proponent.
Term or Condition	The Proponent is encouraged to consider offering additional options for work/study programs available to Project employees (in addition to study programs at project sites that would be offered to employees when off-shift).
Relevant Baffinland Commitment	93
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2021 SEMWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3

METHODS

Baffinland utilizes a learning management system (Cognibox) to track and record training activities for all employees at the mine site. All of this training is available to Nunavummiut and is beneficial as they expand their skills and knowledge.

Additionally, Baffinland has developed a full suite of Leadership Training at site which is available to interested Inuit employees and all supervisory and management employees or prospects, both Inuit and non-Inuit. The supervisory training will help Nunavummiut advance within their set careers.

Training for coaches is also available to Inuit employees who are interested in guiding and assisting other employees as they learn the skills of their role.

Online Training

Online training is available through the Learning Management System (LMS) whereby employees can complete training prior to arriving at site. Baffinland and QIA have discussed expanding access to this delivery of training. There is online training for employees through Cognibox, such as the Workplace Hazardous Materials Information System (WHMIS) 2015 and Zero Energy State Isolation Awareness (Lockout Tag-out – LOTO).

Q-STEP

Baffinland and the Qikiqtani Inuit Association (QIA) as well as the Government of Nunavut, Kakivak Association and the Government of Canada have partnered in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program, the objective of which is to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Training

under the Q-STEP program includes work readiness programs as well as targeted training programs directed at apprenticeships, skills development, and formal certification in heavy equipment operation.

Baffinland Human Resources personnel work with the Mary River Inuit Impact and Benefit Agreement (IIBA) and the Joint Employment Committee to discuss training opportunities at both the mine site and in communities. These discussions are of an ongoing and iterative nature and will continue to occur in 2022.

RESULTS

The Qikiqtani Skills and Training for Employment Partnership has proven to be the most successful employment and training program currently offered at Baffinland. The Q-STEP Charter from Employment and Service Development Canada was scheduled to end on March 31st, 2021. Due to COVID-19, it has been extended until March 31st, 2022 and the Q-STEP teams were authorized to spend remaining funds within the program charter. The Q-STEP team members at Baffinland and QIA secured additional funding from Kakivak Association in order to ensure that a portion of the Q-STEP program will continue, including:

- Community based work readiness training
- On-site work readiness training
- Heavy Equipment Operators Training
- Adult Basic Education and Pathway to Adult Secondary School programs
- Community based drivers training, Class 7, Class 5, and Class 3

The Q-STEP team continues to seek additional third party funding to support the continuation of apprenticeship training at Baffinland.

TRENDS

In 2021 a clear and purposeful transition to more community based training was realized. This resulted in recognizable benefits for Inuit participants who could train in their own community while remaining at home with families and loved ones. Increasing community based training also resulted in a positive financial benefit to each community. Travelling instructors utilized local hotels and restaurants, and community participants received a training allowance recognizing their successful participation in training. As a result of the community-based training, numerous participants realized employment at both the Project as well as within the community.

RECOMMENDATIONS / LESSONS LEARNED

The Q-STEP team continues to seek additional third party funding to support the continuation of apprenticeship training at Baffinland.

Baffinland will continue to examine programs offered in other jurisdictions, including those offered by other mining companies operating in similar conditions, to determine their potential suitability for offer at the Mary River Project.

Review and expansion of online learning will be examined in order to expand this delivery options for employees and community residents.

Project Certificate Condition No. 136

Category	Education and Training - Transferable skills and training
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Government of Nunavut, Municipal Training Organization
Project Phase(s)	Construction and Operations
Objective	Offering training which results in certifications that are valid for employment at more than one site or in different fields provides an investment in the long-term employability of Nunavummiut.
Term or Condition	The Proponent is encouraged to work with training organizations and/or government departments offering mine-related or other training in order to provide additional opportunities for employees to gain meaningful and transferable skills, credentials and certifications especially where such training of employees offered by the Proponent remains valid only at the Mary River Project sites.
Relevant Baffinland Commitment	92, 94
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2021 SEMWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3

METHODS

Baffinland works in partnership with the Government of Nunavut, Department of Family Services to conduct an apprenticeship program. This allows Nunavummiut to train to become journeypersons in skilled trades. Prior to entering the apprenticeship program Baffinland offers eligible employees pre-trades training. The pre-trades training program introduces Nunavummiut to the trades, but more importantly is an upgrading program that allows them to prepare for the educational requirements of each trade.

Baffinland has identified apprenticeship opportunities in the following areas: Housing Maintainer, Electrician, Heavy Duty/Truck, Welder and Heavy Equipment Mechanic, Automotive Service Technician/Mechanic, Heavy Truck and Trailer Service Technician/Mechanic, Heat Systems Technician/Oil Burner Mechanic, Millwright, Parts Technician and Machinist.

In 2021, Baffinland partnered with Nunavut Arctic College to explore highlighting the availability of both the Adult Basic Education Program and the Pathway to Adult Secondary School Program. Baffinland socialized these programs utilizing social media and in-community posters, and assisted interested residents in registering and beginning this training.

Baffinland has trained a number of Inuit employees in Mine Rescue. This training involves advanced first aid and Cardiopulmonary Resuscitation (CPR), ladder and fire tool training, pumper truck operations, self-contained breathing apparatus, rope and confined space rescue and basic and advanced firefighting techniques. Internal and external instructors have been engaged to ensure the highest standard is being achieved.

RESULTS

In 2021 the Human Resources and Training Departments provided the following training programs. The objective of these training programs is to upskill the trainees and provide them transferable skills to work at the Project, or to be able to apply to other careers and opportunities.

A list of qualifications that Baffinland employees can obtain is provided in the 'Methods' section for Project Certificate Condition No. 137.

TRENDS

In 2021, Inuit training hours totalled 32,974.25 hours which is 27.2% of the total training provided by Baffinland.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continued to offer apprenticeship training in 2021. Throughout 2021 there were 16 Inuit apprentices undergoing training. Efforts to continue to advance their training and have them attend apprenticeship block training resulted in a number of apprentices advancing to the next level of training. Pre-Trades Training was offered in the communities of Arctic Bay, Pond Inlet, and Iqaluit. 10 participants completed the Pre-Trades training, and seven (7) were successful on challenging the Trades Entrance Exam. Pre-Trades training will be conducted in Clyde River, Igloolik and Sanirajak in 2022. Baffinland is proposing to add six new apprentices in 2022. Baffinland will support and encourage apprentices to attend and complete their eight-week apprenticeship block training advancement.

In 2021, Adult Basic Education and Pathway to Adult Secondary School Programs have been successfully delivered in a number of the impacted communities in partnership with Nunavut Arctic College. Baffinland socialized these programs utilizing both social media as well as in community posters. Baffinland also assisted interested residents in registering for this training and working with Nunavut Arctic College to begin the training. Additional training opportunities in the communities is continually explored and additional training may be available in 2022. Other community based training initiatives currently under review include enhanced financial literacy, computer basics for adults, Inuit leadership development, suicide prevention training, and job search training/portfolio development. Baffinland will work closely with Nunavut Arctic College to highlight and promote new training opportunities. In addition, these training opportunities will be included as part of the agenda during community tours, radio shows, and engagements.

Project Certificate Condition No. 137

Category	Education and Training - Transferable skills and training
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	Offering training which results in certifications that are valid for employment at more than one site or in different fields provides an investment in the long-term employability of Nunavummiut.
Term or Condition	Prior to construction, the Proponent shall develop an easily referenced listing of formal certificates and licences that may be acquired via on-site training or training during employment at Mary River, such listing to indicate which of these certifications and licences would be transferable to a similar job site within Nunavut. This listing should be updated on an annual basis, and is to be provided to the NIRB upon completion and whenever it is revised.
Relevant Baffinland Commitment	92
Reporting Requirement	The initial listing should be provided to the NIRB at least 60 days prior to the start of construction, an annually thereafter or as may otherwise be required.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2021 SEMWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3

METHODS

There are a number of qualifications that employees can obtain which would aid them for their work and their personal lives. The objective of these training programs is to upskill the trainees and provide them transferable skills to work at the Project, or to be able to apply to other careers and opportunities. An exhaustive list of training is provided below. (Note: ** indicates a type of training that is directly transferrable to another organization).

- ****Apprenticeship Training**
 - Current available apprenticeship program:
 - Millwright
 - Electrician
 - Heavy Equipment Technician
 - Housing Maintainer
 - Welder
 - Machinist
 - Automotive Technician
- **Equipment Theory, Coaching and Evaluations**
 - Aerial Work Platform
 - Scissor Lift
 - <80' boom supported

- >80' boom supported
 - Work Assist Vehicle (WAV)
- Commercial Truck & Trailer
 - OHT
 - Tractor (truck)
 - Steam Truck
 - Vacuum Truck
 - Water Truck
 - Roll Off
 - Plow and Sand Truck
 - Wrecker
 - Shunt Truck
 - Fuel and Lube Trucks
 - Floats and Trailers
 - Fire Trucks - several (fully completed by ERT and recorded in LMS (Learning Management System))
- Drills
 - 4 different models
- Support Equipment
 - Dewatering Pump
 - Pressure Washer
 - Packer
 - Service Truck
 - All Terrain Vehicle (includes side-by-side and ATV)
 - Forklifts and Telehandlers
- Conveyors and Reach Stackers
 - Masaba Stacking Conveyor
 - Huot Stacker
- Heavy Equipment
 - Crawler Dozer
 - Rubber Tire Dozer
 - Excavator
 - Rock Breaker
 - Grader
 - Loader
 - Tire Manipulator
 - Mass Excavator
 - Mine Haul Truck
 - Packer
 - Seacan Handler
 - Hydraulic Shovel
 - Articulated Rock Truck
- Light Vehicle Driving

- General Site Drive
 - Tote Road Drive
 - Mine Drive
- Medium Duty Vehicle
- Mobile & Stationary Crane
 - Spyder Crane
 - Boom Truck
 - Broderson Crane
 - Overhead
 - Rough Terrain
- Personnel Transportation
 - Crew Bus
 - Personnel Carrier
- ****Heavy Equipment Operator (HEO) Program – Operating Engineers Training Institute of Ontario (OETIO)**
 - Certification of completion of Loader, Haul Truck and Skid Steer Practical Field Training certified by OETIO
- **Human Resources Training**
 - ICE: Inuit Cultural Engagement
 - Leadership Development Training
- **Miscellaneous / Specialized Trainings**
 - Baffinland Operating System (BOS) – Continuous Improvement
 - Root Cause Analysis – Continuous Improvement
 - SAP Training – Continuous Improvement
- **Orientations – Site and department**
 - Prior to travelling to site – E-learning
 - Cultural Awareness
 - Respectful Workplace
 - Orientation Part – 1
 - On-site
 - Orientation Part – 2
 - Access Training (Mine Ops, Crusher, Shiploading)
- **Workplace Health & Safety Certifications and Training**
 - Confined Space
 - Fall Protection and Prevention
 - ****First Aid & CPR**
 - Different Levels available -
 - Forklift Safety
 - Lock Out Tag Out (LOTO) - Zero Energy State Isolation Awareness
 - Advanced LOTO (verifier, office, and coordinator)
 - ****Mine Rescue and Fire Fighting Skills**
 - WSCC certification provided after completing a 5-day Recruit course. In-house course – **Transferrable** (completed by ERT)
 - ****Transportation of Dangerous Goods (TDG)**

- Transportation of Dangerous Good by Air: Shipper (ICAO, TDG) – **Transferable** – 3-year expiration (E-learning by Monarch Regulatory Services Inc.)
- Transportation of Dangerous Good by Ground – **Transferable** – 3-year expiration (E-learning by CFT Canada)
- Transportation of Dangerous Good by Maritime – **Transferable** – 3-year expiration (CFT Canada)
- WHMIS
- Hoisting and Rigging
- Incident Cause Analysis Method (ICAM)
- Fatigue Management
- Working Safely on Ice
- Fire Suppression Systems
- ****WSCC Certification**
 - Supervisor Level I - Surface – **Transferable** – 5-year expiration (E-learning by WSCC)
 - Supervisor Level II – Surface - **Transferable** – 5-year expiration (E-learning by WSCC)
 - Supervisor Level II - Exploration– **Transferable** – 5-year expiration (E-learning by WSCC)
 - Mine Rescue – Surface - Listed above
 - Mine Rescue – Instructor – ERT organizes
 - Blaster – Surface - Proctored by BIM H&S department – **Transferable** – 5-year expiration
 - Shift Boss – **Transferable** – 5-year expiration (E-learning by WSCC)
- **Community-base Work Ready Training**
- **On-Site Work Ready Training**
- ****Community-Based Drivers Training**
 - Class 3 Drivers Licence
 - Class 5 Drivers Licence
 - Class 3 Drivers Licence
- ****Pathway to Adult Secondary School (PASS)**

Baffinland delivers training that is job specific, and all of which is subject to operational need. It is noteworthy that due to poor internet connectivity in some communities, employees who reside in the North Baffin Communities upon hire complete the full suite of training once they arrive on site for their first employment rotation.

RESULTS

In 2021, Inuit training hours totalled 32,974.25 hours which is 27.2% of the total training provided by Baffinland. Baffinland is also working to develop new training programs that would be offered both in the community and at the Mine site. Baffinland is also working with contractors to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as the operation advances, employment increases, and feedback from Inuit employees is implemented.

TRENDS

Baffinland continues to provide training and certification to employees as required. Offering programs such as pre-trades training which results in participants challenging the Trades Entrance Exam increases the number of Inuit pursuing certification. Future plans focus on new training programs and certifications that will allow more Inuit to become employed in meaningful and long-term careers at Baffinland.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor and evaluate training programs to ensure that training is effective and offers employees the opportunities to advance in their chosen careers and to develop transferable skills. New initiatives and programs are being considered to enhance the subject matter of training (i.e. Mental Health and First Aid Programs, Inuktitut as a Second Language) as well as enhance the support that is offered by Baffinland Management to Project employees.

Baffinland continues to work with contractors to ensure Inuit content in the form of training opportunities and to explore new skills development initiatives. Training programs are expected to continue to evolve at the Project as the operation advances, employment increases, and feedback from Inuit employees is considered.

In 2021, Baffinland initiated the Inuit Career Mobility Strategy which provides a clear roadmap for new employees joining Baffinland as well as employees seeking advancement or a change in career. Part of the Inuit Career Mobility Strategy requires a career path interview with every Inuk employee. The career path interview explores where the employee is now in their career, what they might be interested in doing in the future, and what Baffinland can do to support and assist Inuit employees in advancing at Baffinland. After the career path interview is conducted the employee will work with Human Resources and their department to create a career development plan which will map out everything required so that the employee can successfully advance at Baffinland. Once completed the career development plan is reviewed and signed off by the department, Human Resources, and the employee signifying that all parties are in full agreement. Once in place the employee will be supported so that they can undertake training and development as required to grow their career. Follow-ups and review will be scheduled every six months minimally.

Project Certificate Condition No. 138

Category	Education and Training - Inuit employee training
Responsible Parties	The Proponent, Qikiqtani Inuit Association (QIA)
Project Phase(s)	Construction
Objective	Working together with the QIA to prepare effective training programs developed specifically for Inuit will assist in employee preparedness and may improve employee retention.
Term or Condition	The Proponent is encouraged to work with the QIA to ensure the timely development of effective Inuit training and work-ready programs.
Relevant Baffinland Commitment	92
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group
Reference	2021 SEMWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.3

METHODS

Baffinland and the QIA as well as the government of Nunavut, Kakivak Association and the Government of Canada have partnered in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program, the objective of which is to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Training under the Q-STEP program includes work readiness programs as well as targeted training programs directed at apprenticeships, skills development, and formal certification in heavy equipment operation.

Baffinland continued working in collaboration with QIA, to identify candidates for training opportunities and for Inuit to gain skills and competencies to secure employment with Baffinland. This program is designed to prepare Inuit for employment both at the Project and in the community and to gain employment skills for future employment in the region through a number of training-to-employment initiatives.

RESULTS

Q-STEP

The Qikiqtani Skills and Training for Employment Partnership has proven to be the most successful employment and training program currently offered at Baffinland. The Q-STEP Charter from Employment and Service Development Canada was scheduled to end on March 31st, 2021. Due to COVID-19, it has been extended with no additional funding until March 31st, 2022. See further Q-STEP updates in response to Project Certificate Term and Condition No. 135.

Community Based Work Readiness

Baffinland continues to offer the Community Based Work Readiness Training Program. The Community Based Work Readiness Training Program is a 40-hour training program facilitated in the communities in person or virtually which addresses the following areas: Self Awareness, An Introduction to Mining, Essential Skills for the Workplace, Money Management and Preparing for Fly-In, Fly-Out. For 2021 in line with the IIBA commitments the Work Readiness Program was delivered in all five of the North Baffin impacted communities as well as Iqaluit.

The COVID-19 Pandemic directly impacted Nunavut and Nunavummiut during 2021. Nunavut based staff were demobilized for a portion of the year in an effort to protect employees and their communities. In 2021, Baffinland held 14 community based Work Ready Program sessions with a total of 62 graduates (74.6%). There were a total of 54 graduates of this program during the year. Because of COVID-19 and travel restrictions delivery of the program was conducted both in person and an online distance format. The online distance format continued to be very successful and will be continued moving forward even after in person training resumes.

Inuit Career Mobility

In 2021, Baffinland initiated the Inuit Career Mobility Strategy which provides a clear roadmap for new employees joining Baffinland as well as employees seeking advancement or a change in career. Part of the Inuit Career Mobility Strategy requires a career path interview with every Inuk employee. The career path interview explores where the employee is now in their career, what they might be interested in doing in the future, and what Baffinland can do to support and assist Inuit employees in advancing at Baffinland. After the career path interview is conducted the employee will work with Human Resources and their department to create a career development plan which will map out everything required so that the employee can successfully advance at Baffinland. Once completed the career development plan is reviewed and signed off by the department, Human Resources, and the employee signifying that all parties are in full agreement. Once in place the employee will be supported so that they can undertake training and development as required to grow their career. Follow-ups and review will be scheduled every six months minimally.

Apprenticeships and Other Opportunities

Apprenticeship opportunities in skilled trades are open to Inuit each year in the following trades:

- Heavy Equipment Service Technician "Heavy Equipment Mechanic"
- Truck and Coach Service Technician "Heavy Truck/Duty Mechanic"
- Automotive Service Technician "Automotive Mechanic"
- Welder
- Machinist
- Millwright "Industrial Mechanic"
- Oil Heat Systems Technician "Oil Burner Mechanic"
- Housing Maintainer
- Electrician

Baffinland and QIA accept expressions of interest in the apprenticeship program from Inuit and conduct interviews, testing and selection for participants to join a Pre-Trades Training Program which qualifies successful participants to apply to enter the apprenticeship program. The career path for apprenticeship training is as follows:

1. Expression of Interest
2. Testing of Prior Learning and Academic Aptitude
3. Pre-Screen Interview and Discussion for Pre-Trades Program
4. Participation in a Three Month Pre-Trades Training Program
5. Writing Trades Entrance Exam
6. Formal Interview
7. Selection & Offer
8. Job Shadowing in area of apprenticeship to understand the business and role
9. Indentured as Apprentice, completion of Year 1, 2, 3 and 4 Apprenticeship Training as required followed by completion of technical training sessions delivered at a post-secondary institution. Number of required sessions corresponds to the general minimum length apprenticeship in terms of years.
10. For roles such as Housing Maintainer which have a 3-year apprenticeship, successful completion of the 3rd year/technical training session would see the apprentice certified as a journeyperson.
11. For other roles completion of Year 4 apprenticeship training, followed by session 4 training, and session 4 exams are required.
12. On successful completion of session 4, apprentices can be certified as journeypersons.

At the end of 2021, there were 14 Inuit apprentices (12 males and 2 females), as summarized in Table 4.42. All current apprentices at Baffinland shall continue to attend technical training school for their specific trade and apprenticeship level in 2022. Baffinland is coordinating the training with the Nunavut Apprenticeship Department.

Table 4.42: Apprentices at Baffinland in 2021

Number of Apprentices	Level of Training	Occupation
4	Year 1 Apprentice	Heavy Equipment Service Technician "Heavy Equipment Mechanic"
0	Year 1 Apprentice	Truck and Coach Service Technician "Heavy Truck/Duty Mechanic"
1	Year 1 Apprentice	Automotive Service Technician "Automotive Mechanic"
1	Year 1 Apprentice	Welder
1	Year 1 Apprentice	Machinist
0	Year 1 Apprentice	Millwright "Industrial Mechanic"
0	Year 1 Apprentice	Oil Heat Systems Technician "Oil Burner Mechanic"
3	Year 1 Apprentice	Housing Maintainer
2	2 X Year 1 Apprentice	Electrician

Heavy Equipment Training

In previous years, Baffinland offered Inuit opportunities to participate in the Heavy Equipment Operating Training delivered by the OETIO in Morrisburg, Ontario in partnership with Q-STEP. However, due to COVID-19 restrictions, training sessions were unable to take place in 2021.

TRENDS

Due to COVID-19 travel restrictions, the apprenticeship program has been altered to have pre-trades training offered in the communities. This model allows for potential participants to study and write the Trades Entrance Exam in their community before beginning the interview process and beginning indentured as an apprentice at site. This change was made due to travel restrictions and the desire to continue in community training for qualified Inuit candidates.

The Community Based Work Ready Program has also been adapted with the inclusion of an online distance format to deal with COVID-19 travel restrictions. Baffinland plans to continue transitioning towards community based training where possible during the global Pandemic and thereafter.

In 2021, a clear and purposeful transition to more community based training was realized. This resulted in recognizable benefits for Inuit participants who could train in their own community while remaining at home with families and loved ones. Increasing community based training also resulted in a positive financial benefit to each community. Travelling instructors utilized local hotels and restaurants, and community participants who received a training bonus most often spent that money in the community. For some of the community based training, local community employment resulted (pre-trades training for 3 months with local instructors).

RECOMMENDATIONS / LESSONS LEARNED

The COVID-19 Pandemic continued to cause travel and other restrictions in Nunavut and across the world. This impacted Nunavut based employees who, for a portion of the year, were no longer able to travel to and work at site. Nunavut based employees remained at home in their respective communities. Recognizing this it was important for Baffinland to continue to communicate with and engage employees and community residents during this time. Baffinland did this by conducting monthly community town halls and transitioning to community based training. The benefit of community based training is primarily that employees remain at home with their families and loved ones. Without the added stress of having to travel or to be away from home employees and residents were better able to concentrate and be successful with their training. In addition, by running training in the communities this provided additional employment and contracting opportunities in each community. Hotels, restaurants, and local stores would all have benefitted from instructor travel as well as increased spending by participants if they received training bonuses.

During 2021, Baffinland committed to increase community training initiatives. This has been done so that training to staff and community members can continue under the COVID-19 travel restrictions that have taken place in the territory. The Work Ready Program was initially transitioned to an online delivery format with participants being provided an iPad and internet access to be able to participate in the program. Even when in-person training resumed, Baffinland will continue to offer the distance online format which was well received by participants.

Baffinland continued to work with its partners, such as Nunavut Arctic College, to offer ongoing training and development in the communities including: The Adult Basic Education Program, the Pathways to Adult Secondary School (PASS) Program, the Pre-Trades Program and Portfolio Development.

Project Certificate Condition No. 139

Category	Education and Training - Hiring southern Canadians and foreign employees
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	With the unknown availability of labour from the North Baffin region and Nunavut as a whole to provide employment to the Project, the need to employ southern Canadians or foreign workers may implicate the Proponent's on-site language, cross-cultural awareness, and other programming. Having information available regarding the sourcing of labour for the Project is important to ensuring the Proponent and others are prepared for any influx of southern or foreign employees.
Term or Condition	Prior to commencing construction, the Proponent is requested to undertake and provide the results of a detailed labour market analysis which provides quantitative predictions of the number of employees that may reasonably need to be sourced from southern Canada and from foreign markets, identifying where applicable, the country of origin for the foreign labour. Within 90 days of the issuance of the Project Certificate, the Proponent is required to submit an updated Labour Market Analysis which considers requirements of the ERP as well as hiring points within Nunavut and outside of the North Baffin region and RSA.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-Economic Monitoring Working Group
Reference	Qikiqtani Labour Market Analysis (NIRB Registry No. 291437, FHW Consulting, 2014a)
Ref. Document Link	Not applicable

METHODS

Baffinland completed and presented a labour market analysis in the 2014 Annual Report to the NIRB to satisfy this condition.

In 2019, Mining Industry Human Resources Council (MIHR) was engaged to conduct a Qikiqtani Labour Market Analysis in the region, for both Baffinland and QIA. The Labour Market Analysis is intended to estimate and assess the availability of Inuit labour for Baffinland operations in the Qikiqtani region of Nunavut and to help identify the factors that may influence that availability. The final report was delivered in March of 2020.

There are challenges in recruiting Inuit effectively given the Qikiqtani labour supply. Limited numbers of semi-skilled and skilled qualified workers currently seeking work are available. Because of this limited availability of labour from the North Baffin region, and Nunavut as a whole, Baffinland is required to employ southern Canadian workers at site to ensure production continues.

When employing a workforce with significant southern Canadian representation it is important to ensure on site language, cross cultural awareness, and other programming is available. Taking steps to ensure these are in place will increase communication and good working relations.

Baffinland ensures priority hiring is available for Inuit within the 5 point of hire communities as well as the Qikiqtani region. Following this Inuit who are beneficiaries under the Nunavut Agreement and who reside anywhere else in Canada are priority hires. All Inuit employees who express interest are contacted, and their qualifications and skills are assessed against any open roles. Inuit who are qualified for roles are interviewed and if successful are offered career positions at Baffinland.

In 2021, MiHR developed a draft Skills Equivalency Assessment Template (SEAT). This assessment template is designed to assess Inuit skills and knowledge acquired through traditional skills and training as opposed to southern education and training. The SEAT is based on a holistic complete review of Inuit Traditional Knowledge and Skills and allows Baffinland to include this as part of the recruitment and selection process.

RESULTS

The Qikiqtani Labour Market Analysis report is organized around 2 key sections:

- **Section 1:** The Labour Market Analysis (LMA) examines the labour market conditions in the Qikiqtani region of Nunavut, from both a labour demand and labour supply perspective; and the Skills and Capacities Assessment (SCA) profiles the skills and capacities of the labour force, including a look at how people distribute by skill level among Qikiqtani's labour supply;
- **Section 2:** Inuit Labour Force Barriers Analysis (ILBA) explores barriers to full employment for Inuit and identify potential strategies to support/improve the ability of Inuit people to attain and maintain employment at Baffinland operations.

At its core, the Qikiqtani Labour Market Analysis (QLMA) aims to understand and inform expectations of labour supply in the Qikiqtani region, such that project partners can develop strategies to maximize the potential of their community members. As well, the QLMA covers labour demand factors that may tighten the labour market for different occupations and categories of skill level.

This report provides an analytical framework that is simple to understand and reproduce and can lead to informed decisions about Baffinland's Inuit Employment Goals (IEGs) and targets as set out in the Inuit Impact Benefit Agreement.

This study also develops a Skills and Capacities Assessment (SCA) for Qikiqtani. The SCA will profile the skills and capacities of the labour force, including a look at how people distribute by skill level and how specific skills are utilized among the labour supply. Understanding the skill profile of the labour force can help identify where particular skill gaps in a region may exist and ultimately point to potential opportunities to better align the skills of the labour force with those in demand.

TRENDS

The Qikiqtani Labour Market Analysis is a critical resource when examining labour supply and demand. An updated QLMA will be completed in March 2022 and triennially in the year prior to Minimum Inuit Employment Goals for the Project being updated.

Through MiHR, Baffinland, QIA, research and understanding the SEAT will highlight knowledge and skills gained through traditional Inuit Qaujimajatuqangit (IQ), Inuit teaching and learning, and traditional activities. These skills will be measured as equivalent to southern Canadian traditional learning where appropriate.

RECOMMENDATIONS / LESSONS LEARNED

There are challenges in attracting workers in the Qikiqtani's unique and complex labour market. The main attractors to working full-time are financial and personal motivations such as supporting family members or purchasing equipment that will help with hunting such as snowmobiles, boats and ATVs as well as rifles and ammunition. However, these attractors are challenged by factors such as earnings-based rent increases and the family impacts of a rotational work schedule.

Findings from the Qikiqtani Labour Market Analysis indicate that there is limited detailed understanding of what mining work involves and what employment opportunities there may be. The community based work readiness training program helps understand employment and training opportunities at Baffinland. Improvements to the work readiness training program in 2021 included resume writing with the inclusion of traditional knowledge and skills and interviewing skills. These improvements in the work readiness training program prepares Inuit participants with more employable and transferable skills.

Many of the barriers to Inuit employment stem from weak social infrastructure, notably lack of access to affordable child care, housing shortages, limited educational (elementary, secondary and post-secondary) levels and work-related training opportunities, social assistance dependency through rent related to income, lack of equitable health services to address complex mental health and addiction issues, and barriers to obtaining a driver's licence (often a requirement for employment).

Skills gaps and cultural norms concerning career advancement can create barriers, suggesting that Inuit employees may need more encouragement to apply for advancement, particularly for supervisory positions and above. The timeframes and steps required to advance from an entry-level position upward can also pose challenges. Recognizing this, Baffinland has undertaken Career Path interviews with all Inuit employees to understand the individual employees' current career path interest and other opportunities as part of their career development.

Recognizing the importance of ensuring that language and cross cultural awareness is provided to the total workforce, Baffinland has ensured this is addressed. 100% of employees who arrive at the Baffinland site are required to complete an extensive site orientation on their first day at site. One hour of this orientation provides cultural awareness training, provided to all employees on their first day of work.

Inuit Cultural Engagement Workshop

In 2021, the Inuit Success Assurance Team continued to review and update the Inuit Cultural Engagement Workshop, and by using shared experience and knowledge they continually work on improving the workshop to the benefit of all employees. In 2021, by way of feedback participants expressed interest in learning more about the Nunavut communities and how to gain more communication skills with their Inuit colleagues. As a follow up to the workshops, participants provided an overall positive feedback as they were able to learn and understand more about the Inuit culture.

Country Kitchens

Country kitchens are available in three separate areas of the site. These kitchens allow both Inuit and non-Inuit employees to gather for cultural activities such as bannock making, and also to enjoy country food. Each country kitchen is equipped with a freezer to store country food that is brought to the site by employees.

Baffinland on-site Cultural Workshops

Each quarter at the Mary River mine site and Milne Port site, Baffinland organizes cultural workshops for both Inuit and non-Inuit employees to participate in. In 2021, Baffinland held a variety of workshops, including; purse making, Inuktitut classes, country food cooking and spring parka making. Access to an area to sew, as well as material and supplies is available at all times.

Inuit Societal Days

Nunavut Day celebrates the official division of Nunavut from the Northwest Territories and the official recognition of Nunavut as an independent territory. In 2021, Baffinland celebrated Nunavut Day on July 9th, 2021, at both Mary River and Milne Port. Due to the continuing COVID-19 Pandemic the celebrations were limited to socially distanced activities such as watching videos, completing Nunavut themed quizzes, participating in a competition with prizes, and bingo. There was also a promotion of Inuit music and Inuit Literature for all staff. Country food was served to employees in the staff cafeterias.

On November 7th, 2021, Baffinland celebrated International Inuit day on site. Due to the COVID-19 Pandemic restrictions activities were limited. There was a special Inuit cultural presentation delivered between 9 am and 12 pm by the Inuit Success Team in the main cafeteria of the Mary River site.

Cultural Advisors On Site

Formally known as “Elders”, the role of Cultural Advisors is to act as Inuit career and cultural advisors and to provide guidance and assistance to all employees on issues involving Inuit culture. Cultural Advisors also develop, identify, encourage and facilitate cross-cultural activities on site. On-Site Cultural Advisors provide the following support:

- Personal support for Inuit;
- Work-related counselling for Inuit;
- Cultural advisement to Inuit and Non-Inuit;
- On-site interpretation/translation services (both written and verbal translation/ interpretation) as required by site personnel;
- Assistance to Baffinland’s Human Resources department with administrative and onboarding activities related to Inuit employees;
- Assistance with training facilitation required for Inuit employees; and
- Advise the Baffinland on-site Social Committee on the organization of on-site cross-cultural activities.

Project Certificate Condition No. 140

Category	Education and Training - Survey of Nunavummiut employees
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	Monitoring the number of employees who leave previous employment in their home communities or who leave some type of formal education in pursuit of employment with the Project is important to evaluate predictions made and the potential impacts to North Baffin communities and education rates.
Term or Condition	The Proponent is encouraged to survey Nunavummiut employees as they are hired and specifically note the level of education obtained and whether the incoming employee resigned from a previous job placement or educational institution in order to take up employment with the Project.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Baffinland regularly administers a voluntary Inuit Employee Survey, which collects information on employee level of education obtained and whether the employee resigned from a previous job placement or educational institution in order to take up employment with the Project. Baffinland has discussed its surveys with the Government of Nunavut, SEMWG (which includes GN, QIA, and CIRNAC representatives) and QSEMC and will continue to engage both groups on the Project's socio-economic monitoring program. The most recent survey was administered by Baffinland in September/October 2020, results shown below. Results from the Inuit Employee Survey are also provided, where relevant, in the Project's Socio-Economic Monitoring Reports.

Baffinland had intended to administer the Inuit Employee Survey in 2021 following Inuit employees' return to work end of July 2021, and worked with the SEMWG on survey question updates in the fall of 2021. However, due to a number of factors including the onset of the Omicron variant in December, Baffinland was not able to administer the Inuit Employee in 2021.

When a candidate applies to a job listing through Baffinland's online application system, the candidate is prompted to fill out employment and education details in their profile for the application to the respective role. A candidate can also upload a resume and the information is added to their profile for employment history and education. In the event the candidate is not able to apply online, Baffinland collects the candidate's employment and education history during their pre-screening interview.

Although unable to administer the survey in 2021, Baffinland captures employment and education history for new employees through its employee application system and remains in compliance with this condition. Baffinland is working toward updating its applicant tracking system to ensure these data are able to be compiled in a reportable format for 2022 data.

RESULTS

In 2020, total of 82 surveys were completed by Inuit employees and contractors. Table 4.43 summarizes results on the highest level of education obtained by survey respondents ($n=82$).

Table 4.43: Education Status (2020 Inuit Employee Survey Results)

Highest Level of Education	Number of Respondents	Percentage of Respondents
What is the highest education level you have obtained? ($n=82$)		
Apprenticeship or trades certificate or diploma	7	8.5%
College, or other non-university certificate or diploma	14	17.1%
High school diploma or equivalent	23	28.0%
Less than high school	34	41.5%
University certificate or diploma	2	2.4%
Unknown	2	2.4%
Total	82	100.0%
If Baffinland or other agencies were to offer additional educational or training programs for mine employees, what kind of programs would you be interested in? (Select all that apply) ($n=82$)		
Financial management	30	36.6%
Literacy and numeracy	8	9.8%
Traditional skills	21	25.6%
Training to prepare for a different job at the mine	47	57.3%
Other	21	25.6%

Notes:

Source: 2020 Inuit Employee Survey.

Table 4.44 summarizes results on the employment status of survey respondents prior to Project employment ($n=82$).

Table 4.44: Employment Status Prior to Project Employment (2020 Inuit Employee Survey Results)

Pre-Employment Status	Number of Respondents	Percentage of Respondents
Did you resign from a previous job in order to take up employment with the Mary River Project? (n=71)		
Yes	19	23.2%
No	63	76.8%
Total	82	100.0%
If yes, what was your previous employment status? (n=19)		
Casual	2	10.5%
Full-time	13	68.4%
Part-time	3	15.8%
Unknown	1	5.3%
Total	19	100.0%

Notes:

Source: 2020 Inuit Employee Survey.

Table 4.45 summarizes results on the education status of survey respondents prior to Project employment (n=82).

Table 4.45: Education Status Prior to Project Employment (2020 Inuit Employee Survey Results)

Pre-Employment Status	Number of Respondents	Percentage of Respondents
Were you enrolled in an academic or vocational program at the time of your hire at the Mary River Project? (n=82)		
Yes	6	7.3%
No	70	85.4%
Unknown	6	7.3%
Total	82	100.0%
If yes, did you suspend or discontinue your education because you were hired to work at the Mary River Project? (n=6)		
Yes	1	16.7%
No	5	83.3%
Total	6	100.0%

Notes:

Source: 2020 Inuit Employee Survey.

TRENDS

Like previous surveys, the individuals who completed Baffinland's Inuit Employee Survey in 2020 had varied educational and pre-employment backgrounds. 41.5% had less than a high school education, 28.0% had a high school diploma or equivalent, and 10.9% had higher than a high school diploma or equivalent. By comparison, data from the 2016 Census indicate the proportion of the North Baffin LSA's population (aged 25 to 64 years) with no certificate, diploma or degree was 50.8%; with a secondary school diploma or equivalency certificate was 14.4%; and with a postsecondary certificate, diploma, or degree was 36.0%. Likewise, the proportion of Nunavut's

population (aged 25 to 64 years) with no certificate, diploma or degree was 40.9%; with a secondary school diploma or equivalency certificate was 14.6%; and with a postsecondary certificate, diploma, or degree was 44.4% (Statistics Canada, 2017).

Surveyed Inuit working at Baffinland generally did not quit their schooling for the job, with only one respondent reporting leaving an academic program in 2020. Past years have had similar results. In 2017, 2018 and 2019, 0%, 3% and 0% of survey respondents report suspending their education as a result of being hired to work at the Project. Baffinland will continue to track employee education and pre-employment status through an Inuit Employee Survey to see if additional trends emerge.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to administer the Inuit Employee Survey on a regular basis, including in 2022. Baffinland will also continue to welcome feedback on the survey from the SEMWG and QSEMC members.

Although unable to administer the Inuit Employee Survey in 2021, Baffinland is able to capture employment and education data through its applicant tracking system. Although these data are not in a reportable format, Baffinland will update the applicant tracking system to be able to export these data in a report format for 2022 data.

Project Certificate Condition No. 141

Category	Education and Training - Training of Inuit
Responsible Parties	The Proponent, Qikiqtani Inuit Association
Project Phase(s)	Construction
Objective	To ensure that effective training is available in a timely manner.
Term or Condition	The Proponent is encouraged to work with the Qikiqtani Inuit Association prior to construction in order to prioritize the provision of training of Inuit to serve as employees in monitoring or other such capacities.
Relevant Baffinland Commitment	92
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Baffinland continues to work collaboratively with the QIA to promote Inuit training, education, and employment initiatives, consistent with provisions of the Inuit Impact and Benefit Agreement (IIBA, 2018). This work occurs through IIBA committees such as:

- The Joint Executive Committee; and
- Employment and Contracting Committees.

Inuit training and employment initiatives addressed through the IIBA include:

- Inuit Human Resources Strategy;
- Apprenticeship Program (not mentioned specifically in the IIBA, but apprenticeship training is identified as a potential program);
- Morrisburg Heavy Equipment Operator training program (not mentioned specifically in the IIBA, but heavy equipment operator training is identified as a potential program);
- Work Ready Program;
- Summer Student Employment;
- Inuit Internship Program;
- Achievement Awards and Scholarships; and
- Baffinland Inuit Training Centre.

Furthermore, Baffinland and the QIA are partners in the \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) program, which has been designed to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region. Q-STEP is an initiative consisting of both work readiness measures as well as targeted training programs directed at

apprenticeships, skills development, supervisor training, and formal certification in heavy equipment operation. The program will be implemented through the joint efforts of Baffinland and QIA.

RESULTS

Detailed information on training programs is provided in the 2021 SEMR (Aglu and Stratos, 2022).

TRENDS

Detailed information on training programs is provided in the 2021 SEMR (Aglu and Stratos, 2022).

RECOMMENDATIONS / LESSONS LEARNED

While this condition was met for the construction period for which it applied, Baffinland recognizes the need to institute training programs at early stages to ensure Inuit are equipped with the necessary skills to take advantage of employment opportunities at the Mary River Project. The Mary River IIBA and Inuit Human Resources Strategy outline several initiatives Baffinland is undertaking to advance Inuit training and employment. The success of Inuit training and employment initiatives will continue to be tracked through Baffinland's Socio-Economic Monitoring Reports and IIBA Implementation Reports provided to QIA.

In 2020 and 2021, Baffinland was able to successfully implement some distance learning programs in response to the COVID-19 Pandemic. Further, the Company was able to mobilize Nunavut-based members of the Inuit Success Team to successfully deliver in-person training in communities. Detailed information on training programs is provided in the SEMR.

Should the Phase 2 Proposal be approved, Baffinland is committed to the development of an updated Inuit Training Program that covers the period between Phase 2 construction and the first three years of operations. This plan will provide updates on programs that will be offered and how Baffinland intends to maximize Inuit engagement with the Project.

4.7.3 Livelihood & Employment (PC Conditions 142 through 147)

The Project provides direct and indirect employment opportunities to residents of the five (5) North Baffin communities and other Nunavummiut.

Six (6) PC conditions relate to potential impacts of the Project on livelihood and employment. The conditions identify actions that Baffinland and other parties (the GN, QIA and the Nunavut Housing Corporation) should undertake to remove barriers to employment of Inuit, including those barriers faced by Nunavummiut with limited or no previous wage employment experience; women; those living in social housing (the majority of Nunavummiut); and unilingual candidates.

The IIBA outlines the commitments Baffinland has made to ensuring the North Baffin communities benefit from employment opportunities of the Project. Baffinland and QIA also establish annual Minimum Inuit Employment Goals (MIEGs) to set a target for Inuit employment and to outline the actions that need to be taken to meet it. Both parties are currently working toward creating a 3-year MIEGs, which are expected to be implemented in Q2 of 2022.

Baffinland and QIA initiated the development of an Inuit Human Resources Strategy (IHRS) in 2016. The IHRS was finalized with QIA in 2017. In 2019, Baffinland developed the Inuit Success Assurance team. This team ensures Inuit success at Baffinland by directly interacting with all Inuit working at Baffinland. The team encourages Inuit to access available on-site and community-based training opportunities as well as ensures Baffinland continues to develop and retain Inuit employees.

Inuit & Stakeholder Feedback

Discussions around livelihood and Project-related employment opportunities continue to be a key focus of the comments provided by community members and other stakeholders during public meetings. Employment impacts and/or opportunities is a common topic discussed in SEMWG meetings (Appendix C.3).

Monitoring

Baffinland tracks and reports on Inuit employment levels reached each year. This information is presented in quarterly and annual IIBA reports to the QIA, and annually in the socio-economic monitoring report. Furthermore, Baffinland has provided information on potential barriers to employment for women in the 2021 Socio-Economic Monitoring Report for the Mary River Project. This includes indicator data on hours worked by female employees and contractors, and information on childcare availability and costs. Table 4.46 provides an evaluation of the Project's impacts on employment, relative to predictions presented in the FEIS.

In 2021, the Project continued to generate substantial wage employment for LSA residents. The generation of 274,493 employment hours for North Baffin LSA Inuit is greater than the FEIS prediction of 230,000 hours, while the 103,860 employee hours generated by Inuit from Iqaluit is less than the 112,000 hours predicted in the FEIS. Combined, the 378,353 hours for the North Baffin LSA and Iqaluit is significantly greater than the predicted 342,000 hours.

Path Forward

Baffinland continues to refine its Inuit human resources programs and remains committed to meeting Inuit employment targets. The Baffinland Apprenticeship Program, the development of a labour pool of multi-skilled Inuit Heavy Equipment Operators, implementation of the Q-STEP training program (in conjunction with QIA and Governments), the running of on-site and community-based training initiatives, and other actions to meet the

Minimum Inuit Employment Goal (MIEG) should also assist with increasing employment in the North Baffin communities. Baffinland will continue to monitor Inuit employment levels at the Project for future trends. Reporting on each PC condition follows.

Table 4.46: Livelihood and Employment Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Wage Employment	Employment of LSA residents	In 2021, the Project continued to generate substantial wage employment for LSA residents. The generation of 274,493 employment hours for North Baffin LSA Inuit is greater than the FEIS prediction of 230,000 hours, while the 103,860 hours in Iqaluit is less than the 112,000 hours predicted in the FEIS. Combined, the 378,353 for the LSA is significantly greater than the predicted 342,000 hours.	Positive effects consistent with FEIS predictions
	Creation of indirect jobs within the LSA	Spending on Inuit businesses is an indicator of potential indirect employment: Since Project development, more than \$1.5 billion worth of contracts have been committed to Inuit Firms. More than \$220 million in contracts was committed to Inuit Firms in 2021. Furthermore, the Project created 4,145,326 hours of labour opportunity in 2021, much greater than the predicted amount.	Positive effects consistent with FEIS predictions
Job Progression and Career Advancement	Expanded employment and career development options	In 2021, Baffinland continued providing training and skills development opportunities to Inuit. This included 32,974 hours of training for Inuit in dozens of training programs. Twelve (12) Inuit apprentices were also employed by Baffinland and two (2) participants in the Inuit internship program. Over 140,000 hours of training have been provided to Inuit since Project development. 9 Inuit were promoted in 2021, an increase from 5 promotions in 2020.	Positive effects consistent with FEIS predictions

Project Certificate Condition No. 142

Category	Livelihood and Employment - Employee Cohesion
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To promote cohesion between employees on site, and between employees and their families.
Term or Condition	The Proponent is encouraged to address the potential direct and indirect effects that may result from Project employees' on-site use of various Inuktitut dialects as well as other spoken languages, specifically paying attention to the potential alienation of some employees that may occur as a result of language or other cultural barriers.
Relevant Baffinland Commitment	105
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Although the working language at the work sites is English, the Company supports the principle of increased use of Inuktitut in the workplace over the lifetime of the Project. As an operating mine in Nunavut, Baffinland must also comply with the *Inuit Language Protection Act*. At the end of 2019, Baffinland's Inuktitut in the Workplace Policy was revised with QIA as part of the work completed by the IIBA Employment Committee. The updated policy was formally rolled out in 2020 at Project sites.

As such, Baffinland has implemented the following considerations throughout the employment lifecycle in order to proactively address direct and indirect effects:

- In order to ensure that ability to access opportunities is not impacted by language, Baffinland integrates language consideration throughout its recruitment, employment and training processes. An Inuktitut language portal was added to the Baffinland job search database in 2017. This portal allows job seekers to read job descriptions in Inuktitut. In addition to this, Inuit are able to apply/send in resumes in both English and/or Inuktitut. Baffinland also includes Inuktitut speaking trainers for the Work Ready Program offered in North Baffin LSA communities. Baffinland also has an individual who will be able to support apprentices in Inuktitut as required.
- Baffinland is committed to providing translation in the dialect required to ensure that every employee is able to fully understand materials and documents. All staffing documents and processes, including notices, applications and interviews, are available in and can be completed in Inuktitut. In 2021, Baffinland employed two full-time translators. Pursuant to the IIBA, Baffinland provides Inuit employees with access to professional career counselling and professional counselling for personal issues on an as-needed basis. Services are available from Inuktitut speaking counsellors.

- To address potential health and safety effects of language use at the Project sites', as well as other effects, such as potential alienation of employees, Baffinland applies its *Inuktitut in the Workplace Policy*, which outlines the Company's position in respect to support for the use of Inuktitut at all Project sites in Nunavut and ensures that a lack of proficiency in English will not be a barrier to Inuit employment, subject to considerations of health and safety.
- At the mine site, for both health and safety considerations as well as to promote inclusivity, Baffinland works to reduce barriers associated with language through increased use of bilingual (English and Inuktitut) signs and documents, with the use of graphics and symbols where possible. All safety materials, policies, directives and public postings are available in both English and Inuktitut. Baffinland also provides translation and interpretation services as necessary, including at certain meeting and presentations to ensure respectful, transparent dialogue, and understanding. In any instance where language is a barrier for any employee, Baffinland is committed to using best efforts to provide translation in the dialect required to ensure that every employee is able to fully understand materials and documents. Article 11.4 (Inuktitut in the Workplace) of the IIBA also specifically addresses the topic of Inuktitut in the workplace. The *Inuktitut in the Workplace Policy* has been in place since 2013. In 2019, Baffinland worked collaboratively with the QIA to update the Policy, which is currently implemented at Site. Progress in adherence to the policy is tracked in the IIBA Annual Implementation Report and is further discussed at the Employment Committee.
- Baffinland is proactive in addressing any potential language or cultural barriers. To address potential alienation of employees that may occur as a result of language or other cultural barriers, Baffinland uses a variety of activities and programming that promotes the use and awareness of Inuktitut and Inuit culture on site for all staff, including:
 - Inuit Cultural Engagement Workshops, which are provided to all employees at the project and which share Inuit History, Customs and Traditions, including language;
 - Mandatory Cultural Awareness Employee Orientation Program. Cultural awareness training is compulsory and is completed by all Baffinland employees and contractors during site orientation (excluding short-duration visitors);
 - Inuit Cultural Engagement Training. This is a 3-hour in-person course which is delivered at Mary River. The workshop focuses on Inuit history, customs, and traditions;
 - Inuktitut lessons, which are delivered by site-based Cultural Advisors;
 - Country food cooking classes, and country food tastings; and,
- Baffinland has also revised its Mission, Vision and Values statements in direct alignment with Inuit Societal Values.

To ensure an understanding of workplace conditions, including the use of language, QIA and Baffinland also administer the Annual Workplace Conditions Survey, which provides opportunity for employees to report concerns; however, due to the ongoing impacts of COVID-19, the Workplace Conditions Survey, including associated site visits conducted by the QIA, did not take place during 2021.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 143

Category	Livelihood and Employment - Employee family contact
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To enable and foster connection and contact between employees and family members.
Term or Condition	The Proponent is encouraged to consider the use of both existing and innovative technologies (e.g. community radio station call-in shows, cell phones, video-conferencing, Skype, etc.) as a way to ensure Project employees are able to keep in contact with family and friends and to ward off the potential for feelings of homesickness and distance to impact on employee retention and family stability.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	As needed
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Internet and telephone access is available free of charge to employees in the accommodations rooms at site, and in some common areas. If the individual has a phone, tablet or laptop they may use the wireless internet to connect their devices and communicate with friends and family via audio or video applications, in the privacy of their own room or common areas. Bandwidth and utilization levels may limit the use of some applications.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 144

Category	Livelihood and Employment - Requirements for employment
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To ensure that the prerequisites and requirements for employment are clear and well known in work readiness programs.
Term or Condition	The Proponent is encouraged to make requirements for employment clear in its work-readiness and other public information programs and documentation, including but not limited to: education levels, criminal records checks, policies relating to drug and alcohol use and testing, and language abilities.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Job postings identify employment prerequisites and requirements, as do Baffinland Community Liaison Officers (BCLOs) when individuals drop off their resumes at their local offices. Employment prerequisites and requirements are also made clear to potential employees during Work Ready training (general) and pre-screening interviews (specific). Ongoing requirements (background check, and medical) are included in the employment agreement that new employees receive and sign. Between the various channels, all the listed prerequisites and requirements as listed in Project Certificate Condition No. 144 are effectively communicated to potential employees.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is continuously seeking ways to increase Inuit employment in the Project and to provide relevant and meaningful training opportunities for local community members.

Project Certificate Condition No. 145

Category	Livelihood and Employment - Barriers to employment for women
Responsible Parties	The Proponent, Government of Nunavut, members of QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor and understand the existence of barriers to employment for women specifically relating to childcare availability and costs.
Term or Condition	The Proponent is encouraged to work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor the barriers to employment for women, specifically with respect to childcare availability and costs.
Relevant Baffinland Commitment	43, 45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland has provided information on potential barriers to employment for women in the Socio-Economic Monitoring Report. This includes indicator data on hours worked by female employees and contractors, and some information on childcare availability and costs. Furthermore, specific reference is made in the Mary River Project IIBA to Inuit women's access to employment (Article 7.17) and affirmative steps for attracting female employees (Article 11.5; which acknowledges Inuit women entering non-traditional occupations can face barriers related to skill levels and discrimination). Actions identified in Article 11.5 include:

- The Company shall develop an affirmative action plan that sets out measurable goals and procedures to monitor compliance with government employment equity legislation and any harassment policies.
- The Company and a designated Inuit organization shall develop and locate training programs developed specifically to attract women who may want to work at the Project.
- The Company and a designated Inuit organization shall develop and implement gender sensitivity training programs.
- The Company shall provide for appropriate accommodations and facilities for female Inuit employees.

The Arnait Action Plan identifies barriers to employment for women, and then develops methods of reducing or eliminating those barriers. Two separate focus groups were conducted in preparation for the plan. The first was

conducted in Arctic Bay with a group who did not currently work at Baffinland. The second focus group was conducted at the Mary River site and involved a group of current employees. After the focus groups, Baffinland brought together a group of government, and non-government organizations along with a facilitator to conduct an Arnait Action Plan Round Table working group. At that time, all identified barriers from the two previous focus groups were explored, and potential solutions were discussed. Following this, a report was produced by the facilitator and all participants of the Round Table Working Group helped to prepare a three year Arnait Action Plan.

The Arnait Action Plan is planned for three years with each year having a specific focus:

- Year 1 (2021-2021) Recruitment Barriers
- Year 2 (2021-2022) Retention barriers
- Year 3 (2022-2023) Advancement Barriers

In 2021, Arnait Action Plan committee was formed. This committee is comprised of female Inuit employees. The committee has made recommendations to remove or reduce some of the barriers related to employment with Baffinland.

RESULTS

Table 4.47 presents the hours (and percentage of hours) worked by women and men on the Project in 2021. 513,351 hours (or 12.4% of total hours worked on the Project) were worked by women, which is 77,935 hours more than documented for 2020. As a percentage of the workforce, Inuit women represented approximately 28.4% of the Inuit workforce (which is consistent with the proportion in 2020), and non-Inuit women represented approximately 10.2% of the non-Inuit workforce (up from 8.8% in 2020).). When looking at the ratio of female vs. male employment at site for Inuit and non-Inuit employees, the percentage of hours worked by Inuit women (i.e. 28.4% of total Inuit workforce) exceeded that for non-Inuit women (i.e. 10.2% of total non-Inuit workforce) in 2021.

Women in mining have been under-represented over the last 5 years, representing 15% of the Canadian workforce (MiHR, 2021). When looking at the ratio of female vs. male employment at site for Inuit employees, the percentage of hours worked by Inuit females exceeds the average 5-year trend across Canada by more than 10%.

Table 4.47: Hours Worked by Project Employees and Contractors by Ethnicity and Gender (2021)

	Hours Worked	FTE	% of 2021 Total
Inuit			
Male	353,242	175	8.5%
Female	139,889	69	3.4%
Non-Inuit			
Male	3,278,734	1,626	79.1%
Female	373,462	185	9.0%
All Ethnicities			
Male	3,631,975	1,802	87.6%
Female	513,351	255	12.4%
Total	4,145,326	2,057	100%

Appropriate community-level indicator data are currently unavailable for the topic of childcare availability and costs. As such, this topic continues to be tracked and discussed through the GN-Baffinland MoU, QSEMC process, community engagement conducted for the Project, and through the Inuit employee survey that is typically administered on an annual basis. Employment levels can be influenced by many factors, including the existence of barriers faced by certain demographic groups. Inadequate access to childcare in the LSA may be creating some barriers to increased employment of women at the Project. However, the new employment opportunities being created for women in the LSA because of the Project should be acknowledged. Baffinland has also developed, or has committed to developing, several measures that encourage Inuit female employment and retention at the Project. Goals and priorities in this area were finalized with the QIA in the IHRS and through renegotiation of the IIBA in 2018. The success of IIBA and IHRS initiatives will continue to be tracked by Baffinland.

Baffinland completed the Arnait Action Plan in 2019. This plan has identified potential areas that can be addressed over the long term to increase the number of Inuit women working at the project. In 2021 the Arnait Action Plan committee was formed. This committee is comprised of female Inuit employees. Refer to Term and Condition No. 147 of this report for a summary of recommendations and improvements made by the committee in 2021.

Baffinland continues to strive for the inclusion of Inuit women in its annual training programs. In 2021, training completed by Inuit women represented an approximate 28% - or 6,755 hours – of total training hours completed by Inuit (i.e. 32,974 hours).

In 2019, Baffinland provided a \$50,000 donation to support the development of a daycare in Arctic Bay. Baffinland is committed to further support for daycare development, and the offsetting of costs of daycare for Baffinland employees, however, these are dependent on the outcomes of the Phase 2 Proposal and Inuit Certainty Agreement.

TRENDS

There were 69 female Inuit FTEs in the workforce in 2021 (Baffinland and contractor employees), down from 71 in 2020. Female Inuit employment as a percentage of the total Inuit workforce and entire workforce (i.e. Inuit and Non-Inuit) was 28% and 3.4%, respectively, representing a slight decreased when compared to 2020 values.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information related to potential barriers to employment for women through its Socio-Economic Monitoring Reports. However, appropriate community-level indicator data are currently unavailable for the topic of childcare availability and costs. As such, this topic continues to be tracked and discussed through the GN-Baffinland Memorandum of Understanding (MoU), QSEMC process, and community engagement conducted for the Project.

Baffinland engages with the GN on employment topics through the SEMWG and QSEMC as well as the Memorandum of Understanding signed in 2019. Baffinland remains open to discussion with the Government of Nunavut as part of its engagement with these groups. Baffinland also remains open to discussion and feedback on how improved monitoring data may be obtained.

Through the Inuit Certainty Agreement, Baffinland has committed to the investment of CAD \$3 million towards the construction of a childcare facility in each North Baffin LSA community as well as the provision of a Nunavut resident Baffinland Inuit employee early childcare subsidy. A subsidy of up to \$19/day per child (14 years and younger) will be made available to Inuit Nunavut residents who are employed by the Project.

Project Certificate Condition No. 146

Category	Livelihood and Employment - Availability of childcare for Project Employees
Responsible Parties	Government of Nunavut and Qikiqtani Inuit Association
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To lessen the barriers to employment as relating to the availability of childcare.
Term or Condition	The Government of Nunavut and the Qikiqtani Inuit Association are strongly encouraged to investigate the possibility for Project revenue streams to support initiatives or programs, which offset or subsidize childcare for Project employees.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	Not Applicable
Stakeholder Review	Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

This PC Condition is not directed at Baffinland. See PC Condition No. 145 for Baffinland's work with the SEMWG in this area.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 147

Category	Livelihood and Employment - Affordability of housing
Responsible Parties	The Proponent, Government of Nunavut and Nunavut Housing Corporation
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To lessen the barriers to maintaining employment as relating to the availability and costs of housing.
Term or Condition	The Proponent is encouraged to work with the Government of Nunavut and the Nunavut Housing Corporation to investigate options and incentives which might enable and provide incentive for employees living in social housing to maintain employment as well as to negotiate for and obtain manageable rental rates.
Relevant Baffinland Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Progress
Stakeholder Review	Government of Nunavut (Nunavut Housing Corporation; Community and Government Services; Economic Development and Transportation); Mary River Socio-Economic Monitoring Working Group (SEMWG); Qikiqtani Socio-economic Monitoring Committee (QSEMC)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Baffinland discusses housing-related issues with the QSEMC and SEMWG, of which the Government of Nunavut (including Nunavut Housing Corporation) are active participants. Due to the ongoing environmental review process, discussion held with the Government of Nunavut and NHC on housing-related options and incentives was limited in 2021.

Baffinland and the Government of Nunavut also maintain a Memorandum of Understanding that highlights priority areas for potential collaboration. This MoU provides a venue for any GN Department or Agency, including Nunavut Housing Corporation (NHC), to approach Baffinland with proposals relevant to their mandates, including housing. Baffinland will always remain open to any discussions related to housing the GN and NHC wishes to have.

Baffinland delivered basic financial literacy training to North Baffin community members through the Work Ready Program in 2021. The company is currently reviewing enhanced financial literacy and computer basics programming that may be made available in the North Baffin communities.

RESULTS

Not applicable

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Housing in Nunavut is the responsibility of the Government of Nunavut and the NHC. Baffinland will continue to engage and discuss housing-related issues with these parties and will advocate for more work-friendly social housing policies for its workers.

Baffinland is looking forward to engaging with the Government of Nunavut and the NHC through the MoU in 2022. Going forward, and if agreed upon with the GN, Baffinland will report on successes and achievements under the MoU in subsequent annual reports.

4.7.4 Economic Development, Self-Reliance, and, Contracting and Business Opportunities (PC Conditions No. 148 through 152)

Five (5) PC conditions relate to the potential impacts of the Project on economic development and self-reliance, and contracting and business opportunities. The objectives of the conditions are to: encourage Baffinland to investigate what measures the Proponent could take to encourage home ownership; promote the contracting of Inuit firms by contracting with smaller work packages; undertake collaborative monitoring with regional agencies to evaluate the Project's interactions with harvesting and food security; outline measures to minimize impacts on park users; and to complete an assessment of the risk presented by temporary mine closure on local employment and economic development.

Inuit & Stakeholder Feedback

With respect to economic development, local communities, the QIA, the GN, and the federal government are all key stakeholders. As with employment, Inuit and these stakeholders are interested to see the Project deliver and induce economic development in the region. Commitments and contracting guidelines are contained in the IIBA to encourage contracting of Inuit firms.

Concerns have been expressed regarding the potential negative effects or challenges associated with temporary or early closure of the Project. In response to these concerns, and in accordance with Term and Condition No. 149, Baffinland updated its temporary closure planning report in 2021. The updated report was informed by perspectives and feedback received during a series of engagements with the QSEMC, SEMWC, and North Baffin LSA community members (i.e. community economic development officers) in the 2021 year.

Monitoring

Baffinland tracks and reports on the amount spent on contracting with Inuit firms each year and on LSA payroll amounts. Baffinland has also presented information on Project harvesting interactions and food security, household income and food security, and land user. Such Project interactions are discussed in the 2021 Socio-Economic Monitoring Report. Table 4.48 provides an evaluation of the Project's impacts on economic development and self-reliance, and contracting and business opportunities based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Positive effects with respect to aspects of the economy in the North Baffin communities have accrued as a result of Project employment.

Path Forward

Baffinland and QIA signed an amended IIBA in 2018. Both continue to work collaboratively to improve Inuit business opportunities at the Mary River Project. Baffinland will continue to monitor and report on Project-related economic-development effects in future years. Reporting on each PC condition follows.

Table 4.48: Economic Development Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Land	Mine operation and ongoing construction activities causing increased industrial utilization of land, may affect harvesting and travel, or result in changes to how people engage in the land-based economy	Effects are difficult to monitor and assess. In 2021, a total of 199 land use visitor person-days were recorded at Project sites, an approximate 40% reduction from 2020. The decrease is attributed to the impacts of COVID-19 restrictions and the closure of Project facilities to Nunavut residents in respect of Public Health Measures.	Not applicable.
People	Employment, training and contracting resulting in increased human capacity and well-being; opportunities for youth, improved education and training; and increased wealth and well-being	Baffinland's 2021 Socio-economic Monitoring Report presents 2021 training, employment, income and contracting statistics all well as investments in school-based initiatives and company donations. Taken together, this data indicates the Project has had a positive effect on skills and opportunities in the LSA.	Positive effects consistent with FEIS predictions
Community Economy	Employment of North Baffin residents resulting in an improved ability to achieve strategic community development objectives; increased wealth in community; increased local business opportunities	Employment monitoring and results are described in Section 4.7.3. Since Project development, more than \$1.5 billion worth of contracts have been committed to Inuit Firms. \$202.2 million in contracts was committed to Inuit Firms in 2021. Furthermore, Baffinland's Inuit employee payroll totaled \$15.292 million. These amounts include all Inuit employees who lived inside and outside of Nunavut. Contractor's Inuit employee payroll totaled \$6.303 million. Therefore, Project Inuit employee payroll expenditures totaled \$21.596 million in 2021.	Positive effects consistent with FEIS predictions
Territorial Economy	Employment of Nunavut residents causing growth in the territorial economy. Expanded economic activity (Gross Domestic Product; GDP) Increased diversity of territorial economy.	Impacts to the territorial economy consist of employment (Section 4.7.3) and contracting within Nunavut (see above), as well as corporate and payroll taxes, mineral royalties (once they begin), and IIBA payments.	Positive effects consistent with FEIS predictions

Project Certificate Condition No. 148

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Food security
Responsible Parties	The Proponent, Members of the QSEMC
Project Phase(s)	Construction and Operations
Objective	To improve understanding of the interactions between the Project and Inuit harvesting and how this relates to food security for residents of the North Baffin.
Term or Condition	The Proponent is encouraged to undertake collaborative monitoring in conjunction with the Qikiqtaaluk Socio-Economic Monitoring Committee's monitoring program which addresses Project harvesting interactions and food security and which includes broad indicators of dietary habits.
Relevant Baffinland Commitment	45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland has provided information on Project harvesting interactions and food security in the Socio-Economic Monitoring Report. In May 2021, the Qikiqtani Inuit Association's released the last of their Tusaqtuvut studies, supported by Baffinland under IIBA and ICA cost recovery provisions, which reported baseline interactions with the existing approved project, as well as anticipated Phase 2 interactions, including harvesting interactions, from interviewed Inuit participants in Arctic Bay and Clyde River.

Appropriate indicator data at the community level are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information (results are reported on in the Socio-Economic Monitoring Report). Some territorial (but not community-scale) government data are available on harvesting and food security in Nunavut and are presented in the Socio-Economic Monitoring Report. Community-level data collected through the QIA's 2021 Tusaqtuvut Study for Arctic Bay and Clyde River is also included in the Socio-Economic Monitoring Report. Other data related to this topic are presented in the report and include: proportion of tax filers with employment income, median employment income, percentage of population receiving social assistance, number of recorded land use visitor person-days at Project sites, and number of Wildlife Compensation Fund claims.

RESULTS

Harvesting and consumption of country food remains a valued and important part of the Inuit culture and diet. Monitoring data presented in the Socio-Economic Monitoring Report suggest Inuit land use activities coexist with the Project, as local land users have continued to access Project sites since construction. Inuit employee harvesting is also permitted at the Project (subject to certain restrictions).

Stakeholder concerns expressed about Project effects on harvesting and wildlife are acknowledged. Concerns have also been expressed elsewhere about declining rates of country food consumption and the lack of food security in Nunavut, generally. Various mitigation measures have been established by Baffinland to address effects on Inuit travel, camps, and harvesting. For example, Baffinland has contributed an initial \$750,000 to a Wildlife Compensation Fund (administered by the QIA under the terms of the IIBA) to address the potential for wildlife-related impacts from the Project. Four (4) Wildlife Compensation claims were made in 2021, where two (2) were approved. Total funds distributed in 2021 amounted to \$8,190.76. Any accessing of this fund is a good proxy for the number of negative harvesting interactions that happen within a given year. Baffinland has also established a Harvesters Enabling Program in Pond Inlet through the IIBA, whereby Baffinland contributes \$400,000 per year for 10 years for a gas program to enhance travel for Inuit in the area.

There are positive indications that the Project contributes to improved household income and food security in the LSA. This has occurred by providing LSA residents with meaningful employment opportunities and through related contributions and initiatives. Employment income facilitates the purchase of food and other family goods, including those needed to participate in harvesting if desired. The 2020 Inuit Employee Survey results indicated that 40% of respondents felt that their ability to participate in harvesting or other land-based activities has improved since obtaining employment at the mine, which can contribute to improved food security. An additional 49% of respondents noted no effect. Only 3 respondents (<4%) identified employment at the project has worsened their ability to participate in harvesting or other land-based activities.

Baffinland also contributes to various community wellbeing initiatives directly (e.g. through the IIBA's Ilagiiktunut Nunalinnullu Pivalliajutsait Kiinaujat (INPK) Fund, school lunch program, seasonal country food exchange program, community food bank donations) and indirectly (e.g. through the QIA Legacy Fund and QIA Benefits Fund), which may assist individuals not directly benefiting from Project employment.

The Nunavut Food Security Coalition (2014) has outlined four components of food security (i.e. availability, accessibility, quality, and use) and factors affecting each component. Baffinland has acknowledged it can play a role in each of these food security components. However, the Nunavut Food Security Coalition (2014) also highlights food security components "are influenced by many complex factors" and notes "this critical and complex issue is larger than the mandate of any one organization. A collaborative approach is essential." Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer; Baffinland's role in each of the four food security components identified by the Nunavut Food Security Coalition (2014) is described in the Socio-Economic Monitoring Report.

TRENDS

Baffinland acknowledges Inuit and stakeholder concerns have been raised on this topic. However, relevant mitigation is in place (e.g. Wildlife Compensation Fund, Harvesters Enabling Program) and Baffinland continues to make contributions to the components of food security through initiatives commensurate with its role as a regional mineral developer. In addition, potential effects on wildlife resources continue to be tracked through Baffinland's

environmental monitoring programs and the TEWG/MEWG processes. Relevant sections of Baffinland's Annual Report to the NIRB should be consulted for monitoring results and information specific to these topics.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to monitor the topic of Project harvesting interactions and food security in its Socio-Economic Monitoring Report. However, appropriate community-level indicator data are currently unavailable for this topic. As such, this topic continues to be tracked through the QSEMC process, community engagement conducted for the Project, and related information. Baffinland is open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained, which may include reporting wildlife harvest success under quota's each year for caribou and narwhal.

Baffinland has provided the necessary funding and support to QIA to conduct a Pond Inlet Country Food Baseline Study. The study commenced in 2021 with the QIA initiating engagements with the Hamlet of Pond Inlet and the MHTO on the topics of food security and sovereignty. COVID-19 has delayed further engagement activities by QIA and the status of the Study is unknown. The study is being conducted by a team made out of QIA representatives, Inuit chosen researchers, and Pond Inlet Community Members. Regardless of Phase 2's approval, Baffinland is obligated to support the completion of the Pond Inlet Country Food Baseline.

Project Certificate Condition No. 149

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Impacts of temporary closure
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To further the understanding of how a temporary closure may impact on the well-being of the residents and businesses of the North Baffin region.
Term or Condition	Prior to the commencement of operations, the Proponent is required to undertake an analysis of the risk of temporary mine closure, giving consideration to how communities in the North Baffin region may be affected by temporary and permanent closure of the mine, including economic, social and cultural effects and taking into consideration the potential drop in employment between the construction and operations phases of the Project.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Potential Effects of a Mine Closure (FHW Consulting, 2014b) Temporary Closure Planning: Socio-Economic Considerations for the Mary River Project (Jason Prno Consulting Services Ltd. [JPCSL], 2022)
Ref. Document Link	Not applicable

METHODS

Acknowledging the Project has evolved considerably since the 2014 submission of the previous closure planning report (FHW Consulting, 2014b) Baffinland conducted additional planning for socio-economic aspects of temporary closure in 2021. Baffinland engaged with the SEMWG and QSEMC community members on potential impacts and community and stakeholder concerns relating to the heightened risk of temporary closure in 2022.

In January 2022, Baffinland submitted the updated report *‘Temporary Closure Planning: Socio-Economic Considerations for the Mary River Project’* to the Nunavut Impact Review Board which considers risks for temporary mine closure and how communities in the North Baffin region may be affected by it, including economic, social and cultural effects (JPCSL, 2022). The content of the report was informed by community and stakeholder perspectives, and Baffinland engaged QSEMC and MRSEMWG, as well as the north Baffin Community Economic Development Officers (CEDOs), ahead of its submission.

RESULTS

After considering current economic, social, and environmental risk factors, the Project has been assessed to currently be in a ‘moderate to high’ risk profile for temporary closure. This conclusion considers the highest risk rankings identified in all categories assessed in addition to the role of other pertinent risk factors. It is evident the socio-economic effects of temporary closure would be varied and complex, however, the adverse economic implications for North Baffin communities could be considerably negative. Additional mitigation measures are

proposed to provide minor offsets to the anticipated negative consequences of closure on our employees and contractors as we transition from an operating project to a care and maintenance scenario.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

In the case of temporary mine closure, Baffinland's socio-economic goal is to mitigate unanticipated losses in Project economic benefits for local communities by addressing adverse effects through relevant employee, family, and community programs and support. Through its analysis of risk of temporary mine closure, Baffinland has put in place a variety of mitigation and management measures to address potential socio-economic effects of temporary closure. These include, but are not limited to:

- Continuing to provide meaningful work experience, training and skills development, including on-the-job and formal training experiences, to increase employability in the case of closure, and to put in place workforce transition measures (e.g. provision of skills/training records, job search assistance and resume assistance) to assist with transitioning to new endeavours;
- Use of different employment scenarios during temporary closure periods, such as unpaid leaves of absence, early retirement, and work-sharing;
- Providing appropriate notice and engagement to employees, contractors, and communities; and,
- Providing assistance to support health and well-being, including continued availability of employee and family assistance programming (EFAP) for 1 year following closure, financial management training, and transitional funding to continue community counsellors program

When the Project is approaching closure, Baffinland will work with government and community stakeholders to implement programs to support employee transition. Baffinland is also committed to working with the QIA to develop a Mine Closure Working Group that will include members from local communities and will address biophysical and socio-economic issues related to temporary and permanent site closure.

Project Certificate Condition No. 150

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – Impacts to visitors of Sirmilik National Park
Responsible Parties	The Proponent, Parks Canada
Project Phase(s)	Construction and Operations
Objective	To limit potential of Project impacts upon visitors, researchers and/or beneficiary users of the Sirmilik National Park.
Term or Condition	<p>The Proponent will ensure the following:</p> <ul style="list-style-type: none"> a. The Proponent will maintain, where possible, a minimum flying altitude of 2,000 feet over the park, except for approaches to land, take-off or for safety reasons b. The Proponent will ensure that certification of noise compliance is current, where compliance is applicable c. For the purpose of briefing Park visitors, the Proponent will provide Parks Canada (1) prior to commencing the shipping season, with planned daily shipping schedules, and (2) annually, with air traffic information, and (3) to provide updates when significant variations from these are expected d. The Proponent is strongly encouraged to provide due consideration to wilderness experience during its operations in the open water season, especially during the month of August which is typically a time of high use by sea kayakers.
Relevant Baffinland Commitment	34
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Parks Canada, Environment Climate Change Canada, Qikiqtani Inuit Association, Indigenous and Northern Affairs Canada, Nunavut Impact Review Board, Parks Canada
Reference	<p>Draft 2021 Terrestrial Environmental Annual Monitoring Report (EDI, 2022)</p> <p>Draft 2021 Marine Mammal Aerial Survey Report (Golder, 2022e)</p> <p>Draft 2021 Ringed Seal Aerial Survey Monitoring Program Report (Golder, 2022f)</p> <p>2021 MEWG Meeting Records</p>
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.16

METHODS

Pilots are made aware of the minimum flying altitude in the region, which are included in aviation contracts. Helicopter flight height compliance is monitored annually and is reported on in the Draft 2021 Terrestrial Environment Annual Monitoring Report (EDI, 2022). Flight paths were also tracked during the implementation of marine mammal aerial surveys completed in July, August and October, 2021 (Golder, 2022e).

Previously in 2014, Baffinland worked directly with Parks Canada to develop a brochure on kayaking safely around large ships. The brochure was published in French, English and Inuktitut and installed in the Pond Inlet Parks office.

Baffinland continues to contract exactEarth®, a global vessel monitoring and tracking service based on AIS (Automatic Identification System) data from polar orbiting satellites to track and report on vessel movements. The vessel tracking information is available on Baffinland's website to allow any member of the public to check on vessel coordinates, which direction the vessel is moving, and its destination.

RESULTS

No helicopter flights over Sirmilik Park occurred in 2021 (EDI, 2022). All other aircraft transiting to and from monitoring areas near Sirmilik Park took into consideration recommendations to maintain flight elevations that are at least 2,000 feet over the park. Otherwise, ringed seal and marine mammal aerial surveys were completed by aircraft transiting over water in proximity to Sirmilik Park (Golder, 2022e, 2022f).

Parks Canada continues to be advised of shipping activity through publicly accessible information posted in Pond Inlet, social media (through Facebook), local public radio announcements and marine VHF radio, Baffinland's Annual Report to the NIRB and through MEWG updates (i.e. presentations, monitoring reports, etc.). Parks Canada can also access vessel tracking information at any time on Baffinland's website to check on vessel coordinates, which direction the vessel is moving, and its destination.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to make all pilots aware of the cruising altitude of at least 650 m above ground level minimum, consistent with the minimum flying altitude.

Baffinland remains open to discussion with Parks Canada if updates to the brochure or other additional information is requested.

Baffinland has found the use of exactEarth® to be beneficial in providing information related to ship routing to the public. Baffinland will continue to use this service. Furthermore, it is Baffinland's intent to continue providing live viewing of vessel tracks through the Shipping Monitors based out of the Pond Inlet Office, and providing live viewing to the public and any agencies with an interest in the Project, including Parks Canada, on its website in 2022.

Baffinland will continue to provide information about its shipping season through MEWG correspondence and/or relevant MEWG meetings.

Project Certificate Condition No. 151

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities - Access to housing
Responsible Parties	The Proponent
Project Phase(s)	Construction and Operations
Objective	To investigate ways that economic development and self-reliance may improve access to housing by employees.
Term or Condition	The Proponent is encouraged to investigate measures and programs designed to assist Project employees with homeownership or access to affordable housing options.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Nunavut Housing Corporation Home Renovation and Repair Program to Nunavut Residents.(NHC, 2016)
Ref. Document Link	Not applicable

METHODS

Access to affordable housing in Nunavut is the responsibility of the Government of Nunavut and the Nunavut Housing Corporation (NHC). However, with the introduction of paid employment at the Project, some Nunavut-based employees may be introduced to banking activities and programs, including savings and investment accounts and possible access to mortgages and similar opportunities, all of which may help employees with eventual home ownership.

In 2020, Baffinland worked with the NHC to ensure housing supports were provided to Project employees negatively impacted by COVID-19. The NHC helped ensure that additional information and resources were available in the North Baffin LSA communities to assist Project employees affected by the pandemic. These supports included changes to rent payments alongside changes to wages associated with the decision to demobilize Nunavut resident employees from site on standby wages in response to public health advice.

Baffinland also regularly administers an Inuit Employee Survey, which collects data on employee housing status and other topics. Baffinland was unable to administer the survey in 2021; however, 2020 survey results are presented in the Socio-Economic Monitoring Report.

RESULTS

Currently, there is not a clear and direct relationship between Project employment and any measures or programs undertaken by Baffinland or others and home ownership. However, Project employment should eventually act to increase the purchasing power of local residents and decrease the number of individuals receiving income support. This is expected to occur primarily through increases in local wealth generated by Project-related employment and other economic opportunities. While the manner in which Project employees spend their incomes will ultimately be

a personal choice, access to adequate housing (including private ownership) may be a goal for some individuals. Incomes generated by the Project may help individuals accomplish this goal should they wish.

Baffinland provides financial literacy training at both Project locations (i.e. Mary River and Milne Port). In January 2020, two representatives of the Nunavut Literacy Council were on site for a week to complete a workplace literacy needs study. Representatives met with key departmental management and created an advisory committee. A second visit was planned for March, but was postponed indefinitely due to COVID-19. Baffinland was able to deliver basic financial literacy training to North Baffin community members through the Work Ready Program in 2021. The delivery of on-site workplace training to employees will resume in 2022, assuming all Nunavummiut employees remain mobilized to site and will be held on an as-needed basis.

Baffinland and the GN signed a Memorandum of Understanding in 2019 to work on issues of mutual concern. Baffinland would welcome discussions on housing related issues through this forum. The Government of Nunavut and Baffinland Memorandum of Understanding is a public document and can be found on the Nunavut Legislative Assembly Website. ([https://assembly.nu.ca/sites/default/files/TD-178-5\(2\)-EN-GN-BaffinlandMOU.pdf](https://assembly.nu.ca/sites/default/files/TD-178-5(2)-EN-GN-BaffinlandMOU.pdf)).

The First Nations Bank of Canada (FNBC) established a branch in Pond Inlet in 2014. The FNBC also has a branch in Iqaluit, and one in Baker Lake. Though FNBC has established these branches independent of any action by Baffinland, it is likely that the establishment of the Pond Inlet branch was induced at least partly by the Project, in the same way that the branch in Baker Lake was likely induced at least partly by the Meadowbank Mine.

Furthermore, the NHC continues to make investments in new housing units across the territory and has several existing programs, which support improved access to housing for Nunavut residents. These programs include recent changes made to the Public Housing Rent Scale (in 2014) to reduce disincentives to work and encourage savings (e.g. by assessing only the incomes of the two primary tenants rather than non-primary tenants, placing limits on rent increases due to income increases every year until the rent assessed total is eventually reached). The NHC also offers home purchase assistance programs (e.g. the Nunavut Down Payment Assistance Program; Tenant to Owner Program) and home renovation and repair programs to Nunavut residents (NHC, 2016). Together, these programs and investments are expected to lead to improved housing circumstances for individuals, help reduce overcrowding, and address public housing deficits in the territory.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is looking forward to engaging with the Government of Nunavut and the NHC through the MoU in 2022. Going forward, and if agreed upon with the GN, Baffinland will report on successes and achievements under the MoU in subsequent annual reports.

Project Certificate Condition No. 152

Category	Economic Development and Self-Reliance, and Contracting and Business Opportunities – IIBA contract requirements
Responsible Parties	Qikiqtani Inuit Association
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To improve ability of small businesses to access Project contract and sub-contract opportunities.
Term or Condition	The Qikiqtani Inuit Association is encouraged to provide the Board and the Qikiqtaaluk Socio Economic Monitoring Committee with information regarding the effectiveness of any provisions within the Inuit Impact and Benefit Agreement which may require that larger contracts be broken down into smaller size in order that they are reasonably managed by smaller businesses in the North Baffin region, while respecting any confidential or privileged information.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	Not Applicable
Stakeholder Review	Qikiqtani Inuit Association, Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

This condition is not assigned to Baffinland however the Company can confirm that it continued implementing provisions of the IIBA to support increased access to Inuit firms for contracting opportunities at the Mary River Project. This includes contracting procedures designed to maximize opportunities for Inuit Firm participation in smaller and larger contracts. Implementation is regularly monitored by the IIBA Contracting Committee, and Baffinland provided monthly and quarterly reports to QIA on the number and value of contracts awarded to Inuit Firms.

Baffinland contributed \$275,000 to a Business Capacity and Start Up Fund in 2021 which was a continuation of previous years' contributions. The fund, which is administered by QIA, is intended to develop business capacity and enhance the ability of Inuit Firms to participate in the Project bidding process through the provision of advice and assistance related to start-up capital and financing, management development, ongoing business management, financial management, contracts and procurement or human resources management. Baffinland also participates in both the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and the Mary River Socio Economic Monitoring Working Group (SEMWG). These Working Groups provide a discussion forum and information sharing hub that supports impacted communities and interested stakeholders to take part in monitoring efforts to Project specific economic monitoring.

Further Inuit Firm business development efforts will be informed by the Inuit Firm Survey, which was developed in 2019 and released to all Inuit Firms registered with Nunavut Tunngavik Incorporated (NTI). The survey allows Inuit

Firms to identify areas in which they require the most business development support, thereby directing Baffinland and QIA efforts, as well as informing the utilization of the Business Capacity and Start-Up Fund. The survey remains open to all Inuit Firms. Since 2019, a total of ten (10) firms have completed the survey.

RESULTS

The total value of contracts awarded to Inuit Firms was \$220.2 million in 2021. This is an increase from \$91 million in 2020. This includes twenty-five (25) contracts with Inuit-owned businesses and joint ventures, all of which were based in either the North Baffin communities or Iqaluit. Since Project development, more than \$1.5 billion worth of contracts have been awarded to Inuit-owned businesses and joint ventures.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to work with the QIA through the Contracting Committee and the Joint Executive Committees to maximize Project-related benefits to Inuit Firms.

There has been limited uptake with the Inuit Firm Survey. In efforts to increase the survey's response rate, Baffinland will publish the Inuit Firm Survey via social media channels, community radio, and other means in 2022.

4.7.5 Human Health & Wellbeing (PC Conditions 153 through 157)

Five (5) PC conditions relate to the potential impacts of the Project on human health and well-being. These conditions focus on the implementation of measures to support Inuit employed by the Project, including: the provision of employee assistance programs, addressing potential cultural conflicts at site, the provision of services or programs to benefit families in potentially affected communities to mitigate the impact of employees' absence from home, and monitoring of potential indirect effects of the Project on human health and well-being. Commitments to the provision of employee assistance and counselling are contained in the IIBA

Inuit & Stakeholder Feedback

As noted in Section 4.7.1, the key stakeholders focused on the socio-economic environment include the communities, the QIA, various departments of the GN, and the federal government. There is an inherent relationship between the Project and the Government of Nunavut for managing socio-economic effects from the Project as the GN is responsible for delivering most health and social services programs in Nunavut. Key concerns expressed by stakeholders relate to the effects of fly-in/fly-out employment on workers and their families. These concerns were raised during the environmental assessment, and also in recent consultation (Appendix B). The SEMWG and QSEMC also regularly discuss this element of the Project (Appendix C.3).

Monitoring

Baffinland tracks and reports on several indicators of human health and well-being. This includes reporting on the number of instances that illegal substances or alcohol are identified during security searches at the Project sites, and occupational health and safety statistics. Baffinland has also presented information on the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates, proportion of tax filers with employment income and median employment income, percentage of population receiving social assistance, and other topics (e.g. crime rates) in the 2021 Socio-Economic Monitoring Report. Table 4.49 provides an evaluation of the Project's impacts on human health and well-being, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Changes in human health and well-being are often more apparent over a longer term, and attributing cause can be challenging. As Project construction only began in 2013, there is a minimal amount of post-Project data currently available. Human health and well-being can also be influenced by many different socio-economic factors, including those which are external to the Project. Direct correlations between the Project and human health and well-being will only come to light with the analysis of additional annual data. However, there is currently no indication the FEIS predictions are not being met and it is expected that the Project is improving the health and well-being of some individuals and families in the LSA who participate in the Project. There were no significant injuries and no fatalities at the Project sites in 2021.

Path Forward

Baffinland will continue to deliver and refine its training and employee assistance programs, and monitor indicators of human health and well-being, in consultation with the SEMWG, the QSEMC, and the Project's workforce. Reporting on each PC condition follows.

Table 4.49: Human Health and Well-being Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Substance Abuse	Increased substance abuse due to the transportation of substances through Project sites	Security searches employees arriving and departing site, and the site is searched with drug dogs and trained staff. In 2021, five (5) drug and alcohol related contraband infractions occurred at Project sites amongst employees and contractors. This was a large decrease when compared to occurrences in 2020 (i.e. 20 infractions). While all contraband infractions are of concern and taken seriously by Baffinland, the 5 infractions that occurred in 2020 represent only a small number of individuals from the Project workforce. All individuals who do not comply with Baffinland's no drugs/no alcohol policy are immediately removed from site and disciplinary action (up to and including termination) is commenced. Baffinland also notifies the RCMP, where appropriate, of search results.	Relevant monitoring activities for human health and well-being are longer term and conclusions will be drawn in future years
	Increased substance abuse because Project employment makes substances more affordable	Impaired driving violations have increased in the North Baffin LSA during the post-development period. However, the trend is not significantly different than the trend in all of Nunavut when comparing the different periods.	
	The Company's focus on health and safety, and employee assistance and counselling programs will increase awareness of employees, reducing substance abuse		
Increased Well-being and Community Social Stability	Project employment resulting in increased well-being of children, and increased community social stability	There are positive indications the Project is contributing to the enhanced well-being of children, by providing LSA residents (and parents) with opportunities to obtain meaningful employment and incomes. These opportunities can help reduce the various family stresses and uncertainties associated with un- and under-employment. Baffinland has also implemented an Employee and Family Assistance Program for workers and their family members who may require family-related or other forms of personal assistance. There are also positive indications the Project continues to improve household income and food security in the LSA. This has occurred through contributions to community wellness initiatives and by providing LSA residents with meaningful employment opportunities. Increased employment income facilitates the purchase of store-bought food and other family goods, while also providing an improved means to participate in harvesting. As Project construction only began in 2013, there is a minimal amount of post-Project data currently available. Correlations between the Project and the various indicators being tracked (e.g. youth crime, employment income, social assistance rates), if any,	Relevant monitoring activities for human health and well-being are longer term and conclusions will be drawn in future years

Component	Effects	Monitoring Program	Impact Evaluation
		will only come to light with the analysis of additional annual data.	

Project Certificate Condition No. 153

Category	Human Health and Well-Being - Employee and family health and well-being
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	To provide adequate medical services on site, including those that contribute to the mental health and well-being of all employees.
Term or Condition	The Proponent is encouraged to employ a mental health professional to provide counselling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being.
Relevant Baffinland Commitment	96
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) Community Counselor Program Review Report (Baffinland, 2022g).
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Baffinland's benefit plan includes an Employee and Family Assistance Program (EFAP), which offers all permanent employees and their dependents professional short-term counselling as well as topic-specific life coaching on an as-needed basis. In addition, on-site Inuit Cultural Advisors are available for the Project's Inuit employees to meet with, and Baffinland provides all employees with regular access to an on-site Project physician assistant.

A Community Counsellor Program has also been established by Baffinland in the North Baffin LSA communities. In June 2019, Baffinland commenced funding a 3-year agreement with the Ilisaqsivik Society to hire qualified Inuit counsellors to work within Arctic Bay, Clyde River, Igloolik, Sanirajak and Pond Inlet. This partnership has allowed Ilisaqsivik to increase the availability of culturally and linguistically relevant counselling services in Nunavut and also to increase the number of trained Inuit counsellors who are able to provide counselling services in Inuktitut. With the restrictions from COVID-19, the Ilisaqsivik Society adjusted their programming to include virtual services as well as in-community services as public health advice allowed. In 2021, three full-time counsellors operated in Clyde River, Igloolik and Pond Inlet, with Arctic Bay and Sanirajak having remote support (Baffinland, 2021g).

RESULTS

EFAP usage has been relatively consistent since 2017 at approximately 5 accesses per 100 employees. The majority of counselling was conducted over the phone or through video. 60% of the 63 counseling cases in 2021 were classified as "psychological" support, with other issues including marital, work, family, addiction, and trauma. On-site Cultural Advisors are also available for all of Baffinland's Inuit employees. The Project continues to provide all workers with regular access to a physician's assistant, with whom they can confidentially address health-related issues (including those unrelated to the workplace), as well as on-site cultural advisors.

The Community Counsellors Program usage has remained relatively consistent since its launch in June 2019, with over 250 individual clients served in 2019 and 2020. Between April 1, 2021 and September 9, 2021, the program had 145 individual clients served.

TRENDS

The usage of EFAP by Nunavut-based employees increased substantially in 2021, from an average of 15 cases between 2017 and 2020, to 34 in 2021. A similar trend was not seen in those residing outside of Nunavut. It is possible that increased promotion of the program for Baffinland's Inuit employees, coupled with the ongoing impacts of the COVID-19 Pandemic, influenced increased use of the service during 2021. Increased EFAP usage, like other company-provided health services, can be an indicator of either positive (e.g. provision of health services that may have been less available in the community), negative (e.g. onset of Project-related negative health condition), or neutral effects (e.g. provision of health services that would have otherwise been accessed in the community).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has received informal positive feedback about the presence of Inuit Cultural Advisors (previously called on-site Elders) on site to work with and mentor Baffinland employees. Baffinland will maintain the employment of Inuit Cultural Advisors on site, per IIBA Article 11.8. Baffinland has also received direct positive feedback on the deployment of the Community Counsellors Program and would like to take this opportunity to thank the Ilisaqsivik Society for their ongoing work and effort to administer this program.

Baffinland will also continue to explore other options and opportunities to provide support to its Inuit employees, their families and communities. In the 2020 NIRB Annual Report, Baffinland indicated it would investigate support for related substance abuse/alcohol and addictions through a medical practitioner as well as the establishment of alcohol and narcotic anonymous programs at Project sites. Baffinland has not been able to progress such work due to community employees being demobilized from site due to COVID-19. Baffinland aims to make progress on these programs as COVID-19 restrictions are lifted and Nunavummiut presence at the mine site stabilizes.

Project Certificate Condition No. 154

Category	Human Health and Well-being - Indirect impacts to health and well-being
Responsible Parties	The Proponent, Government of Nunavut, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To understand the indirect impacts of the Project upon health and well-being.
Term or Condition	The Proponent shall work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor potential indirect effects of the Project, including indicators such as the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates, and others as deemed appropriate.
Relevant Baffinland Commitment	43, 45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland has provided information on potential indirect effects of the Project in the Socio-Economic Monitoring Report. This includes information (where available) on the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates, and other topics (e.g. crime rates).

RESULTS

See 'Trends' below for summarized results. Detailed results are presented in the Socio-Economic Monitoring Report.

TRENDS

2016 was the most recent year data on the percentage of health centre visits related to infectious diseases were available. Compared to pre-development period averages, there has been a slight increasing trend in health centre visits related to infectious diseases in the North Baffin LSA (from 2.6% to 2.7%) and decreasing trends in Iqaluit (from 2.0% to 1.0%) and Nunavut (from 4.8% to 3.1%) in the post-development period. Detailed results are presented in the Socio Economic Monitoring Report.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on potential indirect effects of the Project through its Socio-Economic Monitoring Reports and complies with this Term and Condition. In instances where appropriate community-level indicator data are currently unavailable (e.g. for the topics of prevalence of gambling issues, prevalence of family violence, prevalence of marital problems, and rates of teenage pregnancy), these topics continue to be tracked, as possible, through the QSEMC monitoring and reporting process and community engagement conducted for the Project.

Baffinland is working to increase its engagement of Community Services Providers (i.e. educators, Royal Canadian Mounted Police (RCMP), Health Care providers) in an effort to better understand these potential indirect effects and to discuss ways in which the Company can partner with Inuit Associations, and Governments to come up with solutions to them.

Further, Baffinland is investigating the establishment of alcohol and narcotics anonymous programs at Site as an additional support to employees. Baffinland has not been able to progress such work due to Nunavut-based employees being demobilized from site due to COVID-19. Baffinland aims to make progress on these programs once COVID-19 restrictions are lifted.

Baffinland is also open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained.

Project Certificate Condition No. 155

Category	Human Health and Well-being - Employee cohesion
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To encourage the on-site cohesion of employees through cultural-awareness and social programs.
Term or Condition	The Proponent is strongly encouraged to provide the NIRB with an updated report on its development of mitigation measures and plans to deal with potential cultural conflicts which may occur at site as these may become needed.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be provided at least 60 days prior to the commencement of any construction activities.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland is committed to promoting employee cohesion through cultural awareness and social programs. In 2021, Baffinland continued to provide cultural recognition programs such as cultural awareness, promotion of Inuktitut in the workplace and Inuit Cultural Advisors to support Inuit employees. All of the cultural awareness and promotion activities on site benefit all employees and help to bridge the gap between different cultures to foster an inclusive and culturally safe work environment.

Baffinland has a robust Proactive Dispute Resolution Process that is designed to facilitate trust, promote open, honest, and accurate communication, expedite the resolution of issues, enhance the relationship, and conform with the Complaints and Grievances process in the IIBA. It focuses on providing a proactive method to amicably resolve issues and in cases involving an Inuit employee, the Human Resources Advisor of Inuit Relations I involved in all meetings.

Nunavut Day celebrates the official division of Nunavut from the Northwest Territories and the official recognition of Nunavut as an independent territory. In 2021, Baffinland celebrated the signing of the Nunavut Land Claims Agreement on July 9th. Due to the COVID-19 Pandemic the celebrations were limited to socially distanced activities such as draws and bingo. There was also a promotion of Inuit films for all staff. Country food was served to employees in the staff cafeterias.

On November 7th, Baffinland celebrated International Inuit day on site. Due to the COVID-19 Pandemic restrictions activities were limited. There was a special Inuit cultural presentation delivered between 9 am and 12 pm by the Inuit Success Team in the main cafeteria of the Mary River site.

Consistent with the provisions of the IIBA, Baffinland has also instituted measures to reduce and address potential cultural conflicts at site, including:

- Mandatory cultural awareness training provided to all new employees and contractors as part of site orientation;
- Offering the Inuit Cultural Engagement (ICE) Workshop to all Baffinland employees and contractors.
- Providing culturally appropriate working conditions, including the use of Inuktitut in the workplace;
- Maintaining up to four (4) on-site Inuit Cultural Advisors to provide counselling services and support;
- Maintaining up to four (4) on-site Human Resources Advisor - Inuit Relations;
- Maintaining two (2) Inuit Success Assurance Facilitators;
- Maintaining one (1) Inuit Engagement Coordinator;
- Maintaining one (1) IIBA Employment and Training Specialist;
- Continuing access to the country food kitchen provided for the consumption and sharing of traditional country food and activities; and
- Ongoing translation of signage and policies on site to ensure effective communications to and for the safety of all employees.

Baffinland is committed to continuing to deliver the Inuit Cultural Engagement Workshop to all employees at site. This workshop exposes non-Inuit to the cultures and traditions of the Inuit and provides for a much greater level of understanding.

The Inuit Success Assurance team continues to work with all employees, Inuit and Non-Inuit to increase engagement and improve communications. This team has been actively involved with reaching out to Inuit employees, discussing concerns, and assisting them to speak with their supervisors or managers. 100% of employees who arrive at the Baffinland site are required to complete an extensive site orientation on their first day at site. One hour of this orientation provides cultural awareness training.

Baffinland makes the Employee Family Assistance Program available to all employees who may wish to talk to someone or to get help dealing with any concerns. This is available in both English and Inuktitut.

RESULTS

The Inuit Success Assurance Team continues to review and update the Inuit Cultural Engagement Workshop, and by using shared experience and knowledge they have significantly improved this program. The Inuit Success Assurance Team delivers the Inuit Cultural Engagement Workshop to all employees at site.

In addition to quarterly Cultural Activities, which in 2021 included events such as purse making, spring parka making etc., the Cultural Advisors at site often do smaller events such as bannock making or sewing with both Inuit and Non-Inuit together, which helps to build understanding and bridge cultural differences between Inuit and Non-Inuit employees.

In 2021 Baffinland created the Inuit Career Mobility Strategy. The strategy provides a structured approach to proactively managing the development of Inuit employees by focusing on experiential learning supplemented with training. As employees gain knowledge and skills, they are better able to identify career goals and Baffinland can support this through training and experiential learning opportunities. This in turn provides Inuit employees with opportunities to progress into more senior positions. In terms of mitigating cultural conflict, providing Inuit employees with tailored opportunities to progress their careers will help eliminate real and perceived barriers that could be or have been potential sources of conflict.

TRENDS

Baffinland continues to deliver cultural workshops and activities at site which are available to all employees. The Inuit Success Assurance Team continues to engage with site management and employees and offers ongoing cultural training and supports.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland is committed to supporting Inuit employees at site and continuing to build cultural awareness and understanding amongst the entire Baffinland team. A number of initiatives are planned for 2022 to increase cultural awareness and reduce misunderstandings including:

- Measures to promote the use of Inuktitut (ongoing efforts to translate signs / manuals – will continue in 2022, also incorporating Inuktitut translation and support in training.);
- Providing language lessons on site for interested employees;
- Continued review and enhancement of cross-cultural training programs and on-boarding orientation programs; and
- Delivery of presentations (on-site and at corporate head office) relating to Inuit culture and the IIBA.
- Conducting an Ulu Making Workshop with Site Employees (Inuit and Non-Inuit)
- Conducting an Inuit Drum Making Workshop at site with Site Employees (Inuit and Non-Inuit)
- Conducting a workshop where site employees learn how to make traditional Inuit Sunglasses
- Conducting a Workshop to allow site employees to sew Sealskin Mitts
- Celebration of Inuit Societal Days including Nunavut Day, Indigenous Peoples Day, and Inuit Day

Project Certificate Condition No. 156

Category	Human Health and Well-Being - Support Initiatives
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To assist with fostering well-being within point-of-hire communities.
Term or Condition	The Proponent is encouraged to assist with the provision and/or support of recreation programs and opportunities within the potentially affected communities in order to mitigate potential impacts of employees' absences from home and community life
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

The following is a summary of programs aimed at the provision and/or support of recreation programs and other opportunities to mitigate potential impacts of employees' absences from those who remain at home and in the communities.

An Ilagiktunut Nunalinnullu Pivalliajutisait Kiinaujat Fund (the Fund) has been established under Article 12 of the IIBA (Support for Communities). The objectives of the fund include:

- Creation of opportunities for community capacity building;
- The fair distribution of impacts and benefits between communities and across generations;
- Maintenance of consistency with community development objectives; and
- Promotion of mutual understanding and learning.

The Fund is intended to support a wide range of activities including participation in community projects, youth and Elder programs, hunter support activities, cultural learning and revitalization, social support programs for families and individuals and counseling and healing programs. Baffinland and QIA each contributed \$375,000 annually to the fund which is administered by QIA from 2013 to 2021. Through successful IIBA renegotiations in 2018, the Company and QIA further agreed that commencing in 2019, maximum annual matching contributions to the Fund by the Company will be increased but shall not exceed \$550,000 annually.

As a responsible corporate citizen, Baffinland is committed to assisting the North Baffin Communities with sponsorship requests. Baffinland has prioritized donations and sponsorships and grouped them into five general categories that best align with Baffinland's corporate vision and objectives.

- Health and Safety;
- Education;

- Arts, Sports and Culture;
- Community Engagement; and
- Mining Events/Mining Education.

Baffinland aims to support initiatives, events, and programs that fall within one or more of these areas. Additionally, Baffinland has provided nearly half a million dollars' worth of goods and in-kind donations including masks, cleaning supplies, food relief, and other donations directly to communities and community members during COVID-19.

Pursuant to IIBA Article 11.6, Baffinland provides employees with access to professional career and personal counselling on an as-needed basis. Baffinland offers five types of counselling and support services:

- Employee and Family Assistance Program (EFAP);
- Site Cultural Advisors;
- Human Resource Advisor- Inuit Relations;
- On-Site physician's assistants;
- Community Counsellors Program.

The intent of the Community Counsellors Program is to offer support to the five impacted communities (Arctic Bay, Clyde River, Sanirajak, Igloolik and Pond Inlet). The Community Counsellor Program will provide in-person counselling and support for all individuals living in all Point of Hire communities. Counsellors are trained professionals with expertise and experience in addressing trauma and related mental health care issues and concerns in a culturally appropriate way. Baffinland and the Qikiqtani Inuit Association (QIA) have been working closely with the Ilisaqsiq Society to design and support this Community Counselor Program.

Project Certificate Condition No. 157

Category	Human Health and Well-Being - Counseling and treatment programs
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To make available, necessary treatment and counseling services for employee and family well-being.
Term or Condition	The Proponent should consider providing counseling and access to treatment programs for substance and gambling addictions as well as which address domestic, parenting, and marital issues that affect employees and/or their families.
Relevant Baffinland Commitment	96
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

Baffinland provides an Employee and Family Assistance Program (EFAP), which offers all permanent employees and their dependents professional short-term counselling on an as-needed basis. In addition, on-site Inuit Cultural Advisors are available for the Project's Inuit employees to meet with, and Baffinland provides all employees with regular access to an on-site Project site physician's assistant.

A Community Counsellor Program has also been established by Baffinland in the North Baffin LSA communities. In June 2019, Baffinland commenced funding a 3-year agreement with the Ilisaqsiq Society to hire qualified Inuit counsellors to work within Arctic Bay, Clyde River, Igloolik, Sanirajak and Pond Inlet. This partnership has allowed Ilisaqsiq to increase the availability of culturally and linguistically relevant counselling services in Nunavut and also to increase the number of trained Inuit counsellors who are able to provide counselling services in Inuktitut.

RESULTS

EFAP usage has been relatively consistent since 2017 at approximately 5 accesses per 100 employees. The majority of counselling was conducted over the phone or through video. 60% of the 63 counseling cases in 2021 were classified as "psychological" support, with other issues including marital, work, family, addiction, and trauma. The Project continues to provide all workers with regular access to a physician's assistant, with whom they can confidentially address health-related issues (including those unrelated to the workplace), as well as on-site cultural advisors.

The Community Counsellors Program usage has remained relatively consistent since its launch in June 2019, with over 250 individual clients served in 2019 and 2020. Between April 1, 2021 and September 9, 2021, the program had 145 individual clients served.

TRENDS

A summary of monitoring results and trends is provided in Figure 35 in the SEMR. Detailed results are presented in the Socio-Economic Monitoring Report.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide employee access to the EFAP, on-site Cultural Advisors, and a Project-site physician assistant, and is committed to the development and operation of a Community Counsellors Program. Baffinland also encourages its employees and stakeholders to provide feedback on how its various programs and initiatives can be improved in the future. For example, Baffinland's Workplace Conditions Review process (required under the IIBA) has previously reviewed aspects of the counselling and support services available to Project employees.

Baffinland has a Support Worker Program for employees who live in a North Baffin LSA community. Through this program community employees are provided support through a leave of absence while they travel to southern hubs (i.e. Ottawa, Montreal, Toronto) to complete rehabilitation programs. Employees are also assigned a support worker through the EFAP. The support program has been limited over the past two years due to COVID-19 related travel restrictions. This support will resume in 2022 once COVID restriction ease.

Baffinland is working to increase its engagement of Community Services Providers (i.e. educators, RCMP, Health Care providers) in an effort to better understand these potential indirect effects and to discuss ways in which the Company can partner with Inuit Associations, and Governments to come up with solutions to them.

In the 2020 NIRB Annual Report, Baffinland indicated it would investigate support for related substance abuse/alcohol and addictions through a medical practitioner as well as the establishment of alcohol and narcotic anonymous programs at Project sites. Baffinland has not been able to progress such work due to community employees being demobilized from site due to COVID-19. Baffinland aims to make progress on these programs once COVID-19 restrictions are lifted

4.7.6 Community Infrastructure and Public Services (PC Conditions 158 through 161)

Four (4) PC conditions relate to the potential impacts of the Project on community infrastructure and public services. All four conditions name the Government of Nunavut as the responsible party for implementation of these conditions. NIRB encourages Baffinland to work with the GN to address public service issues, particularly those that may be adversely affected by the Project.

Inuit & Stakeholder Feedback

Key stakeholders focused on community infrastructure and public services include community members, Hamlet administrations, the QIA, the GN, and CIRNAC. The GN is the primary stakeholder, since it is responsible for the delivery of many public services. Hamlets expressed concern that skilled workers may leave their workforce to work for the Project, resulting in a skills gap, at least temporarily. Some Project employees and contractors have left positions in their communities to pursue employment at the Project. However, the Mary River Experience – The First Three Years report (BDSI, 2016) describes a lack of full-time hamlet work in many communities and the important role the Project plays in filling this gap. Potential opportunities for the community to realize new community infrastructure as a result of the Project continue to be expressed.

Monitoring

Baffinland conducted Inuit Employee Surveys in 2017, 2018, 2019 and 2020. Results are provided in the annual socio-economic monitoring reports. Baffinland also reports on indicators pertaining to competition for skilled workers, labour force capacity, pressures on existing health and social services provided by the Government of Nunavut that may be impacted by Project related in-migration of employees, and on Project-related pressures on community infrastructure. Table 4.50 provides an evaluation of the Project's impacts on community infrastructure and public services, based on monitoring activities completed in 2020, relative to predictions presented in the FEIS and the FEIS addendum. The table is not reflective of 2021 figures due to the Inuit Employee Survey not being administered in 2021. It is assumed that impacts on community infrastructure and public services remain similar to those reported in the 2020 reporting year.

It is also expected that ongoing training and experience generated by the Project, in addition to regular employee turnover, will continue to increase the pool of skilled workers in the local labour force and negate any short-term, negative Project effects. Effects to community infrastructure and public services as a result of Project employment are consistent with FEIS predictions. An overall improvement in the capacity of the local labour force will occur and become apparent over time.

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the SEMWG. Baffinland will administer the Inuit Employee Survey in Q4 of 2022. Different delivery methods for the survey will be explored. Reporting on each PC condition follows.

Table 4.50: Community Infrastructure and Public Services Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Recruitment and Retention of Hamlet Employees	Competition for skilled workers may lead to temporary effects on municipal services	Inuit Employee Survey results continue to indicate the Project may be having some negative effect by increasing the competition for workers in local communities. Results from the 2020 Inuit Employee Survey show that 23% of Inuit workers left a previous job to join Baffinland. Out of the 16 responses that listed the previous employer, four were Hamlets. This effect will continue to be monitored to determine if the project has a sustained negative effect on Hamlet staff retention. Direct engagement with Hamlet governments could support monitoring of this effect. Currently no data is collected on whether and how Hamlets are benefitting from any labour force capacity created by the Project. Reasons Inuit employees cited for resigning in 2020 included family reasons, and accepting positions closer to home. Therefore, it is anticipated that community-based employers, such as Hamlet governments, will continue to have opportunities to hire former Project employees. Further, Baffinland does not offer conditional training. Individuals that receive training from Baffinland are free to use the skills gained from training to seek employment from an employer of their choosing.	Effect within FEIS predictions
Education and Skills	Long term improvement in labour force capacity		Long-term effect may be realized over time

Project Certificate Condition No. 158

Category	Community Infrastructure and Public Services – Impacts to health services
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor indirect Project impacts to health and social services provided by the Government of Nunavut.
Term or Condition	The Proponent is encouraged to work with the Government of Nunavut and other parties as deemed relevant in order to develop a Human Health Working Group which addresses and establishes monitoring functions relating to pressures upon existing services and costs to the health and social services provided by the Government of Nunavut as such may be impacted by Project-related in-migration of employees, to both the North Baffin region in general, and to the City of Iqaluit in particular.
Relevant Baffinland Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland actively engages with the Government of Nunavut on its socio-economic monitoring program and other general socio-economic issues through the QSEMC, the MRSEWG and general socio-economic Baffinland-GN MoU. Baffinland also signed an MoU directly relate to health care services with the GN Department of Health in 2017 regarding site health services and medevac procedures. More specifically, this MoU describes the health care staff and services Baffinland will provide on-site, including procedures Baffinland will follow during medevac situations, for pre-employment medical examinations, and for the reporting and management of communicable diseases, amongst other topics. The MoU also describes how Baffinland will pay for and/or reimburse the GN Department of Health for costs associated with the medical transportation of employees and for conducting pre-employment medical exams.

Baffinland has provided information on potential socio-economic effects of the Project in its Socio-Economic Monitoring Report (Appendix G.13). This includes indicator data related to pressures on existing health and social services provided by the Government of Nunavut that may be impacted by Project-related in-migration of employees

(e.g. percentage of the population receiving social assistance, percent of health centre visits related to infectious diseases, total and per capita number of health centre visits, number of visits to Project site physician assistant).

RESULTS

Summary results and trends in socio-economic monitoring data are presented in Table 4.51. Detailed results are presented in the Socio-Economic Monitoring Report.

Table 4.51: Selected Human Health and Well-Being Indicators and Trends in 2021

Indicator / Topic	Summary and Trends
Percentage of population receiving social assistance	The portion of the population receiving social assistance in the North Baffin LSA has largely stayed the same during the post-development period.
Percent of health centre visits related to infectious diseases	Compared to pre-development period averages, there has been a slight increasing trend in health centre visits related to infectious diseases in the North Baffin LSA (from 2.6% to 2.7%) and decreasing trends in Iqaluit (from 2.0% to 1.0%) and Nunavut (from 4.8% to 3.1%) in the post-development period.
Number of health centre visits (total) Number of health centre visits (per capita)	Between 2010 and 2016 (within both the pre-development and the post-development period), there were significant changes in per capita health centre visits in Pond Inlet, Clyde River, and Arctic Bay. Per capita visits in 2016 in all North Baffin LSA communities, except Arctic Bay, were similar to historical levels (2009 and earlier). Based on this observation, and given the lack of data for more recent years (when Inuit employment grew significantly), the Project is not considered to have had a significant effect on the use of public health services and infrastructure in the LSA.
Number of visits to Project physician assistant	The Project continues to provide all workers with regular access to a physician's assistant, with whom they can confidentially address health-related issues (including those unrelated to the workplace). The number of visits per Inuit employee in 2021 does not show a significant trend. There was a predictable and similar drop in 2020 with most Inuit employees off site due to COVID-19. A trip to the physician's assistance could be an indicator of either positive, negative, or neutral effects.

In-migration of workers is one way the Project could negatively affect health and social service provision in the LSA. Company monitoring data suggest North Baffin Local Study Area in-migration is not occurring in any significant manner (see Section 4 of the Socio-Economic Monitoring Report).

A net of +1 individuals are known to have moved from the North Baffin LSA into Iqaluit since 2015 (data obtained from annual BCLO survey discussed in Section 4.2 of the Socio-Economic Monitoring Report). More generally, Appendix C of the Socio-Economic Monitoring Report indicates an average of 57 Inuit and one (1) non-Inuit employees/contractors (by headcount) with known origins lived in Iqaluit in 2021. Appropriate government-sourced migration data for the LSA are otherwise unavailable. However, the Project may also be contributing positively to LSA health service provision, by providing employees with regular access to an on-site Project physician assistant

and by providing various counselling and support services (e.g. EFAP, on-site Cultural Advisors, Community Counsellor Program).

TRENDS

Baffinland's analysis concludes that it is doubtful the Project had significant effect on the number of clinic visits in North Baffin LSA communities. This is largely based on available data (per capita clinic visits in LSA communities), which shows no significant trend which correlates with mining activity. Baffinland finds this conclusion reasonable given the currently available data.

Trends are presented in Table 4.51.

RECOMMENDATIONS / LESSONS LEARNED

The Government of Nunavut is responsible for health reporting and Baffinland would expect that if additional collaboration with the GN was desired in this area it would be raised through the MRSEMWG, QSEMC, or general socio-economic MoU Working Group.

Baffinland will continue to provide information related to pressures on existing health and social services provided by the GN that may be impacted by Project-related in-migration of employees. Baffinland will also continue to engage the Government of Nunavut, SEMWG and QSEMC on its socio-economic monitoring program.

Project Certificate Condition No. 159

Category	Community Infrastructure and Public Services – Impacts to infrastructure
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To monitor Project-related impacts to infrastructure within the Local Study Area communities.
Term or Condition	The Proponent is encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increased Project- related pressures to community infrastructure in the Local Study Area communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit.
Relevant Baffinland Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland continues to engage the Government of Nunavut directly, and through their membership in the QSEMC and the SEMWG, on the Mary River socio-economic monitoring program. Baffinland also provides information on potential socio-economic effects of the Project in the Socio-Economic Monitoring Report. This includes indicator data related to increased project-related pressures to community and airport infrastructure in the Local Study Area (LSA) communities (i.e. Arctic Bay, Clyde River, Sanirajak, Igloolik, Pond Inlet, and Iqaluit).

RESULTS

To support the movement of workers, freight, and other materials to and from the Project, Baffinland uses community airport infrastructure in the LSA. This is due to the remote location of the Project and lack of viable alternative transportation methods (aside from seasonal marine re-supply).

Baffinland’s utilization of community infrastructure, particularly airports, continued to be low in 2021. In 2021, there were 731 Project aircraft movements at LSA community airports. Though this is more than the 421 Project aircraft movements in 2020, it remains significantly less than in previous years (i.e. down from a total of 2,253 movements in 2019). This includes fixed-wing aircraft (e.g. passenger, cargo, and ‘combi’ type) and rotary-wing aircraft (e.g. helicopters used for site activities). Travel restrictions resulting from public health orders associated with the

COVID-19 Pandemic was a key contributing factor that limited Baffinland's utilization of community infrastructure in 2021, particularly airports.

TRENDS

Project-related aircraft movements add some incremental pressure on LSA community airport facilities. However, LSA community airports regularly accommodate various non-Project passenger, cargo, and other aircraft, and project-related aircraft movements at LSA community airports in 2018 represented a small portion (8.4%) of this total.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to engage with the Government of Nunavut (GN) through the MRSEMWG, QSEMC, and MoU Working Group on the Project's socio-economic monitoring program. As this is an area that is already monitored by the GN, Baffinland would expect that if additional collaboration was desired in this area it would be raised and/or responded to through these forums by the GN.

Baffinland will continue to provide information related to increased Project-related pressures to community infrastructure in the LSA communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit, in the Socio-Economic Monitoring Report.

Project Certificate Condition No. 160

Category	Community Infrastructure and Public Services – Distribution of benefits
Responsible Parties	Qikiqtani Inuit Association, Government of Nunavut
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure the distribution of benefits is done in a way that off-sets Project-related impacts to infrastructure or services.
Term or Condition	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure in a broad sense, that Project benefits are distributed across impacted communities and across various demographic groups within these communities in a manner that best offsets any Project-related impacts to infrastructure or services.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA) and Government of Nunavut (GN)
Reference	The Mary River Project Inuit Impact and Benefit Agreement Between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation (QIA and Baffinland, 2018) 2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

This Project Certificate Condition is not aimed at Baffinland. See Baffinland's reporting under Project Certificate Condition No. 167 for an understanding of the benefits, royalties and taxation that was paid to the GN and QIA for 2021.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 161

Category	Community Infrastructure and Public Services – Policing
Responsible Parties	Government of Nunavut, Royal Canadian Mounted Police
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure the territorial government and its policing service are adequately prepared to handle any Project-related increases to the need for service and associated impacts.
Term or Condition	The Government of Nunavut should be prepared for any potential increased need for policing, and ensure that the Royal Canadian Mounted Police is prepared to handle ongoing Project-related demographic changes and subsequent crime prevention that may be needed as a result of the development, operation, and closure of the Project.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Government of Nunavut (GN)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

This Project Certificate Condition is not aimed at Baffinland.

Baffinland regularly engages the GN on the Project's socio-economic monitoring program. For example, Baffinland produces an annual Socio-Economic Monitoring Report (which includes demographic and crime-related information) and regularly engages the QSEMC and SEMWG to discuss socio-economic impacts and benefits of the Project. GN representatives are active members of both the QSEMC and the SEMWG. Information obtained by the GN during these meetings and through review of Baffinland's annual Socio-Economic Monitoring Reports may be used to prepare for any potential increased need for policing and crime prevention activities.

The Company has also directly engaged local RCMP detachments in the North Baffin communities to discuss socio-economic impacts and benefits of the Project.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to cooperate with the GN regarding Project-related socio-economic monitoring (including monitoring of demographic and crime-related information). Baffinland will continue to engage the GN through the QSEMC and SEMWG, moving forward. Baffinland will also continue to engage directly with the RCMP on an as-needed basis.

4.7.7 Culture, Resources & Land Use (PC Conditions 162 through 166)

Five (5) PC conditions relate to the potential impacts of the Project on culture, resources and land use. The conditions request Baffinland notify communities regarding Project activities and particularly shipping and that Baffinland engage communities in monitoring programs and the establishment of mitigation measures to ensure that both consider traditional activities.

Inuit & Stakeholder Feedback

In addition to the Inuit of the five (5) North Baffin communities, key stakeholders focused on culture, resources and land use include the QIA, the GN Department of Culture and Heritage, and the Inuit Heritage Trust. The latter two organizations are responsible for the management of cultural heritage including archaeological sites. The potential for the Project to affect current land uses and the availability of wildlife resources were key concerns of the communities and the QIA. The GN departments expressed concern regarding the potential for adverse effects to archaeological sites and ensuring proper planning and procedures took place. Concerns regarding potential impacts to resources and land use continue to be a theme of community engagement (Appendix B).

Monitoring

Baffinland conducts annual monitoring and when required mitigation work under an Archaeological Permit issued by the GN. Baffinland also monitors the number of land use visitor person-days at Project sites, and the number of Wildlife Compensation Fund claims recorded annually. Table 4.52 provides an evaluation of the Project's impacts on culture, resources and land use, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Table 4.52: Culture, Resources and Land Use Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Archaeological Sites	Unauthorized removal of artifacts from known archaeological sites	Worker site orientation training includes rules regarding archaeological sites, with dismissal a consequence of offence. Baffinland's consulting archaeologist visits sites most years. Sites are successfully mitigated or protected, as applicable.	Effects did not occur
	Disturbance to archaeological sites due to ground disturbance activities without mitigation		
	Potential for chance finds	Reporting of chance finds as per Cultural and Heritage Resource Protection Plan: no chance finds located in 2021.	Effects did not occur
Inuit Harvesting of Wildlife	Mine operations affecting the harvesting of caribou, marine mammals and fish	Land user visits to the Mine Site and Milne Port were recorded. The QIA reported that 2 claims were paid from the Wildlife Compensation Fund in 2021, totaling \$8,190.76. Fewer hunters using cabins due to the limited Total Allowable Harvest (TAH)	Effect within FEIS predictions

Component	Effects	Monitoring Program	Impact Evaluation
		<p>of 250 set for caribou on Baffin Island. In 2021, the TAH was reached in Q2, resulting in the Baffin Island Caribou 2020-2021 harvest closing on May 3, 2021.</p> <p>There are 3 distinct seasons for narwhal harvesting: Spring (April 1 to July 10), Summer (July 11 to October 15), and Fall (October 16 to March 31). During the 2021-2022 harvesting year a total of 152 tags were issued to Pond Inlet (137 for Summer, and 15 for the Fall/Spring). The entire summer quota of 137 narwhal were successfully harvested and reported to the GN Wildlife Office.</p>	
Travel and Camps	Potential for reduced safety travelling around Eclipse Sound and Pond Inlet and through Milne Port. Emissions and noise disruption during travel and/or camping	Site observations suggest Inuit land use coexists with the Project's activities. In 2021, a total of 199 land use visitor person-days were recorded at Project sites, a 40% reduction from 2020. The decrease is attributed to the impacts of COVID-19 restrictions and the closure of Project facilities to Nunavut residents in respect of Public Health Measures	Effect within FEIS predictions
	Sensory disturbance and safety along Milne Inlet Tote Road		Effect within FEIS predictions
	Detour around Mine Site		
	HTO cabin closure	No closures were experienced in 2021. Hunter and visitor support was provided on an as-needed basis.	Effect within FEIS predictions

Baffinland's monitoring data suggests Inuit land use and harvesting coexists with the Project to some degree, in general. However, Baffinland respects that each individual's experience with the Project can be unique and varied.

Baffinland acknowledges the potential for wildlife-related impacts from the Project that can affect harvesting and has accordingly contributed \$750,000.00 to a Wildlife Compensation Fund (administered by the QIA under the terms of the IIBA) to address this issue.

Baffinland will continue to provide maintenance services to the MHTO Cabins in the Project Area when requested by the MHTO. Additionally, Inuit travel through the site will continue to be accommodated by escorted travel over the Tote Road, conducting repairs to identified land use crossing areas as needed, and the continued provision of food, fuel and equipment repairs.

Path Forward

Baffinland will continue to monitor this aspect of the socio-economic environment, and will discuss monitoring results with the MRSMWG and QSEMC, as well as with Hunters and trappers Organizations in each of the impacted communities, either directly or through their participation in environmental working groups, or ad hoc initiatives to better understand specific project and land use interactions. Reporting on each PC condition follows.

Baffinland also awaits the outcomes of several undertakings by the QIA to further understand the Projects effects on culture, resources and land use beyond the Tusaqtuvut Studies, which includes the ongoing supplemental Phase 2 CRLU Assessment and the Pond Inlet Country Food Baseline Report.

Project Certificate Condition No. 162

Category	Culture, Resources and Land Use - Public consultation
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure the ongoing and consistent involvement of Elders and community members in developing and revising monitoring and mitigation plans.
Term or Condition	The Proponent should make all reasonable efforts to engage Elders and community members of the North Baffin communities in order to have community level input into its monitoring programs and mitigative measures, to ensure that these programs and measures have been informed by traditional activities, cultural resources, and land use as such may be implicated or impacted by ongoing Project activities.
Relevant Baffinland Commitment	97
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association (QIA), North Baffin Communities
Reference	2021 MEWG Meeting Records 2021 TEWG Meeting Records 2021 Shipping and Monitoring Program Meeting Records
Ref. Document Link	Appendix C.1 and C.2 Appendix G.4

METHODS

Baffinland is committed to meaningful engagement with individuals and organizations potentially affected by the Project, including the five (5) North Baffin Communities (Arctic Bay, Clyde River, Sanirajak, Igloodik and Pond Inlet). In support of the Company's focus on continuous improvement and the engagement objectives defined for the Project (Section 2.2), Baffinland implements a variety of engagement mechanisms that are intended to ensure that a broad and comprehensive approach to the identification of interested parties and that the creation of enhanced opportunities for dialogue and input are executed.

Baffinland meets with various community groups on a regular basis to discuss aspects of the Project and any concerns or recommendations Community representatives may have. Baffinland directly funds the participation of the Mittimatalik Hunters and Trappers Organization (MHTO) in both the Terrestrial and Marine Environment Working Groups. Aside from creating a forum for the most affected community of Pond Inlet to understand what monitoring programs are planned each year, and what the outcomes of previous programs were, Baffinland relies on the MHTO to provide practical insights into the feasibility and value of our monitoring programs given their intimate knowledge of the land and wildlife.

For more general engagement of the community of Pond Inlet with respect to our shipping activities, Baffinland holds annual pre-shipping and end of shipping season meetings with representatives of the Hamlet of Pond Inlet and the MHTO (including Elders) in order to discuss past and upcoming shipping seasons. During these meetings, various

topics are discussed including, though not exclusively, shipping activity levels, relevant mitigation measures, shipping communications, monitoring intentions and timing, etc.

Furthermore, through the undertaking of annual monitoring programs, Baffinland strives to leverage as many local resources as required, including the hiring of Inuit (including Elders) during program implementation (e.g., caribou Height of Land and marine mammal aerial surveys), and to provide Inuit training and employment opportunities in a variety of settings. This includes marine vessel safety and field data collection techniques such as marine wildlife observations (marine mammals and seabirds), and physical and biological sampling (e.g., collection of water, sediment, benthos and fish samples).

RESULTS

Community members and other stakeholders continue to provide valuable input that guides the development of monitoring programs and mitigation measures, as needed. A specific example includes the development of an Arctic char health monitoring program in the Milne Port area in 2021 in fulfillment of PCC 48a. Prior meetings with the MHTO were crucial to establishing the monitoring locations and objectives, while direct MHTO representative participation in the field program assisted with the day to day execution of the program and its overall success. Further discussion is provided in response to PC Condition No. 48a.

Baffinland recognizes that the potential to engage with Elders and community members in-person continued to be affected in 2021 due to travel and other operational restrictions related to the COVID-19 Pandemic. Engagements relied heavily on the use of teleconferences, videoconferencing and radio show formats thereby allowing for critical discussions to continue in a remote setting. A list of meetings held with the public (including with elders) and with community groups such as the MHTO in 2021 are listed in Table 2.1.

The MHTO participated in teleconference calls held for MEWG and TEWG on May 13, 2021 and on June 30, 2021, respectively (Appendix C.1). As part of these meetings, past results and future planned studies were discussed for input. In addition, Baffinland hosted an End of 2020 Shipping Season/2021 Pre-shipping season teleconference meeting with representatives (including Elders) from the MHTO and the Hamlet on May 28, 2021 (see Appendix G.4). During this meeting, Baffinland shared its plans on its anticipated shipping schedule, mitigation and management measures, and a high-level summary of the communications protocol to be implemented during the 2021 shipping season.

Baffinland completed a number of external engagements in 2021 related to its Draft Climate Change Strategy with participation of various community groups and individual residents (see Table 2.2; Appendix B; summary of feedback provided in PC Condition No. 2). Baffinland will be revising/redefining its overarching statement, goals, guiding principles, and supporting actions in consideration of the feedback obtained during external engagement efforts.

Following from commitments related to dust management issued through the Phase 2 review, a third-party Dust Audit was initiated in 2021 and is ongoing. The third-party auditors work with a Dust Audit Committee composed of representatives from each of the five (5) North Baffin communities including Pond Inlet, Arctic Bay, Sanirajak, Igloolik and Clyde River. Committee members were nominated by Hamlet and Hunters and Trappers organizations to participate in the Audit. Committee members have been regularly meeting in order to drive forward the dust audit. The third-party auditor has already completed one field investigation with the support of the Dust Audit Committee, with another planned for June/July 2022. A final Recommendation Report including recommendations for actions to take based on feedback brought forward by Committee members to better manage dust at the Mary River Project will be released for public review by the end of 2022.

Although Inuit participation from North Baffin communities continued to be limited in 2021, a total of seven (7) individuals were employed from either Pond Inlet or Arctic Bay in 2021 to participate in the marine monitoring programs (aerial surveys, Bruce Head Shore-based Monitoring, and MEEMP and AIS Monitoring). The hiring of Inuit was eventually made possible when travel restrictions to the Mine Site from communities was approved by Nunavut Public Health.

In 2021, a QSEMC meeting did not occur due to COVID-19 risks; however, two (2) SEMWG meetings were held via teleconference. Baffinland also engaged with Mayors, Hamlet Councils and other community groups from the North Baffin LSA Hamlets throughout 2021 to provide updates on Mary River's existing operations, and to listen to community updates and issues of importance.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to provide the results of the key monitoring programs of interest to the communities. Baffinland will continue to seek formal feedback from the MHTO through their involvement as a Member of both the MEWG and TEWG, through Baffinland-led annual Pre-Shipping and End of Shipping Season meetings, etc. Baffinland will also engage Inuit directly on programs on an ad hoc basis as needed.

Baffinland intends to continue training and employing Inuit participants in environmental monitoring programs when travel restrictions related to COVID-19 are fully lifted in 2022.

Project Certificate Condition No. 163

Category	Culture, Resources and Land Use - Public consultation
Responsible Parties	The Proponent, North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To involve communities in the development and evolution of management and monitoring plans.
Term or Condition	The Proponent shall continue to engage and consult with the communities of the North Baffin region in order to ensure that Nunavummiut are kept informed about the Project activities, and more importantly, in order that the Proponent's management and monitoring plans continue to evolve in an informed manner.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	North Baffin Communities
Reference	2021 Community Meeting Records 2021 MEWG Meeting Records 2021 TEWG Meeting Records
Ref. Document Link	Appendix B Appendix C.1 and C.2

METHODS

The methods Baffinland employs to satisfy this term and condition are consistent with those outlined in response to Project Certificate Condition 162. In addition to those mechanisms, and of specific relevance to this PCC relates to the more regular use of radio shows in 2021 as a replacement for what otherwise would have been in person open houses. This format has continued to reach Nunavummiut from the affected communities to keep the communities broadly informed of the Projects current activities, inclusive of its environmental monitoring and mitigation plans.

RESULTS

In 2021 Baffinland hosted 18 radio shows between the five (5) impacted communities. A list of all meetings held with the public (including with elders) and with community groups such as the MHTO in 2021 is provided in Table 2.1.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to implement a proactive approach to engagement in 2022, while respecting public health advice related to COVID-19, with Inuit and various stakeholders, through meetings, workshops, surveys and dissemination of information and reports. This will ensure that Inuit, communities, QIA, regulators and the broader public are informed in a timely and culturally sensitive manner of the Project's progress and the potential

environmental and social impacts of ongoing operations. All input received by the Company through its engagements is meaningfully considered and where possible, reported back to those that have provided to it.

Project Certificate Condition No. 164

Category	Socio-Economic Impacts – Shipping notification
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	In order to inform members of North Baffin communities of planned Project shipping transits such that community members' planned travel routing may be adjusted to avoid interaction with Project ships and/or ship tracks.
Term or Condition	The Proponent is required to provide notification to communities regarding scheduled ship transits throughout the regional study area including Eclipse Sound and Milne Inlet, real-time data regarding ships in transit and any changes to the proposed shipping schedule to the MEWG and agencies within Pond Inlet on a weekly basis during open water shipping, and to the RSA communities on a monthly basis.
Relevant Baffinland Commitment	30, 34
Reporting Requirement	The information required shall be provided on a monthly basis at a minimum or more often as the Proponent determines necessary and is to be provided to the Proponent's community liaison officers and those of the Qikiqtani Inuit Association as well as the Hunters and Trappers Organizations and Hamlet organizations of the North Baffin communities, Coral Harbour, and the NIRB's Monitoring Officer. Where deviations from the proposed schedule or routing are required, this information shall be provided as soon as possible.
Status of PC Condition	Steensby – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG) and Mittimatalik Hunter and Trappers Organization (MHTO)
Reference	Northern Shipping Corridor Anchorage Locations (Baffinland, 2020j) Marine Shipping and Vessel Management Report (Baffinland, 2020k) Marine Shipping and Vessel Management Report (Baffinland, 2021p) Baffinland Website
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/

METHODS

Baffinland continues to partner with exactEarth®, a global vessel monitoring and tracking service based on Automatic Identification System (AIS) data from polar orbiting satellites to track and report on vessel movements. The vessel tracking information is available on Baffinland's website to allow communities to check on vessel coordinates, which direction the vessel is moving, and its destination. Baffinland also installed an AIS tracker system in Baffinland's Shipping Monitor office located on the second floor of the Mittimatalik Hunters and Trappers Organization (MHTO) building on a dedicated laptop and wall-mounted monitor so that live viewing may be made possible for those that may not have access to a computer and internet. Outside of COVID-19 restriction periods, live continuous monitoring of vessels active in the Northern Shipping Route is made available to any visitors during Baffinland's regular office hours (8 am to 5 pm).

As first initiated in 2019, Baffinland continued with its implementation of the Pond Inlet Shipping Monitor Program in 2020, which consisted of employing a minimum of two (2) full-time Shipping Monitors from the community of Pond Inlet to actively track daily Project vessel movements in the RSA in real-time, and in relation to reported marine mammal sightings (as shared by the community and the monitoring teams). Shipping Monitors track any feedback they receive over the shipping season and answer questions as needed, and act as a direct liaison between the community of Pond Inlet, hunters and Baffinland's headquarters, including the Shipping and Sustainable Development departments).

In 2020 and 2021, following the direction of the NIRB outlined in the Production Increase Proposal Extension Recommendation Report, Baffinland submitted a Marine Shipping and Vessel Management Report in advance of each shipping season. The Report outlines Baffinland's plans for the shipping season in terms of operations (number of vessels, types of vessels, anchorage locations, approximate timing, commencement conditions, etc.), consultation and engagement activities that have occurred with relevant Parties prior to the start of the shipping season and planned monitoring (ship board observer program, aerial survey program, shore based survey program, etc.). As in all years, in 2021, the shipping season did not commence until the MHTO has confirmed the close of the floe edge for harvesting, which is a direct indicator of the safety of ice for travel.

In addition to the regular communications about daily shipping activity via marine VHF radio, local radio and Facebook, in 2021 Baffinland initiated the weekly sharing via email to the MHTO and Hamlet of Pond Inlet an anticipated approximate 10-day rolling schedule of upcoming Baffinland vessel activity in the Regional Study Area.

RESULTS

Baffinland continues to make vessel routing accessible to the public via the Baffinland website. Baffinland also continues to maintain an AIS tracker system in Baffinland's Shipping Monitor office located in the second floor of the MHTO building on a dedicated laptop and wall mounted monitor. This set-up provides live continuous monitoring of vessels active in the Northern Shipping Route for all those that drop by the Baffinland office during its regular office hours (8am to 5pm). In 2021, due to the COVID-19 Pandemic, public access to the Baffinland Shipping Monitor's office depended on latest public health guidance. Access will be restored in future in consideration of latest public health guidance.

Ongoing consultation with the MHTO and representatives of the Hamlet of Pond Inlet in 2021 (i.e., following the End of 2020 End of Shipping Season and 2021 Pre-Shipping Season meetings held on May 28, 2021) and years prior (see Appendix B for engagement records), resulted in Baffinland committing to new vessel traffic management practices and/or monitoring approaches noting that these are in addition to all other changes implemented from prior years (e.g., 9 knot vessel travel speeds, limiting transits based on ice conditions, etc.):

- Avoidance of icebreaking at the beginning of the season (commitment made by Baffinland on July 13, 2021). Ore carriers delayed their entry into the RSA until it was confirmed that ice conditions were no greater than 3/10ths concentration, which is an ice condition Captains can confidently avoid ice.
- Baffinland did not leave any acoustic equipment over winter between 2020 and 2021 in response to MHTO's preference to not leave sounders on the seabed. However, two units were deployed to overwinter near the easternmost and westernmost floe edge locations in Fall 2021 to measure underwater noise at freeze-up and break-up; these were deployed based on an MHTO request received through the Phase 2 review and will be retrieved in Summer 2022, no additional devices are planned for deployment that year.

- Continuation of the implementation of the Pond Inlet Shipping Monitor Program which consisted of employing a minimum of two full-time Shipping Monitors (10 individuals were hired during the 2021 shipping season) from the community of Pond Inlet to actively track daily Project vessel movements in the RSA in real-time, and in relation to reported marine mammal aggregations (as shared by the community and the monitoring teams). Baffinland created a dedicated “Baffinland Shipping” Facebook Group page and posted regularly on shipping updates.
- In addition to the regular communications about daily shipping activity via marine VHF radio, local radio and Facebook, Baffinland initiated the weekly sharing via email to the MHTO and Hamlet of Pond Inlet an anticipated approximate 10-day rolling schedule of upcoming Baffinland vessel activity in the Regional Study Area; and
- Continuation of enhanced vigilance of the boundaries of the shipping lane by the establishment of additional notifications related to shipping lane deviations and vessel follows-up, as well as further improving response time to correct vessel movement or speed in the event of non-adherence to vessel management protocols. Continued use of a real-time AIS-based alert system immediately informed the Port Authority and Baffinland’s Shipping department of a non-compliance event, such as a speed exceedance in the RSA, so that the issue could be quickly resolved. Deviation reports were also provided by vessel Masters to Port Captain for tracking purposes.

Since start of operations, Baffinland has clearly demonstrated its commitment for successfully implementing the various shipping-related mitigation and management measures (e.g., tight adherence to the defined shipping route and vessel speed restrictions) and by adopting new procedures over the years to improve performance based on previous’ years results. Furthermore, Baffinland has shown its flexibility in expanding upon the types of communication methods being employed over the years to inform residents about its activities (e.g., hiring of shipping monitors to communicate vessel locations through use of marine VHF radio, public radio, Facebook) and also by providing updated rolling schedules on anticipated shipping activities on a regular basis in addition to the live online tracking available 24 h/day.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland has found the use of exactEarth® to be beneficial in providing information related to ship routing to the public. Baffinland will continue its use of this service. Baffinland will continue to communicate changes to the proposed shipping schedule to the MEWG where the MHTO is a member, and will notify should any additional deviations be made to the Northern Shipping Route based on feedback obtained by the MHTO. Furthermore, Baffinland will continue to hire Shipping Monitors based out of Baffinland’s office in Pond Inlet in order to maintain communications in the community of Pond Inlet on the presence of vessels along the Northern Shipping Route over the duration of the shipping season and to provide a direct liaison with the community of Pond Inlet, including the MHTO. Baffinland will also remain open to updating its communications methods as informed by community needs.

Project Certificate Condition No. 165

Category	Socio-Economic Impacts - Emergency shelters
Responsible Parties	The Proponent, Elders and community members of the North Baffin communities
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	In order to provide for human safety precautions in the event of adverse weather or other emergency situations along segments of linear transportation infrastructure.
Term or Condition	The Proponent is strongly encouraged to provide buildings along the rail line and Milne Inlet Tote Road for emergency shelter purposes, and shall make these available for all employees and any land users travelling through the Project area. In the event that these buildings cannot, for safety or other reasons be open to the public, the Proponent is encouraged to set up another form of emergency shelters (e.g. seacans outfitted for survival purposes) every 1 kilometre along the rail line and Milne Inlet Tote Road. These shelters must be placed along Tote Road and rail routing prior to operation of either piece of infrastructure, and must be maintained for the duration of project activities, including the closure phase.
Relevant Baffinland Commitment	14
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Rail Corridor – Not Active Milne Inlet Tote Road – Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtani Inuit Association, Nunavut Water Board, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board
Reference	Emergency Response Plan (Baffinland, 2020h) Roads Management Plan (Baffinland, 2020b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland has constructed four (4) refuge stations at KM 33, 40, 60 and 69 along the Tote Road. Each station is heated and outfitted with beds and bedding, water, an Automatic External Defibrillator (AED), food and a digital radio that provides direct contact with Baffinland security or dispatch. In addition to the four (4) refuge stations, there are eleven (11) heated seacans located at communication towers along the Tote Road, equipped with a fire extinguisher and first aid kits. The communication tower seacans are intended for emergency and temporary use only and do not house radios, food or water. All buildings are accessible for emergency purposes by employees and land users.

Baffinland has a trained emergency response team at both ends of the Tote Road with emergency vehicles to rapidly respond to any concerns. The emergency response team also has access to snowmobiles, a side by side and a Sno-Cat® that are capable of moving through snowdrifts and effecting a rescue as required. The Tote Road Travel Procedure is publicly available and outlines the emergency response procedure.

Ensuring the health and safety of local hunters on-site is of utmost importance to Baffinland. If travel across or along the Tote Road is required, local hunters are continued to be advised to report to security and request a transport for

their equipment and personnel. To prevent potential transfer of the COVID-19 virus to Nunavummiut, all visits to Project facilities by non-project staff were continued to be halted during 2021. As a result of the temporary closure, all camps and accommodations were closed to non-Project staff, however, the HTO Cabins remained available for use by hunters/visitors.

To eliminate any potential contact with site personnel while COVID-19 restrictions are in place, the non-contact Visitor Communication Centers continued to be used (Mary River and Milne Inlet), eliminating the necessity for visitors and Baffinland employees to interact closely. The Visitor Communication Center includes a radio with a dedicated channel for hunters/visitors to contact Security directly. Requests for food and other goods were dropped off at the Visitor Communication Centers at a predetermined drop off time.

The BCLO's continued to advise Nunavummiut of the COVID-19 protocols in place at the Project. Baffinland maintained COVID-19 signage at the HTO hunting cabins and Visitor Communication Centers. Hunter and visitor supply requests continued to be accommodated in 2021 based upon supplies available on site.

In 2021, Baffinland participated in three (3) Search and Rescue (SAR) responses. Two involved utilizing the Dornier plane to assist Pond Inlet SAR searches for missing individuals, and the third Baffinland assistance SAR involved the utilization of a helicopter to pick up and rescue stranded individuals and their broken ATV.

The Steensby rail line project has been deferred at this time.

RESULTS

A total of 199 individuals stopped and checked in at the Project site in 2021 to hunt near the Project area or for other reasons such as resting, stopping for food, or having snowmobiles serviced. Baffinland accommodated all individuals, providing support when required for breakdowns and maintenance issues.

This was a decrease from 2019 to 2020, in which 936 and 316 individuals checked in at the Project, respectively, and was mostly likely due to the ongoing COVID-19 Pandemic. The number of individuals which checked in at the Project in 2020 (316) was comparable to 2018 (354 individuals).

The number of individuals which checked in at the Project in 2021 was comparable to 2017 (when 154 individuals were recorded as having visited the Project).

No project related safety related incidents occurred in 2021 for visiting hunters and all emergency shelters were available for use.

TRENDS

Emergency shelters continue to be available for use and no project related health and safety incidents with hunters and visitors occurred in 2021.

RECOMMENDATIONS / LESSONS LEARNED

PC Condition No. 165 was originally developed for the development of the southern railway to Steensby Inlet. For the Emergency Response Plan (ERP), use of the Tote Road means that there are multiple types of vehicles readily available to access a person in need of assistance. Therefore, construction of emergency shelters along every 1 Km of the Tote Road is not warranted at this time. Construction of emergency shelters along the railway to Steensby Port will be planned in concert with other interested Parties when this phase of the Project becomes active.

Project Certificate Condition No. 166

Category	Socio-Economic Impacts - Public Consultation
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To ensure members of the public are able to access shipping information on an as-required basis in order to inform potential users of the scheduled Project activities, which could require deviations to land users' schedules or routing.
Term or Condition	The Proponent should ensure through its consultation efforts and public awareness campaigns that the public have access to shipping operations personnel for transits into and out of both Steensby Inlet port and Milne Inlet port either via telephone or internet contact, in order that any questions regarding ice conditions or ship movements that could assist ice users in preparing for travel may be answered by Project staff in a timely fashion.
Relevant Baffinland Commitment	30
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Hunter and Visitor Site Access Procedure (Baffinland, 2020I)
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/

METHODS

Baffinland continues to implement a shipping communications protocol with the community of Pond Inlet. Information regarding the communications protocol was shared during meetings with the MHTO during the pre-shipping season meeting in May 2021, as well as during the June 29, 2021 MEWG meeting. Baffinland also made available a Shipping and Marine Monitoring Program Fact Sheet, which contained relevant Baffinland staff contact information should community members have any concerns throughout the season.

RESULTS

The public has access to shipping operations personnel via telephone (corporate direct land-line and cell-based, and local cell phone number), and internet contact via a dedicated shipping email address (shipping@baffinland.com) that is monitored by Baffinland staff including Shipping Monitors and Manager - Environmental, Social, and Governance, in addition to having in-person access to Pond Inlet-based Shipping monitors during daily office hours from a dedicated Baffinland office (when not closed due to COVID-19 restrictions). For additional information on the role of Shipping Monitors, refer to summary sheet for PC Condition No. 102 and 164.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to promote the use of the Hunter and Visitor Site Access Procedure, though in consideration of most recent GN public health guidance available related to the COVID-19 Pandemic, and the ship transit web tracking service available on the Baffinland website. Shipping and Marine Monitoring Fact sheets and large maps showing the Northern Shipping Route will continue to be posted throughout Pond Inlet, and will include staff contact information should community members have any concerns throughout the shipping season.

The communications protocol proved to be an effective method for addressing ongoing community concerns related to shipping throughout the season. Baffinland will continue to make community members aware of the protocol and implement this in 2022. This includes the continuation of a minimum hiring of two full-time Shipping Monitors to act as the liaison between community members, hunters and Baffinland and tracking of comments and concerns over the shipping season, using a variety of communication methods.

4.7.8 Benefits, Royalties and Taxation (PC Condition 167)

One (1) PC condition relates to the potential impacts of the Project on benefits, royalties and taxation: that Baffinland negotiate a Development Partnership Agreement with the GN. The GN, however, no longer negotiates such agreements.

Inuit & Stakeholder Feedback

Key stakeholders focused on the benefits, royalties and taxation include the following:

- QIA - Receives IIBA benefits, as well as rent payment for the lease of Inuit Owned Land (IOL), royalties on aggregate from IOL, and tipping fees for waste deposited on IOL;
- NTI - recipient of mineral royalties first payable to the Government of Canada, since Inuit hold sub-surface rights to Deposit No. 1 covered by a grandfathered federal mining lease;
- GN - Recipient of territorial taxes (corporate, property and payroll taxes);
- Qikiqtani Inuit - Beneficiaries of benefits and royalties that accrue to the QIA, as well as a portion of mineral royalties paid to NTI and then dispensed to the QIA and other regional Inuit organizations; and
- Other Nunavummiut - Beneficiaries of mineral royalties' payable to NTI.
- Communities – The 5 North Baffin communities are recipients of donations under Baffinland's Community Donation Program; the community of Pond Inlet also receives direct payments under the Tasiuqtiit Agreement as well as the Harvesters Enabling Program.

Communities continue to express a desire to maximize benefits of the Project (Appendix B).

Monitoring

Baffinland tracks payments made as benefits, royalties and taxes, and this information is presented in annual monitoring reports. Table 4.53 provides an evaluation of the Project's impacts on benefits, royalties and taxes, based on monitoring activities completed in 2021, relative to predictions presented in the FEIS and FEIS Addendum.

Significant positive benefits have been realized by the stakeholders listed above, as a result of benefits, royalties and taxes paid by the Project in 2021.

Path Forward

Baffinland will continue to meet its commitments with respect to benefits, royalties and taxes. Reporting on PC Condition No. 167 follows.

Table 4.53: Benefits, Royalties and Taxation Impact Evaluation

Component	Effects	Monitoring Program	Impact Evaluation
Benefits and Royalty Payments to Inuit Organizations	Increased revenues that can be dispensed to Inuit beneficiaries	<p>Baffinland paid a total of \$9,206,970 in royalties to QIA in 2021 (includes 2020 Q4 payment, and Q1-Q3 of 2021) as well as \$3,463,126 in Commercial Rent. In addition to these payments, Baffinland spends \$5.9 million annually to implement the IIBA to support training, business capacity and community wellness. In 2021 Baffinland also provided approximately \$2 million in Inuit Certainty Agreement implementation payments. These payments alone total in excess of \$20 million for the QIA. Spending by Inuit organizations can be tracked at a high level through NTI and QIA annual reporting.</p> <p>The Hamlet of Pond Inlet and MHTO earned \$140,000 in 2021 under the Tasiuqtiit Agreement. Residents of Pond Inlet also received \$400,000 in support through the Harvesters Enabling Program.</p>	Within FEIS predictions
Territorial Own-source Revenues	Increased taxes and revenues; Payments of payroll and corporate taxes to territorial government	The Project's effect on revenues flowing to the territorial government is largely established by the value of its payroll as well as the assessment of corporate tax payments by Baffinland. In 2021, Baffinland paid a total of approximately \$15 million in taxes to the Government of Nunavut: \$10.3 million in employee payroll tax and \$4.7 million in fuel tax.	Within FEIS predictions

Project Certificate Condition No. 167

Category	Benefits, Royalty and Taxation – Partnership Agreements
Responsible Parties	The Proponent, Government of Nunavut
Project Phase(s)	Construction
Objective	The Proponent and the Government of Nunavut develop a formalized partnership agreement.
Term or Condition	The Proponent and the Government of Nunavut are strongly encouraged to, as soon as practical following the issuance of the Project Certificate, enter into discussions to negotiate a Development Partnership Agreement.
Relevant Baffinland Commitment	43
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Baffinland issued an invitation letter to the Government of Nunavut (GN) in September 2013 regarding the negotiation of a Development Partnership Agreement (DPA). However, a DPA between the GN and Baffinland has not yet been formalized. The GN DPA Policy expired on March 31, 2016 and was never extended or replaced. Baffinland and the Government of Nunavut cannot negotiate a Development Partnership Agreement as instructed by PCC 167 as the program no longer exists.

In lieu of a Development Partnership Agreement, Baffinland and the GN signed a Memorandum of Understanding in 2019 on the basis that “Nunavummiut should benefit from resource development within the territory of Nunavut and that, therefore, maximizing their capacity to engage in such development is important”. Through this MoU, GN and Baffinland identified four (4) priority areas for continued collaboration, “Barriers to Employment, Education and Training, Community Wellness, and Infrastructure and Transportation.” The GN and Baffinland continue to engage frequently on many aspects of the Mary River Project to continue collaboration that supports responsible resource development.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland and the Government of Nunavut will report all meetings and material progress towards implementing the spirit of the MoU that takes place in 2022.

4.7.9 Governance & Leadership (PC Conditions 168 through 169)

Two (2) PC conditions relate to the potential impacts of the Project on governance and leadership, both of which relate to the collection of socio-economic data and annual reporting to NIRB.

Inuit & Stakeholder Feedback

Members of the SEMWG include Baffinland, the QIA, the GN, and CIRNAC. Each organization has an interest and a role in improving socio-economic conditions within the Qikiqtani Region and Nunavut as a whole. Baffinland has actively engaged the group over the past several years. In 2015 and early 2016, Baffinland revised its socio-economic monitoring program based on feedback from this group. Baffinland is also actively involved in the Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and regularly participates in its meetings. There was no QSEMC meeting in 2021 due to COVID-19.

In 2021, Baffinland received input from SEMWG members on the Inuit Employee Survey. The survey was updated to reflect input received from the Government of Nunavut and CIRNAC. Due to COVID-19, Baffinland did not administer the survey. The company is exploring additional methods on how the survey could be administered (i.e. hybrid, virtual).

Acknowledging the Project has evolved considerably since the 2014 submission of the previous closure planning report (FHW Consulting, 2014b) Baffinland conducted additional planning for socio-economic aspects of temporary closure in 2021. Baffinland engaged with the SEMWG, QSEMC and North Baffin Community Economic Development Officers on potential impacts and community and stakeholder concerns relating to the heightened risk of temporary closure in 2022.

Monitoring

Baffinland completes a socio-economic monitoring report annually, which presents monitoring results for aspects of the socio-economic environment that interacts with the Project. No negative regional or cumulative economic effects associated with the Project were identified in 2021. As such, no mitigation measures have been proposed to manage negative effects. The socio-economic monitoring program has been developed in consultation with the SEMWG, and monitoring results are also reviewed by this group and QSEMC annually.

The COVID-19 Pandemic has had a major impact on the Mary River Project, with Baffinland implementing various measures to ensure a safe workplace and to protect Nunavut communities. Nunavummiut employees returned back to their home communities in Q4 of 2020 and slowly started to return back to site in July 2021. Such decision was made in accordance with Government of Nunavut recommendations. While these employees continued to receive standby pay, certain benefits of employment, such as frequency of training programs, skills development, and advancement were impacted.

Path Forward

Baffinland will continue to undertake the collection of socio-economic monitoring data in consultation with the SEMWG and QSEMC, and report this monitoring data annually through its Socio-Economic Monitoring Report. Reporting on each PC condition follows.

Project Certificate Condition No. 168

Category	Governance and Leadership - Monitoring program
Responsible Parties	The Proponent, members of the QSEMC
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	Outline variables that are relevant to the Project and which should be adopted by the QSEMC's monitoring program.
Term or Condition	The specific socio-economic variables as set out in Section 8 of the Board's Report, including data regarding population movement into and out of the North Baffin Communities and Nunavut as a whole, barriers to employment for women, project harvesting interactions and food security, and indirect Project effects such as substance abuse, gambling, rates of domestic violence, and education rates that are relevant to the Project, be included in the monitoring program adopted by the Qikiqtani Socio-Economic Monitoring Committee.
Relevant Baffinland Commitment	45
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2021) Draft 2019 Socio-Economic Monitoring Plan (Baffinland, 2019h)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix G.13

METHODS

This Project Certificate Condition is addressed in reporting related to PC Condition No. 131, 140, 144, 145, 148, 157, and 154. Additional reporting is provided here, however, those additional PC Condition's should be reviewed as well when consider compliance. Socio-economic data collection and analysis methods are described in the Socio-Economic Monitoring Plan (Baffinland, 2019h) and annual Socio-Economic Monitoring Report. Government data are collected from the Nunavut Bureau of Statistics and Statistics Canada. Change of address information is collected by Baffinland's Community Liaison Officers and through voluntary employee surveys. Other Project-specific information is also presented by Baffinland, as appropriate.

RESULTS

Summary results and trends for relevant socio-economic monitoring data are presented in Table 4.54. Detailed results are presented in the annual Socio-Economic Monitoring Report, including additional information where appropriate community-level indicator data are currently unavailable (e.g. for the topics of childcare availability and costs, Project harvesting interactions and food security, prevalence of gambling issues, prevalence of family violence).

Table 4.54: 2021 Monitoring Results and Trends for Selected Socio-Economic Indicators

Indicator / Topic	Summary and Trend
Known in-migrations of non-Inuit Project employees and contractors	Cumulative Baffinland data (i.e. Baffinland Human Resources data and BCLO survey) since 2015 indicates a net of one non-Inuit employee/contractor is known to have in-migrated to the North Baffin LSA.
In-migration of non-Inuit to the North Baffin LSA	While LSA-level migration data is not available, the proportion of Inuit to non-Inuit in LSA communities has remained relatively similar to pre-development levels.
Known out-migrations of Inuit Project employees and contractors	Cumulative Baffinland data (i.e. Baffinland Human Resources data and BCLO survey) since 2015 indicates a net negative migration (out-migration) of 24 Inuit workers from the North Baffin LSA, which includes a net out-migration of 3 Inuit employees/contractors in 2021..
Out-migration of Inuit from the North Baffin LSA	While LSA-level migration data is not available, the proportion of Inuit to non-Inuit in LSA communities has remained relatively similar to pre-development levels.
Nunavut annual net migration	Nunavut net migration was -88 people in 2019, continuing a negative trend over the past 5 years.
Employee and contractor changes of address, housing status, and migration intentions	Based on 2020 Inuit Employee Survey results, declared migration intentions for 2021 align with the past several years of movement, with nine respondents expressing an intention to move in the next year.
Project female employment	The project had 255 female FTEs in 2021, representing 12% of the total workforce, an increase in both number and proportion from 2020.
Childcare availability and costs	Comments on the lack of childcare in LSA communities have been made previously by Project stakeholders and can be found in previous SEMRs. This topic continues to be tracked through the QSEMC process and community engagement conducted for the Project.
Project harvesting interactions and food security	Topic will continue to be tracked through the QSEMC process, community engagement conducted for the Project, and related information.
Number of drug and alcohol related contraband infractions at Project sites	Five (5) drug and alcohol-related contraband infractions occurred at Project sites among Baffinland and contractor employees in 2021, representing a decrease from 2020 (20).
Number of impaired driving violations	Impaired driving violations have increased in the North Baffin LSA during the post-development period. However, the trend is not significantly different than the trend in all of Nunavut when comparing the different periods.
Number of drug violations	Both Iqaluit and Nunavut have seen rapid decreases in drug violations during the post-development period, while North Baffin LSA has only seen a slight decrease, with an uptick in 2018, the latest year for which data is available.
Prevalence of gambling issues	These topics continue to be tracked through the QSEMC process and community engagement conducted for the Project.
Prevalence of family violence	
Number of secondary school graduates	Graduation rates steadily declined in the Qikiqtani region from 2009 to 2014 but have risen quickly since then. School attendance rates in the North Baffin LSA region have not changed considerably over time or compared to the rest of Qikiqtani. Many factors affect school attendance and graduation rates, and the data does not suggest a significant effect of the Project.
Secondary school graduation rate	

TRENDS

Trends in the monitoring data are presented in the 'Results' section above with additional detail in the socio-economic monitoring report.

RECOMMENDATIONS / LESSONS LEARNED

In response to feedback received from NIRB and Pond Inlet, Baffinland has updated its Inuit Employee Survey to explore motivations for completed or planned moves to different communities and the extent to which they may or may not be connected to Project activities.

Baffinland continues to provide information on socio-economic effects of the Project through its Socio-Economic Monitoring Report. In instances where appropriate community-level indicator data are currently unavailable (e.g. for the topics of childcare availability and costs, Project harvesting interactions and food security, prevalence of gambling issues, prevalence of family violence), these topics continue to be tracked through the QSEMC process and community engagement conducted for the Project.

Baffinland is open to discussing with the SEMWG and QSEMC how improved monitoring data may be obtained, understanding that some data is outside of industries ability or responsibility to collect. The SEMWG Terms of References acknowledged this point as it outlines each members (Baffinland, Government of Canada, GN and QIA) roles and responsibilities, including what type of data is most appropriate for each organization to provide.

Project Certificate Condition No. 169

Category	Governance and Leadership – Monitoring economic effects
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure / Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To maintain transparency inform communities in relation to economic benefits associated with the Project.
Term or Condition	The Proponent provide an annual monitoring summary to the NIRB on the monitoring data related to the regional and cumulative economic effects (positive and negative) associated with the Project and any proposed mitigation measures being considered necessary to mitigate the negative effects identified.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) and Mary River Socio-Economic Monitoring Working Group (SEMWG)
Reference	2021 Socio-Economic Monitoring Report (Aglu and Stratos, 2022) 2021 Community Engagement and SEMWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix B Appendix C.3 Appendix G.13

METHODS

Baffinland has provided a summary of monitoring data related to regional and cumulative economic effects associated with the Project in its annual 2020 Socio-Economic Monitoring Report (Aglu and Stratos, 2022).

RESULTS

The Project continues to make positive contributions to Nunavut's economy. Some highlights include that 245 Inuit FTEs were employed by the Project in 2021, earning a combined total of \$21,595,612. A total of \$220.2 million was paid to Inuit Firms in 2021. Since Project development, a total of \$1.52 billion dollars has been paid to Inuit Firms.

Mining remains an important contributor to the Nunavut economy. Nunavut's real gross domestic product (GDP) for all industries in 2019 (the latest year for which data is available) was \$3,156 million. Of this amount, 'metal ore mining' was responsible for contributing \$874 million (or 28%). Mining may also make economic contributions to supporting industries such as 'construction' (\$585 million contribution to the Nunavut economy in 2019), 'transportation and warehousing' (\$72 million contribution to the Nunavut economy in 2019), and 'accommodation and food services' (\$32 million contribution to the Nunavut economy in 2019), among others.

TRENDS

The Project continues to provide positive regional and cumulative economic effects.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland continues to provide information on regional and cumulative economic effects of the Project through its Socio Economic Monitoring Report. No negative regional or cumulative socio-economic effects directly associated with the Project were identified in 2021.

4.8 PERFORMANCE ON OTHER CONDITIONS

4.8.1 Accidents & Malfunctions (PC Conditions 170 through 177)

Eight (8) PC conditions relate to accidents and malfunctions. Two (2) of these conditions relate to the TEMMP, four (4) relate to spill response planning, one (1) relates to implementing adaptive management measures for hunter safety around ice tracks (not applicable to Northern Shipping Route), and one (1) relates to the use of foreign flagged vessels. Baffinland's updates to these PC conditions are provided in the pages that follow.

Project Certificate Condition No. 170

Category	Accidents and Malfunctions - Terrestrial Wildlife Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	Updates to plan in order to better understand the potential for, and to minimize possible caribou-railway interactions.
Term or Condition	The Proponent shall include in an updated Terrestrial Wildlife Management and Monitoring Plan, plans for increased caribou monitoring efforts including weekly winter track surveying and summer and fall surveys undertaken on foot twice per month.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Responsible Party	Baffinland
Status of PC Condition	Steensby – Not Active
Status of Compliance	Not Applicable
Stakeholder Review	Terrestrial Environment Working Group (TEWG), Nunavut Impact Review Board
Reference	Terrestrial Environment Mitigation and Monitoring Plan (TEMMP; Baffinland, 2016) 2021 Draft Terrestrial Environment Annual Monitoring Report (EDI, 2022a)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

The purpose of snow track surveys is to monitor the patterns of movement and response of caribou and other wildlife to Project-related activities based on their observable tracks in proximity to roadways. Snow track surveys were conducted on February 17, March 18, April 7 and 27, October 10, and November 1, 2021, typically within 24 to 48 hrs following a fresh snowfall. Two or three Baffinland personnel led surveys, who surveyed the Tote Road from a light truck at a speed of ~30 km/hr. If/when wildlife tracks were suspected, personnel would investigate on-foot, confirm the species' identity and follow the tracks (to or from the roadway) to document the patterns of movement, behaviour, and habitat use to the extent possible. The following information was recorded:

- geo-referencing (latitude and longitude) at the location of the tracks/wildlife crossing;
- species identity;
- number of distinct sets of tracks (i.e., group size);
- description of the pattern of movement (e.g., deflected, travelled along, or crossing the road);
- height of the snowbank measured at either the crossing point or likely point of deflection (i.e., the point where the animal redirected its path away from the road); and,
- site photo-documentation and other miscellaneous survey observations (if/where applicable).

Snow track surveys generally occur in early winter and late spring; they are dependent on light availability and snow conditions, so they are somewhat unpredictable in frequency. The TEMMP includes a plan to increase the frequency of these surveys when caribou populations increase to a level that supports robust statistical analysis.

RESULTS

A total of 74 tracks were observed over six surveys conducted between February 17, 2021, and November 1, 2021, after recent snowfall events. Of the total tracks recorded, 44 were estimated to be 'fresh', belonging to species such as Arctic fox (*Vulpes lagopus*), Arctic hare (*Lepus arcticus*), Ptarmigan (*Lagopus* sp.), lemming (*Cricetidae* sp.), or ermine (*Mustela* sp.). In addition to wildlife tracks, one burrow was noted on February 17, 2021, and recorded as an ermine burrow on the east side, roughly 1 m from the Tote Road.

TRENDS

Caribou density is still too low and observations too infrequent to warrant increased survey frequency.

RECOMMENDATIONS / LESSONS LEARNED

Project Certificate Condition No. 170 refers to better understanding and minimizing caribou interactions with the Railway. The Railway for the Steensby Port phase of the Project has not been built, and the railway associated with the Phase 2 Proposal is still under review. Therefore, these monitoring activities have not been triggered. Rail specific monitoring programs will be re-evaluated once plans resume for Railway construction and operation are determined. Although traffic has increased along the Tote Road, caribou density is still too low and observations too infrequent to warrant increased survey frequency.

Project Certificate Condition No. 171

Category	Accidents and Malfunctions - Terrestrial Wildlife Management and Monitoring Plan
Responsible Parties	The Proponent
Project Phase(s)	Pre-Construction
Objective	Updates to plan in order to minimize potential for caribou-railway interactions.
Term or Condition	The Proponent shall include within its updated Terrestrial Wildlife Management and Monitoring Plan, a commitment to establish deterrents along the railway and Tote Road embankments at any areas where it is determined that caribou are utilizing the embankments or transportation corridors to facilitate movement and where such movement presents a likelihood of caribou mortality to occur.
Relevant Baffinland Commitments	Not applicable
Reporting Requirement	To be included in the Annual Report submitted to the NIRB.
Responsible Party	Baffinland
Status of PC Condition	Milne Inlet Tote Road – Active Steensby Railway – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Terrestrial Environment Working Group (TEWG)
Reference	Terrestrial Environment Mitigation and Monitoring Plan (Baffinland, 2016) 2019 Terrestrial Environment Annual Monitoring Report (EDI, 2020) FEIS Terrestrial Wildlife Baseline Report (EDI, 2012)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Areas along the Tote Road that may be used for caribou movement were identified in the FEIS Terrestrial Wildlife Baseline Report (EDI, 2012). Successive Height of Land surveys and driver observations have continued to provide information on potential areas of use by caribou along the Tote Road.

Section 3.3.3 and 3.3.4 of the TEMMP (Baffinland, 2016) outline specific mitigation and management measures concerning caribou movement and mitigating mortalities. Snowbank heights along the Tote Road are limited to 1 m in height to allow for caribou movement across the length of the road corridor. Any new trail crossings will be identified and reviewed with QIA, Elders and hunters, such that any adjustments to the embankments facilitate the desired wildlife movement. Refer to the TEMMP for further discussion on management measures and adaptive management.

RESULTS

A total of 104 caribou from 33 groups were reported from incidental observations in 2021. Most caribou were observed in exploration areas outside the RSA and southeast of the Project in summer. No caribou were seen during the Height of Land surveys. Caribou have not been observed directly in the PDA during Height of Land surveys between 2014 and 2021. Caribou abundance surveys conducted in 2014 and 2018 by the Government of Nunavut also reported low abundance throughout Baffin Island.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

To date, the implementation of deterrents along the Tote Road has not been required, given the relatively low abundance of caribou. Existing mitigation and monitoring as outlined in the TEMMP is considered adequate to meet the terms of the Project Certificate condition.

Project Certificate Condition No. 172

Category	Accidents and Malfunctions – Overwintered fuel vessel
Responsible Parties	The Proponent
Project Phase(s)	Construction
Objective	To provide evidence that vessel to be used is fit and insured for proposed use.
Term or Condition	The Proponent is encouraged to provide the Government of Nunavut with evidence that the vessel that it intends to use for the overwintering of fuel has been designed and certified for use under the conditions which it is expected to operate, and that it be required to provide copies of the vessel owners' insurance policies.
Relevant Baffinland Commitment	8
Reporting Requirement	The required information is to be provided to the Government of Nunavut as soon as possible, and at a minimum, at least 60 days prior to the commencement of any construction related shipping.
Status of PC Condition	Not Active
Status	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021, Baffinland did not require the overwintering of fuel via vessel in 2021.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

If overwintering of fuel is required, Baffinland will provide the Government of Nunavut with the requested information.

Project Certificate Condition No. 173

Category	Accidents and Malfunctions - Use of best practices
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure
Objective	To provide additional spill contingency measures for spills in marine areas.
Term or Condition	The Proponent shall employ best practices and meet all regulatory requirements during all ship-to-shore and other marine-based fuel transfer events.
Relevant Baffinland Commitment	9
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Environment and Climate Change Canada, Qikiqtani Inuit Association, Nunavut Water Board, Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board.
Reference	Spill Contingency Plan (Baffinland, 2021k) 2021 Oil Pollution Emergency Plan – Milne Inlet (OPEP; Baffinland, 2021l) 2021 Oil Pollution Prevention Plan – Milne Inlet (OPPP; Baffinland, 2021m) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) Spill at Sea Response Plan (SSRP; Baffinland, 2015)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Baffinland maintains a Transport Canada approved Oil Pollution Emergency Plan (OPEP) for ship to shore fuel transfers at Milne Port, which is currently a Class 2 Oil Handling Facility. The OPEP was updated in 2021. Training of Baffinland staff on the Milne Inlet OPEP was conducted by a qualified marine spill response contractor (Navenco Marine) between July 9 to 10, 2021. Baffinland is committed to undertaking fuel transfer from vessels under good weather conditions. Baffinland also maintains a Transport Canada approved Oil Pollution Prevention Plan (OPPP) for Milne Port (Baffinland, 2021m), which is specifically designed to prevent the discharge of oil during bulk fuel transfers at Milne Port.

Baffinland also maintains the Spill at Sea Response Plan (SSRP) that outlines procedures for dealing with the unlikely event of a spill at sea, including during ship-to-ship fuel transfers. Each vessel under contract to Baffinland also maintains its own Shipboard Oil Pollution Emergency Plan (SOPEP), which outlines the vessel's protocol for dealing with a spill event, and includes an inventory of spill response equipment onboard the vessel.

RESULTS

OPEP training occurred in 2021. A mock spill exercise was performed to ensure spill readiness. Baffinland has invited communities of the North Baffin Region to participate and observe training in the past, however, due to the ongoing COVID-19 Pandemic, visits to Project facilities by non-project staff were put on hold until further notice to eliminate any potential close interactions between employees and visitors of the mine. Required equipment for a Class 2 Oil Handling Facility was met. No spills occurred during fuel transfers.

TRENDS

As in previous years, Transportation Canada's Guidelines for Baffinland's Class 2 (previously Class 1) Oil Handling Facility were adhered to.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically place resources and equipment on site for spill response during ship-to-shore fuel transfer events.

Project Certificate Condition No. 174

Category	Accidents and Malfunctions - Community level spill response
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure
Objective	To improve community ability to assist in spill response
Term or Condition	The Proponent and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to potentially improve response times in the event of a spill.
Relevant Baffinland Commitment	108,110
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Environment Climate Change Canada (ECCC), Qikiqtani Inuit Association (QIA), Nunavut Water Board (NWB), Crown-Indigenous Relations and Northern Affairs Canada, Nunavut Impact Review Board (NIRB).
Reference	2021 Oil Pollution Emergency Plan – Milne Inlet (OPEP; Baffinland, 2021l) 2021 Oil Pollution Prevention Plan – Milne Inlet (Baffinland, 2021m) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) Spill at Sea Response Plan (Baffinland, 2015)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

In a January 29, 2015 letter from the Canadian Coast Guard (CCG) to NIRB, the CCG noted that the provision of spill response equipment and training to communities was the responsibility of CCG.

Training of Baffinland staff on the Milne Inlet OPEP was conducted by a qualified marine spill response contractor between July 9 to 10, 2021. This ensured that Baffinland is ready to respond to potential spills along the shipping route within the Inlet. Oil Spill Response Ltd. has continued to be retained to respond to significant spills that occur. Baffinland is committed to ensuring that adequate resources are allocated to the development and deployment of emergency and spill response capabilities within the Project.

RESULTS

OPEP training occurred in 2021. A mock spill exercise was performed to ensure spill readiness. Baffinland has invited communities of the North Baffin Region to participate and observe training in the past, however due to the ongoing COVID-19 Pandemic, visits to Project facilities by non-project staff were put on hold until further notice to eliminate any potential close interactions between employees and visitors of the mine. Required equipment for a Class 2 Oil Handling Facility was met. No spills occurred during fuel transfers.

TRENDS

Baffinland is committed, during operations, to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to conduct routine training exercises and strategically place resources and equipment on site for spill response during ship-to-shore fuel transfer events.

Project Certificate Condition No. 175

Category	Accidents and Malfunctions – Ship track markers in ice cover
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Hunters and Trappers Organizations of the North Baffin region and Coral Harbour
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	To ensure that measures taken to mark the shipping track(s) during periods of ice cover are effective in advising ice-based travelers, and that, where necessary, revisions to this practice can be made to ensure public safety.
Term or Condition	The Proponent shall, in coordination and consultation with the Qikiqtani Inuit Association and the Hunters and Trappers Organizations of the North Baffin communities and Coral Harbour, provide updates to its Shipping and Marine Mammals Management Plan to include adaptive management measures it proposes to take should the placement of reflective markers along the ship track in winter months not prove to be a feasible method of marking the track to ensure the safety of ice-based travelers.
Relevant Baffinland Commitment	34, 57
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Steensby Port – Not Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021. There is no winter shipping associated with the current phase of the Project. Furthermore, action on this PC Condition is deferred until the Steensby Port is developed and transits through ice are scheduled.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 176

Category	Accidents and Malfunctions - Revised spill modeling
Responsible Parties	The Proponent
Project Phase(s)	Pre-Construction, Construction Operations, Closure
Objective	To improve community ability to assist in spill response.
Term or Condition	The Proponent is required to revise its spill planning to include additional trajectory modeling for areas of Hudson Strait, such as Mill Island, where walrus concentrate, as well as for mid-Hudson Strait during winter conditions as well as for the northern shipping route, including Milne Inlet, Eclipse Sound and Pond Inlet.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	The updated modeling shall be provided to the NIRB, Fisheries and Oceans Canada, and Environment Canada for review at least 3 months prior shipment of bulk fuel to Steensby Inlet or Milne Inlet.
Status of PC Condition	Steensby Port – Not Active Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada, Canadian Coast Guard, Fisheries and Oceans Canada, Environment and Climate Change Canada
Reference	Milne Inlet Spill Modelling Report Fuel Spill Modelling: Northern Shipping Route Open Water Season - Milne Inlet, Eclipse Sound, Pond Inlet (AMEC Foster Wheeler, 2015) Emergency Response Plan (Baffinland, 2020h) 2021 Oil Pollution Emergency Plan – Milne Inlet (Baffinland, 2021l) 2021 Oil Pollution Prevention Plan – Milne Inlet (Baffinland, 2021m) 2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) Spill at Sea Response Plan (Baffinland, 2015) Spill Contingency Plan (Baffinland, 2021k) Diesel Environmental Emergency (E2) Plan – Mine Site (Baffinland, 2020m). Diesel Environmental Emergency (E2) Plan - Milne Port (Baffinland, 2020i). Exploration Spill Contingency Plan (Baffinland, 2014d)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

Not applicable as Steensby Port and the Southern Shipping Route were not developed or active in 2021. Revised oil spill modelling was conducted for shipping from Milne Port in 2015 that satisfies this condition. Leading up to this modelling, a fuel spill preparedness workshop was held in April 2014 with Transport Canada and the Canadian Coast Guard. This workshop established the following credible spill scenarios for modelling:

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

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

Two (2) scenarios were modelled at each of the five (5) locations using the software OST, which computes spill probability distributions to indicate geographical regions (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet) which might be affected as a result of a spill, how frequently and how soon.

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

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

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

RESULTS

The modelling results from the 2015 report were presented in a series of figures showing expected spill trajectories after one (1) day and five (5) days. The spill model informed the development of Baffinland's Spill at Sea Response Plan.

The spill modelling results highlight the importance of spill prevention and the Spill at Sea Response Plan preparedness to minimize any adverse effects in the unlikely event of a fuel release of any size during vessel traffic into Milne Inlet.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Management plans, including the Spill at Sea Response Plan (Baffinland, 2015) and the Emergency Response Plan (Baffinland, 2020h) are being updated as part of the Phase 2 Proposal regulatory process to incorporate the updated

fuel spill dispersion modelling that was completed in support of the Phase 2 Proposal. Operational practices and mitigation measures have been implemented as a proactive measure until decision on the Phase 2 Proposal is received.

Project Certificate Condition No. 177

Category	Accidents and Malfunctions - Foreign flagged vessels
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Closure and Post-Closure Monitoring
Objective	To ensure foreign flagged ships operating in Canadian waters are held to the same standard as domestic ships with regard to emergency response planning.
Term or Condition	The Proponent shall enroll any foreign flagged vessels commissioned for Project-related shipping within Canadian waters into the relevant foreign program equivalent to Transport Canada's Marine Safety Delegated Statutory Inspection Program.
Relevant Baffinland Commitment	13, 37
Reporting Requirement	To be determined following approval of the Project by the Minister.
Status of PC Condition	Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Transport Canada
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Ship owners / operators are responsible for enrolling their foreign flagged vessel with the appropriate program. Baffinland incorporates this requirement into contract terms and conditions with all vessels contracted directly by Baffinland.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

4.8.2 Alternatives Analysis (PC Condition 178 through 184)

Ten (10) PC conditions relate to alternatives analysis. Four (4) of these conditions relate to shipping activities, two (2) relate to the membership of the MEWG, one (1) relates volumes of ore to be hauled on the Tote Road, one (1) relates to the implementation of mitigation measures in the marine environment, and two (2) relate to the assessment of Baffinland's performance against commitments and terms and conditions of the Project Certificate. Of note, PC Condition No. 179 (a), (b) and (c) relate to Baffinland's production increase proposal to allow for shipment of 6 Mtpa of ore through Milne Inlet. Baffinland's updates to these PC conditions are provided in the pages that follow.

Project Certificate Condition No. 178

Category	Alternatives Analysis - Mill Island shipping route consideration
Responsible Parties	The Proponent, Qikiqtani Inuit Association, Nunavut Impact Review Board, Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance
Objective	To prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island.
Term or Condition	Subject to safety considerations and the potential for conditions, as determined by the crew of transiting vessels, to result in route deviations, the Proponent shall require project vessels to maintain a route to the south of Mill Island to prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	Where project vessels are required to transit to the north of Mill Island owing to environmental or other conditions, an incident report is to be provided to the Marine Environment Working Group and the NIRB within 30 days, noting all wildlife sightings and interactions as recorded by shipboard monitors. The Proponent shall summarize all incidences of deviations from the nominal shipping route as presented in the FEIS to the NIRB annually, with corresponding discussion regarding justification for deviations and any observed environmental impacts.
Status of PC Condition	Steensby – Not Active Milne Port – Active
Status of Compliance	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021. Shipping iron ore through Steensby Inlet is not active and has yet to be part of the Project's operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 179

Category	Operational Variability
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To apply the precautionary principle in respect of potential effects on marine wildlife and marine habitat from changes to shipping frequency that may result from a significant increase in mine production for an extended period of time.
Term or Condition	Baffinland shall not exceed 20 ore carrier transits to Steensby Port per month during the open water season and 242 transits per year in total.
Relevant Baffinland Commitment	4
Reporting Requirement	To be developed following approval by the Minister.
Status of PC Condition	Steensby Port – Not Active
Status	Not applicable
Stakeholder Review	Not applicable
Reference	Not applicable
Ref. Document Link	Not applicable

METHODS

Not applicable in 2021. Shipping iron ore through Steensby Inlet is not active and has yet to be part of the Project's operations.

RESULTS

Not applicable.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Not applicable.

Project Certificate Condition No. 179 (a)

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure that there are appropriate limits on the Milne Inlet marine shipping component in order to limit and manage likely project effects, while balancing the need for operational flexibility.
Revised Term or Condition	Until December 31, 2021, the total volume of ore shipped via Milne Inlet may exceed 4.2 million tonnes per year, but must not exceed 6.0 million tonnes in any calendar year. After December 31, 2021 the maximum total volume of ore shipped via Milne Inlet in a calendar year returns to 4.2 million tonnes per year, unless this condition has been further modified under s. 112 of <i>Nunavut Planning and Project Assessment Act</i> , S.C. 2013, c. 14, s.2.
Relevant Baffinland Commitment	4
Reporting Requirement	For each year after the Proponent commences shipping ore via Milne Inlet under the Early Revenue Phase Proposal, the Proponent shall include in the Annual Report to the NIRB, a summary of the total amount of ore shipped via Milne Inlet for the previous calendar year.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

The total volume of ore shipped via Milne Inlet is tracked annually by Baffinland.

RESULTS

Baffinland shipped a total of 5.6 million tonnes (Mt) of iron ore during the 2021 shipping season, which is a slight increase from 2020 (~5.5 Mt).

TRENDS

The total volume of ore shipped via Milne Inlet increased between 2015 (~0.92 Mt) and 2019 (~5.9 Mt), but decreased slightly in 2020 (~5.5 Mt) and 2021 (~5.6 Mt) in comparison to volumes reached in 2019 (Figure 4.16).

Baffinland continues to operate within the existing allowance for shipping limits outlined in PC Condition No. 179(a).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes shipped on a yearly basis.



Figure 4.16: Number of Ore Carriers and Tonnage by Year through Milne Port, 2015 to 2021

Project Certificate Condition No. 179 (b)

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure that there are appropriate limits on the Milne Inlet Tote Road land transportation component in order to limit and manage likely project effects, while balancing the need for operation flexibility.
Revised Term or Condition	Until December 31, 2021, the total volume of ore transported by truck on the Milne Inlet Tote Road may not exceed 4.2 million tonnes per year, but must not exceed 6.0 million tonnes in any calendar year. After December 31, 2021, the maximum total volume of ore transported by truck on the Milne Inlet Tote Road in a calendar year returns to 4.2 million tonnes per year, unless this condition has been further modified under s. 112 of the <i>Nunavut Planning and Project Assessment Act</i> , S.C. 2013, c. 14, s. 2.
Reporting Requirement	For each year after the Proponent commences shipping ore via Milne Inlet under the Early Revenue Phase Proposal, the Proponent shall include in the Annual Report to the NIRB, a summary of the total amount of ore shipped via Milne Inlet for the previous calendar year.
Relevant Baffinland Commitment	4
Status of PC Condition	Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Nunavut Impact Review Board (NIRB)
Reference	2021 QIA & NWB Annual Report for Operations (Baffinland, 2022b)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/

METHODS

The total volume of ore transported by truck on the Tote Road is tracked annually by Baffinland.

RESULTS

In 2021, a total of ~5.4 Mt of iron ore was transported by truck on the Tote Road.

TRENDS

From 2017 to 2020, the amount of ore transported by truck on the Milne Inlet Tote road has increased from ~4.5 to 6.0 Mt. With ~5.4 Mt of ore transported by truck on the Milne Inlet Tote Road in 2021, this is the first year that the volume of ore transported along the Tote Road has decreased (Figure 4.17).

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to track ore volumes transported by truck on the Tote Road. As of January 1, 2022, the maximum total volume of ore transported by truck on the Milne Inlet Tote Road in a calendar year has returned to 4.2 million tonnes per year.

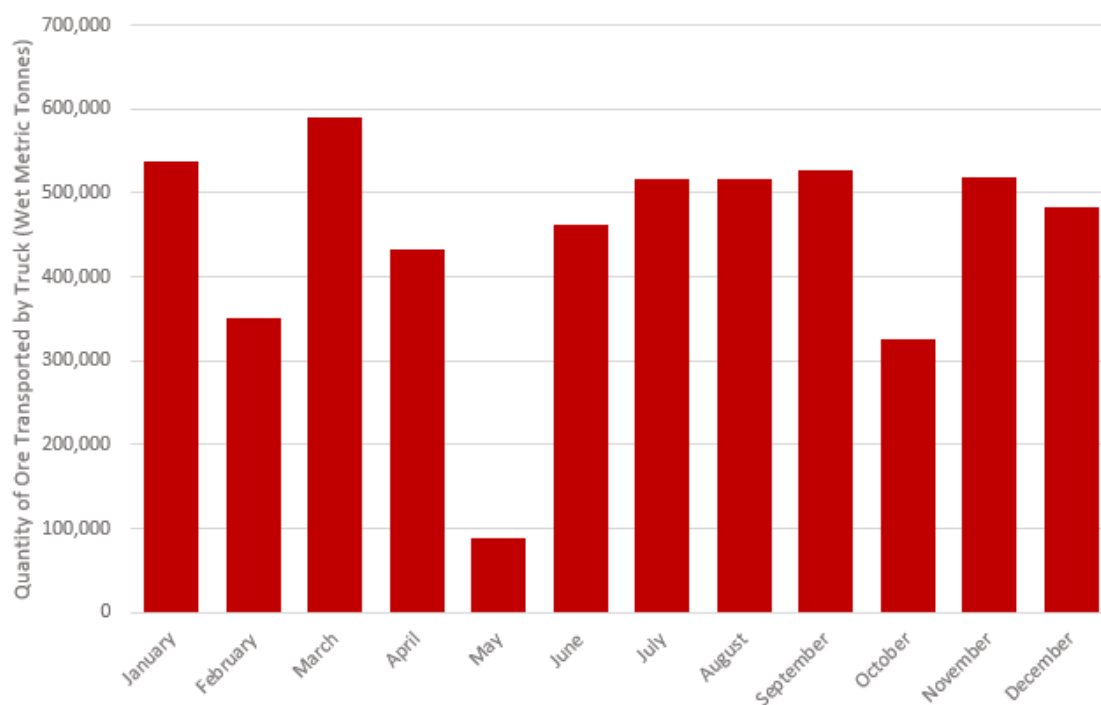


Figure 4.17: Monthly Quantities of Ore Generated and Transported Via the Tote Road in 2021

Project Certificate Condition No. 179 (c)

Category	Operational Variability/Flexibility
Responsible Parties	The Proponent
Project Phase(s)	Operations
Objective	To ensure commitments made by the Proponent with respect to the 2018 production increase and delivery of benefits to Inuit are adhered to, and can be determined through a body of evidence.
Revised Term or Condition	The Proponent shall be required to resource and support a third party to conduct bi-annual performance audits of commitments made by the Proponent in relation to both the IIBA and every Proponent commitment and every terms or condition of the Project Certificate relating to environmental management of the Tote Road component or environmental management related to shipping. The Proponent shall file Performance Audit Reports with the NIRB on or before March 31 and September 30 of each calendar year.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	On a bi-annual basis, the Proponent shall file a Performance Audit Report with the NIRB on or before March 31 and September 30 of each calendar year. This report shall include the findings of the third-party auditor, and Baffinland's commitment to addressing findings of the auditor. This term and condition will remain in force for the duration of the Mary River Project, unless it is modified under the <i>Nunavut Planning and Project Assessment Act</i> .
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Not applicable
Reference	Specified Auditing Procedures on the Commitments Audit Protocol report to the Nunavut Impact Review Board For the period ending June 30, 2021 (BDO, 2021)
Ref. Document Link	Not applicable

METHODS

Since 2018, Baffinland has retained a consultant to complete an audit that would meet the specific objectives of the terms and conditions of Project Certificate Condition No. 179 (c). Prior to it's implementation, the audit template was shared with the Qikiqtani Inuit Association (QIA) to confirm the scope prior. A contract was established with BDO Canada LLP (BDO) to conduct two (2) audits in 2021 in relation to both the IIBA, project Commitments, and the Terms and Conditions of the Project Certificate relating to the operation of the Tote Road and shipping activities.

RESULTS

The first Performance Audit Report for the 2021 year, was submitted to the NIRB in September 2021, for the period between January 1, 2021 and June 30, 2021 (BDO, 2022). For the IIBA section of the audit report, Baffinland had a 93% completion rate. For the PC No. 005 Terms and Conditions section, Baffinland had a 95% completion rate.

The second Performance Audit Report for the 2021 year, which covers the period of July 1st, 2021 to December 31st, 2021, will be submitted on March 31st, 2022. Compliance highlights will be included in the covering letter to that submission.

TRENDS

In 2021, Baffinland maintained its completion rate of 95% for the Project Certificate Commitments, and 93% for the Inuit Impact and Benefit Agreement (IIBA) Commitments.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to execute the bi-annual audits required under Project Certificate Condition No. 179(c) in 2022.

Project Certificate Condition No. 180

Category	Transboundary Effects - Makivik Corporation involvement in the Marine Environment Working Group (MEWG)
Responsible Parties	The Proponent, members of the Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.
Term or Condition	The Marine Environment Working Group established for this Project shall invite a representative from Makivik Corporation to be a member of the Group.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1

METHODS

Makivik is a member of the MEWG established in 2013. Meeting Records of working group meetings are distributed to all parties. If a representative of Makivik is unable to attend a meeting, they are informed of Project plans through the sharing of meeting presentation slides in Inuktitut and English, and meeting minutes (draft and final versions in Inuktitut and English) via email.

RESULTS

Makivik was sent MEWG meeting presentation slides and meeting minutes for all scheduled meetings, in addition to other technical information (e.g., latest drafts of annual monitoring reports) in 2021.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to update Makivik on Project activities through the MEWG meetings and distribution of technical documentation.

Project Certificate Condition No. 181

Category	Transboundary Effects - Marine Environment Working Group (MEWG) reporting
Responsible Parties	The Proponent, members of Marine Environment Working Group
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.
Term or Condition	Regardless of whether Makivik Corporation participates as a member of the Marine Environment Working Group, the Marine Environment Working Group will provide Makivik Corporation with regular updates regarding the activities of the Marine Environment Working Group throughout the Project life cycle.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval by the Minister.
Status of PC Condition	Steensby - Not Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	2021 MEWG Meeting Records
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1

METHODS

Makivik is a member of the MEWG established in 2013. Meeting Records of the MEWG meetings are distributed to all parties. If a representative of Makivik is unable to attend a meeting, they are informed of Project plans through the sharing of meeting presentation slides [Inuktitut and English] and meeting records (draft and final versions [Inuktitut and English]) via email.

RESULTS

Makivik received MEWG meeting presentation slides for all scheduled meetings, meeting records and other technical information (e.g., latest drafts of annual monitoring reports as available) in 2021.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to update Makivik on Project activities through the MEWG meetings and distribution of technical documentation via email.

Project Certificate Condition No. 182

Category	Transboundary Effects - Reporting to Marine Environment Working Group (MEWG)
Responsible Parties	The Proponent, Makivik Corporation
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.
Term or Condition	Baffinland shall make available to Makivik Corporation any ship route deviation reports provided to the NIRB in accordance with the terms and conditions set out in Section 4.12.4 of the Final Hearing Report.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	To be developed following approval by the Minister.
Status of PC Condition	Steensby – Not Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG)
Reference	Not applicable
Ref. Document Link	https://www.baffinland.com/operation/shipping-and-monitoring/

METHODS

This condition is focused on shipping through the shared waters of Hudson Strait from Steensby Port. The Project has not utilized the Southern Shipping Route to transport ore to date. However, vessel transit information for all vessels (non-Baffinland and Baffinland-procured vessels) with Automatic Identification System (AIS) tracking data and travelling within the RSA along the active Northern Shipping Route is publicly available on a 24-hour basis on the Baffinland website over the entire shipping season. Accordingly, online tracking is available prior to start of shipping and remains in place until after shipping has ended (typically set to provide data from July to October, inclusively). Baffinland will provide relevant ship route deviation reports to Makivik when required.

RESULTS

There were no changes to the ship route in 2021 that would be relevant to the Southern Shipping Route since the portion of the Project is not active. Baffinland did share through MEWG meeting slide decks and minutes that the slight deviation of the Northern Shipping Route near Bruce Head initiated in 2020 continues to be enforced.

TRENDS

Not applicable.

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to make ship route information publicly available through its online website and will provide Makivik with any ship route deviation reports when relevant to the Southern Shipping Route when the Steensby portion becomes active.

Project Certificate Condition No. 183

Category	Project monitoring of impacts to marine mammals
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessment, and the identification of other mitigation measures that have the potential to further reduce potential impacts to marine mammals.
Term or Condition	The Proponent shall collaborate with the Marine Environment Working Group (MEWG) to develop impact avoidance or mitigation strategies for the protection of the marine environment, and shall implement these strategies. The Proponent shall implement any direction from the Department of Fisheries and Oceans (DFO), issued in furtherance of their mandate, for any avoidance or mitigation measures, including cessation of any activity, for the protection of the marine environment. The Proponent shall, every six months, provide to DFO a tracking table of (i) collective recommendation of the other members of the working group, and (ii) any directions from DFO. For each, the table must show the Proponent's means of implementation. Where any direction or recommendations are not fully implemented, the Proponent shall include the rationale.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	Results of the observer program shall be provided in the Annual Report to the Board. Further, Baffinland shall report all data it generates from the implementation of monitoring of marine impacts it is required to implement pursuant to the Terms and Conditions of the Project Certificate. In relation to the specific reporting associated with the Extension Request to the Production Increase Proposal, Baffinland shall provide the tracking table referenced above to Fisheries and Oceans Canada and the other members of the Marine Environment Working Group within six months following the NIRB's issuance of Amendment No. 003 to the Project Certificate and shall provide subsequent updates to the table every 6 months thereafter.
Status of PC Condition	Milne Port – Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Department of Fisheries and Oceans (DFO)
Reference	2021 Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) 2021 Narwhal Adaptive Management Response Plan (Baffinland, 2021h) 2020 Marine Mammal Monitoring Programs - Technical Memo (April Prelim Results) (Golder, 2021c) 2021 MEWG Meeting Minutes
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix G.12, G.14

METHODS

Baffinland has regularly consulted with the MEWG, DFO and Inuit stakeholders when developing or enhancing impact avoidance and mitigation strategies for the protection of the marine environment.

The MEWG provides a valuable forum for ongoing Project communication and reporting between Baffinland and other interested parties. The MEWG also serves as an advisory group to provide recommendations on appropriate management approaches and actions related to the Project.

Any new or modified/enhanced mitigation measures related to shipping or port operations are documented in Baffinland's Shipping and Marine Wildlife Management Plan (Baffinland, 2021h).

Baffinland and the MEWG held meetings on May 13 and June 20, 2021. Both meetings were held via teleconference due to the COVID-19 Pandemic public health restrictions. Additionally, On April 8 2021, Baffinland provided to the NIRB a Technical Memo prepared by Baffinland's marine mammal monitoring technical consultants, Golder Associates Ltd. (Golder), entitled Preliminary Summary of 2020 Narwhal Monitoring Programs (the Memo) (Golder, 2021d). The Memo outlined key results of Baffinland's 2020 marine mammal monitoring programs, notably that through the 2020 marine mammal aerial survey, Golder had recorded a statistically significant decline in the stock estimate for the Eclipse Sound narwhal stock. The Memo also included a preliminary investigation of several factors that may have contributed to the recorded decline in the stock estimate, including icebreaking activities associated with Baffinland's 2020 shipping season.

Subsequent to Baffinland's April 8, 2021 submission, the NIRB facilitated a comment and response period for interested Parties on the Memo. On or before May 17, 2021, the NIRB received comments from:

1. Qikiqtani Inuit Association
2. Hamlet of Pond Inlet
3. Ikajutit Hunters and Trappers Organization
4. Government of Canada;
 - a. Department of Fisheries and Oceans Canada
 - b. Parks Canada
5. Oceans North

On June 4, Baffinland provided responses to comments from these Parties (NIRB Registry No. 335788, Baffinland, 2021i).

In addition to NIRBs facilitated exchange of written comments on the Memo, Baffinland conducted its own engagements with several Parties. A summary of these engagements was provided in Baffinland's 2021 Narwhal Adaptive Management Response Plan (Baffinland, 2022h), and is as follows:

1. Meeting with DFO on April 9, 2021 to provide an overview of information contained within the Memo.
2. Sent an information request to DFO on April 22, 2021 to obtain additional information on the 2020 Small Craft Harbour (SCH) construction activities for the purpose of conducting additional investigations into potential causal factors.

3. Provided the Marine Environmental Working Group (MEWG) copies of all its 2020 Draft Marine Monitoring Program Reports on May 13, 2021, with comments expected back from the MEWG on June 24, 2021.
4. Submitted to the Nunavut Impact Review Board (NIRB) its 2020 Annual Monitoring Report as of May 6, 2021, with comments expected back from interested Parties on July 6, 2021.
5. Held a meeting with the MEWG on May 13, 2021 to provide an opportunity for members to ask questions regarding the Technical Memo in advance of their written submissions. A copy of the draft minutes from the May 13 2021 MEWG Meeting and the relevant presentation materials were provided to the NIRB as part of Baffinland's June 4 2021 submission (NIRB Registry No. 335788, Baffinland, 2021i).
6. Met with representatives from the Mittimatalik Hunter and Trappers Organization (MHTO) and the Hamlet of Pond Inlet to discuss plans for the 2021 shipping season on May 28, 2021,
7. Hosted a radio show in Pond Inlet with a question and answer period on June 2, 2021.
8. Met with representatives from DFO on June 22, 2021 to provide an opportunity for follow-up questions on Baffinland's responses to comments submitted by DFO on the Memo and to discuss the Draft version of the 2021 Narwhal Adaptive Management Response Plan.
9. Held a meeting with the MEWG on June 29, 2021 where details regarding Baffinland's 2021 monitoring programs and an overview of shipping season were provided.
10. Met with representatives from the Hamlet of Pond Inlet on June 30, 2021 and July 12, 2021 to discuss Baffinland's Draft version of the 2021 Narwhal Adaptive Management Response Plan
11. Sent an information request to the Government of Nunavut on July 7, 2021, with follow-up on July 12, 2021 to obtain additional information on the 2020 SCH construction activities for the purpose of conducting additional investigations into potential causal factors.

Baffinland also requested additional meetings with the QIA and MHTO to discuss the Memo, however, neither Party responded with an intention to meet.

RESULTS

Through these consultation efforts, Baffinland received at a high level, the following feedback from the MEWG and other interested Parties (Table 4.55).

Recognizing the value of the Eclipse Sound narwhal stock to the residents of Pond Inlet, and that there are unknown and/or unmitigated cumulative activities occurring in the Marine RSA that could have continued in 2021, Baffinland took a precautionary approach and adding additional mitigations to its shipping activities in 2021 on an interim basis.

The 2021 shipping season did commence until a continuous path of 3/10ths or less ice concentration was available along the Northern Shipping Route. The additional mitigation measure delayed the commencement of the shipping season, eliminated icebreaking activities, and shortened the overall number of shipping days available to Baffinland in the 2021 season. Baffinland also continued to implement all other existing mitigation measures as described in Section 6 of the Shipping and Marine Wildlife Management Plan (Baffinland, 2021h) and summarized below.

Table 4.55: Summary Of Engagement Outcomes

Summary of Comment/ Recommendation	Baffinland Response / Outcomes
Recommendations from Hamlet of Pond Inlet, Parks Canada, DFO and QIA on enhancements to Baffinland's existing and proposed monitoring programs.	Baffinland has committed to working with these Parties further on the refinement of these programs (i.e. analysis of EWI monitoring at Bruce Head). Baffinland also reaffirmed the need for and importance of strengthened regional monitoring that will enhance Baffinland's ability to discriminate Project-related effects from other anthropogenic activities or environmental changes that could be affecting the Eclipse Sound narwhal stock.
DFO and QIA identified the need for additional details on the methodology and analysis undertaken for each of Baffinland's 2020 marine mammal monitoring program in order to provide more fulsome feedback.	Baffinland distributed copies of all of its draft 2020 marine monitoring programs to the MEWG on May 13, 2021. Comments were submitted by MEWG members on July 8, 2021. Responses to all comments received will be provided as an appendix to the final versions of these monitoring reports, which will incorporate comments from the MEWG as relevant.
Hamlet of Pond Inlet and QIA requested additional information on pile driving activities associated with the SCH construction and icebreaking activities, respectively.	Baffinland noted that requests for additional information on SCH activities were directed to the GN and DFO. Baffinland has submitted information requests to these Parties that would assist in answering in some of the Hamlet's inquiries, however no information has been provided by these Parties to-date. In response to the QIA, Baffinland provided an appendix to its June 4 2021 responses to comments that breaks down the distance travelled by vessels in various ice concentrations along the shipping route in 2017, 2018, 2019 and 2020.
QIA and DFO sought additional information regarding how Baffinland had accounted for the SCH in its cumulative effects assessment.	Baffinland provided clarity to these Parties on its responsibilities with respect to cumulative effects assessment and monitoring. Baffinland also requested DFO formally describe what its mandated responsibilities are for cumulative effects monitoring on a regional scale with respect to managing cumulative effects on marine mammals in Canadian Arctic waters and provide its proposed strategy for cumulative effects assessment in this regard, and describe what level of cumulative effects monitoring has been completed by the Government of Canada to date in support of this work.
Recommendations from MHTO and Hamlet of Pond Inlet to eliminate all icebreaking activities from Baffinland's operational activities.	Baffinland proposes to avoid icebreaking at the beginning of the 2021 shipping season. The trigger to begin shipping will be a continuous path of 3/10ths ice concentrations between Baffin Bay and Milne Port. The icebreaker will still be present throughout the season, however, it will only serve as a precaution at the beginning of the shipping season. Icebreaking may still be required at the end of the shipping season, depending on ice conditions. However, Baffinland will continue to close the shipping season to avoid breaking landfast ice.

All vessels are instructed to follow the nominal shipping route to the fullest extent possible, however at the start and end of the shipping season there may be a need for slight deviations from the nominal route to avoid interactions with ice. Any notable deviations will be communicated to hunters on the water and in the communities via the

Baffinland's Shipping Monitors. In all cases vessels will continue to be instructed to avoid Koluktoo Bay, the western shoreline near Bruce Head and 10km from the shoreline of Pond Inlet to minimize effects on marine mammals and interference with hunting activities.

All Project vessels will restrict speed to 9 knots when transiting along the established shipping corridor, and will be operated in such a way as to avoid separating an individual member(s) of a group of marine mammals from other members of the group. 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 move away from the immediate area.

A detailed description of mitigations for minimizing Project-related activities on marine mammals are available for review in Baffinland's Shipping and Marine Wildlife Management. Table 4.56 summarizes these mitigations:

Table 4.56: 2021 Mitigation Measures For Marine Mammals

Project Activity	Mitigation Measure(s)	Species
Vessel traffic to/from Milne Port	<ul style="list-style-type: none"> Maintain constant speed and course when possible. Reduce vessel speed to 9 knots. Reduce vessel idling Additional temporary measures have been introduced for 2021 that shipping will not commence until a continuous path of 3/10ths or less ice concentrations between the entrance of Eclipse Sound and Milne Port is present. No breaking of landfast ice will occur in the spring or fall shoulder season. If marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows). All Project vessels will be provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group; All Project vessels will be provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice; Vessels awaiting instructions from the Port Captain to enter the RSA will be instructed to wait in Baffin Bay at least 40 km east of the Nunavut Settlement Area. 	Ringed Seal, Bearded Seal, Walrus, Beluga, Narwhal, Bowhead Whale, Polar Bear

It is important to note that none of the aforementioned mitigations related to vessel movement, should be read in any way as over-riding the Master's authority and responsibility for safe navigation and management of the vessel.

TRENDS

The MEWG has successfully provided valued input into the Baffinland annual marine monitoring programs and shipping related mitigation measures.

DFO has not provided any directions to Baffinland with respect to Term and Conditions No. 183. DFO identified on March 22, 2021 in response to MHTO written questions for the Phase 2 Public Hearing that "to date, there has not been a situation, within DFO's mandate, that provided sufficient evidence that there would be imminent negative impacts to the marine environment such that it required a direction".

RECOMMENDATIONS / LESSONS LEARNED

Baffinland will continue to work with the MEWG to review and guide marine monitoring programs and shipping mitigation and management strategies on an annual basis. These will be reported through MEWG meetings, the annual shipping report to the NIRB, and annual year end reporting to the NIRB. Where monitoring indicates the need for adaptive management, Baffinland will provide additional reporting to remain transparent and accountable. These venues more than satisfy the twice per year requirement of the term and condition, as written.

Project Certificate Condition No. 184

Category	Project monitoring of impacts to marine mammals
Responsible Parties	The Proponent
Project Phase(s)	Construction, Operations, Temporary Closure /Care and Maintenance, Closure and Post-Closure Monitoring
Objective	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessments, and the identification of other mitigation methods that have the potential to further reduce potential impacts to marine mammals.
Term or Condition	The Proponent shall collaborate with the Marine Environment Working Group to review the status of compliance with, and implementation of, all of the Terms and Conditions in Project Certificate No. 005 related to marine environmental protection.
Relevant Baffinland Commitment	Not applicable
Reporting Requirement	Results of the observer program shall be provided in the Annual Report to the Board. Further, Baffinland shall report annually all data it generates from the implementation of monitoring of marine impacts it is required to implement pursuant to the Terms and Conditions of the Project Certificate.
Status of PC Condition	Active
Status of Compliance	In Compliance
Stakeholder Review	Marine Environment Working Group (MEWG), Department of Fisheries and Oceans (DFO)
Reference	Marine Environmental Effects Monitoring Plan. (Baffinland, 2020n) 2019 Marine Mammal Aerial Survey Report (Golder, 2020g) Is vessel hull fouling an invasion threat to the Great Lakes? (Sylvester and MacIsaac, 2010)
Ref. Document Link	https://www.baffinland.com/media-centre/document-portal/ Appendix C.1 Appendix E Appendix G.12, G.14

METHODS

Refer to PC Condition No. 77 and 183.

RESULTS

Refer to summary for PC Condition No. 77 and 183.

TRENDS

Refer to summary for PC Condition No. 77 and 183.

RECOMMENDATIONS / LESSONS LEARNED

Refer to summary for PC Condition No. 77 and 183.

5 NIRB CORRESPONDENCE

5.1 NIRB SITE VISITS AND INSPECTIONS

The objective of the NIRB's site visits to the Mary River and Milne Port sites is to determine whether, and to what extent, the land or resource use in question is being carried out within the predetermined Terms and Conditions as set out in the amended Project Certificate issued for the Mary River Project, in accordance with Section 12.7.2(b) of the *Nunavut Agreement*. As described by NIRB, the observations resulting from the site visits shall, wherever possible, be incorporated into the measurement of the relevant effects of the Project, provide the information necessary for agencies to enforce terms and conditions of land or resource use approvals, and will be further used to assess the accuracy of the predictions contained in the project impact statements in accordance with Section 12.7.2 of the *Nunavut Agreement*, and s. 135 (3) of the *Nunavut Planning and Project Assessment Act* (NuPPAA; NIRB, 2021b, 2021c).

In 2021, no in-person site inspection by NIRB was possible at both the Mary River Mine Site and Milne Port, due to public health measures and travel restrictions related to the ongoing COVID-19 Pandemic. A desktop-review was completed by the NIRB as an alternative to both the in-person Winter and Summer Site visit based on photos shared with the NIRB.

Following NIRB's completion of the desktop-based 2021 winter update review, Monitoring Officers concluded that Baffinland appears to be compliant with the majority of terms and conditions contained within PC No. 005. Consistent with conclusions made in 2020, NIRB reiterated that *"From the photos and text provided, Baffinland appears to have a well-managed and well maintained site with adequate environmental protection measures in place where necessary and is beginning preparations for the spring melt. NIRB's Monitoring Officers intend to follow up on applicable Terms and Conditions once it is safe for in-person site-visits to resume"* (NIRB, 2021b).

Following NIRB's completion of the desktop-based 2021 summer update review, Monitoring Officers concluded that *"from the photos received, the site appears to be generally in compliance with the Terms and Conditions of the Project Certificate 005, Amendment 3. The equipment on-site looks well maintained and waste generated by the Project seems appropriately managed and segregated into its suitable location"* (NIRB, 2021c).

A summary of the conclusions from these desktop reviews, in addition to general performance related to the PC No. 005 is also provided in the 2020 to 2021 NIRB Annual Monitoring Report and the Board Recommendations report (NIRB, 2021a), further described below.

5.2 COMMENTS ON THE 2020 ANNUAL REPORT TO THE NIRB

Baffinland submitted its 2020 Annual Monitoring Report (the 2020 Annual Report; Baffinland, 2021f) to the NIRB on May 6, 2020. The NIRB subsequently sent a notification to its Mary River Distribution List on May 10, 2021 indicating that the report was now accessible on NIRB's online public registry and requested comments from all interested parties with respect to their jurisdiction and/or area of expertise by June 24, 2021. Following a request from CIRNAC, an extension for reviewers to provide comments was granted by the NIRB to July 6, 2021.

Subsequently, on July 13, 2021, the NIRB provided Baffinland with comments submitted by QIA, GN, CIRNAC, ECCC, DFO, PCa, TC and ON on its 2020 Annual Report. NIRB requested that Baffinland provide a response to reviewer comments to the NIRB by August 13, 2021.

In Baffinland's response to the NIRB regarding comments received on the 2020 Annual Report, Baffinland provided itemized responses to 192 comments received, where applicable, from QIA (114), GN (3), CIRNAC (10), ECCC (2), DFO (55), PCa (4), and ON (4). As part of its responses to reviewer comments, Baffinland also provided the following considerations to NIRB in light of comments received:

- Comments from the GN included those based on a review of the Draft 2020 Terrestrial Environment Annual Monitoring Report that was sent to the Terrestrial Environment Working Group (TEWG) for review, but not included as part of Baffinland's Annual Report to the NIRB.
- Several comments from the QIA and ON were provided in relation to the Phase 2 Proposal. As the Board's assessment of the Phase 2 Development proposal is in the decision-making process and currently waiting for the Public Hearing proceedings to resume, Baffinland did not provide a response to those comments.
- Comments from DFO, QIA, PCa, and ON suggested that the exclusion of the draft marine and terrestrial monitoring reports provided to the Marine Environment Working Group (MEWG) and TEWG from Baffinland's Annual Report to the NIRB limits a fulsome review of the information presented in the Report. Baffinland notes, however, that Baffinland's terrestrial and marine mammal monitoring programs are detailed and extensive and that the current timelines to produce reports far exceed what any other organization that performs similar work in the area is able to accomplish. Baffinland is willing to continue to work with the Working Groups on the timing of the release monitoring reports through updates to the Terms of Reference, but any timeline must consider what is reasonably possible given the scope of Baffinland's current monitoring programs. Further, Baffinland provides a summary of the marine and terrestrial monitoring programs, where relevant, in relation to each Term and Condition included in the Project Certificate (explained further below). As the NIRB Annual Report is meant to report on the Projects status against the Terms and Conditions set forth in the Project Certificate, the level of detail provided is consistent and sufficient for these purposes. On top of annual reporting to the NIRB, there is a secondary process and opportunity for Working Group members to provide their comments on the detailed monitoring reports.
- Choosing to include or not include the draft marine or terrestrial monitoring program reports as an Appendix to the Annual Report does not mean the Annual Report to the NIRB is absent of the results for each of these programs. The Annual Report to the NIRB provides details on the methodology, trends and results of each of these monitoring programs, and is written with the express intent to make the details of these monitoring programs accessible to a less technical audience and to allow for the NIRB to provide guidance on Baffinland's operationalization of the Terms and Conditions of the Project Certificate. Baffinland further notes that there were no Parties who submitted comments on the Annual Report to the NIRB that did not have concurrent access to the draft marine and terrestrial monitoring reports while preparing their comments for the NIRB by way of membership in the MEWG and TEWG. Baffinland maintains that the MEWG and TEWG are the appropriate forums to facilitate the review of the detailed technical reports which substantiate the information included in Baffinland's Annual report to the NIRB. Baffinland therefore wishes to confirm to NIRB that no Party that opted to provide comments to the NIRB for their consideration was excluded from being able to do so on any report of relevance.
- A summary of the marine monitoring reports has been available to the public on the NIRB registry since early April 2021. Baffinland has engaged Parties, including communities, directly on these results, and used feedback, notably from the Hamlet of Pond Inlet and the Mittimatalik Hunters and Trappers Organization (MHTO) to inform the Company's adaptive management response for the 2021 shipping season. The timing

of the delivery of these reports has in no way limited Baffinland from engaging with Parties on the results and seeking input on adaptive management measures for our 2021 operations.

Baffinland also offered the following suggestions to the NIRB, which it believes will assist in the efficient and timely response to comments received on the annual monitoring report.

- Comments were provided from Parties in several different formats. It would be beneficial if in future years the NIRB provided further guidance to Parties on how comments and recommendation should be formatted to ensure they are focused on the key areas that NIRB is seeking feedback on.
- In future years, the NIRB should continue providing guidance to Baffinland on the scope of comments that require responses from interested Parties.

5.3 NIRB'S ANNUAL MONITORING REPORT AND BOARD RECOMMENDATIONS

On October 27, 2021 the NIRB issued its 2020 to 2021 Annual Monitoring Report for Baffinland Iron Mines Corporation's Mary River Project and the Board's Recommendation (NIRB, 2021a). As stated by the NIRB, in October 2021, the Board motioned to issue six (6) recommendations meant to assist Baffinland in achieving compliance with the Project Certificate and to ensure the NIRB has all information necessary to fully execute its mandate under the Nunavut Agreement and *NuPPAA* as it pertains to the Project.

The Board Recommendations focused on the following key areas:

1. Operationalisation and function of the Marine and Terrestrial Environmental Working Groups
2. Biofouling Monitoring Program Alternatives
3. Engagement with the MEWG on the development of additional Early Warning Indicators
4. Dust Monitoring and Mitigation

Baffinland's responses to the Board's 60 and 90 day recommendations were provided December 16, 2021 and January 28, 2022, respectively. These responses, and other recommendations which requested that additional information be supplied in Baffinland's 2021 Annual Report to the NIRB can be found in Appendix E.

6 MANAGEMENT PLAN UPDATES

Table 6.1 provides an extensive list of all the Management Plans for the Project.

Table 6.1: Current List Environmental Monitoring and Management Plans

Document Number	Plan Name	Current Revision Date
BAF-PH1-300-P16-0002	Snow Management Plan	Mar-22
BAF-PH1-830-P16-0001	Sampling Program - Quality Assurance and Quality Control Plan	Mar-22
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan	Apr-21
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan	Mar-14
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	Mar-16
BAF-PH1-830-P16-0008	Environmental Protection Plan	Apr-21
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan	Mar-22
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan	Mar-22
BAF-PH1-830-P16-0012	Interim Closure and Reclamation Plan	Oct-18
BAF-PH1-830-P16-0013	Oil Pollution Emergency Plan - Milne Inlet (OPEP)	May-21
BAF-PH1-830-P16-0017	Q1 Quarry Management Plan	May-19
BAF-PH1-830-P16-0023	Roads Management Plan	Feb-20
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan	July-21
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	Mar-16
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystems Management Plan	Mar-21
BAF-PH1-830-P16-0027	Terrestrial Environmental Management and Monitoring Plan	Mar-16
BAF-PH1-830-P16-0028	Waste Management Plan	Mar-20
BAF-PH1-830-P16-0029	Phase 1 Waste Rock Management Plan	Jun-20
BAF-PH1-830-P16-0030	Borrow Source Management Plan – Kilometre 2	Oct-14
BAF-PH1-830-P16-0031	Life of Mine Waste Rock Management Plan	Apr-14
BAF-PH1-830-P16-0032	Borrow Source Management Plan - Kilometre 97	Oct-14
BAF-PH1-830-P16-0035	Borrow Source Management Plan - Kilometre 104	Mar-14
BAF-PH1-830-P16-0036	Spill Contingency Plan	Feb-21
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan	Jan-21
BAF-PH1-830-P16-0038	Exploration Closure and Reclamation Plan	Jan-21
BAF-PH1-830-P16-0039	Aquatic Effects Monitoring Plan	Mar-22
BAF-PH1-830-P16-0040	QMR2 Quarry Management Plan	Jul-21
BAF-PH1-830-P16-0041	Polar Bear Safety Plan	Mar-16
BAF-PH1-830-P16-0042	Spill at Sea Response Plan	Aug-15
BAF-PH1-830-P16-0046	Marine Environmental Effects Monitoring Plan	Mar-16
BAF-PH1-830-P16-0047	MDMER Emergency Response Plan	Dec-20

Document Number	Plan Name	Current Revision Date
BAF-PH1-830-P16-0050	Ballast Water Management Plan	Mar-19
BAF-PH1-830-P16-0056	Diesel Environmental Emergency (E2) Plan - Milne Port	Feb-20
BAF-PH1-830-P16-0057	Diesel Environmental Emergency (E2) Plan – Mine Site	Feb-20
BAF-PH1-830-P16-0058	Oil Pollution Prevention Plan - Milne Inlet (OPEP)	May-21
BAF-PH1-840-P16-0002	Emergency Response Plan	Dec-20
H349000-3000-07-245-0001	Q7 Quarry Management Plan	Oct-13
H349000-3000-07-245-0002	Q11 Quarry Management Plan	Oct-13
H349000-3000-07-245-0003	Q19 Quarry Management Plan	Oct-13
H349000-4200-07-245-0001	D1Q1 Quarry Management Plan	Oct-13
H349000-4200-07-245-0002	D1Q2 Quarry Management Plan	Oct-13

Baffinland's Environmental Management Plans relevant to the Annual Report are available on the document web portal: <https://www.baffinland.com/media-centre/document-portal/>.

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