



Mary River Project—Phase 2 Proposal

Addendum to the Final Environmental Impact Statement

Baffinland Iron Mines Corporation | NIRB File No. 08MN053

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EXECUTIVE SUMMARY

1 PROJECT SUMMARY

The Mary River Project is an operating iron ore mine located on northern Baffin Island, in the Qikiqtani Region of Nunavut, in the Canadian Arctic. Baffinland Iron Mines Corporation (Baffinland) is the owner and operator of the Project. Baffinland's initial Project consisted of mining iron ore from the reserve at Deposit No. 1 at a production rate of 18 Million tonnes per year (Mt/a) and constructing a railway to transport the ore to market via a port at Steensby Inlet. The Nunavut Impact Review Board (NIRB) issued Project Certificate No. 005 for this Project on December 28, 2012.

In 2013-2014, Baffinland prepared an addendum to the final environmental impact statement (FEIS) for the Project and the Project Certificate was subsequently amended to include the mining of an additional 4.2 Mtpa of ore, trucking this amount of ore by an existing road (the Tote Road) north to a port at Milne Inlet. The total approved iron ore production was increased to 22.2 Mtpa (4.2 Mtpa transported by road to Milne Port, and 18 Mtpa transported by rail to Steensby Port). This is now considered the Approved Project. The 18 Mtpa Steensby rail project has not yet been constructed, however 4.2 Mtpa of iron ore is currently being transported north by road to Milne Port.

The Addendum to the FEIS is part of the environmental assessment process established for a project under the Nunavut Land Claims Agreement. Under this environmental assessment process, the proponent of a project, such as the Mary River Project, describes the surrounding environment and the proposed development. Potential effects are then predicted and mitigation plans are developed. The severity or significance of residual effects (effects remaining after mitigation measures have been applied), are evaluated based on established criteria and expert opinion.

On February 3, 2017, Baffinland submitted the Phase 2 Proposal for conformity review to the NPC and an amendment to the North Baffin Regional Land Use Plan (Appendix P) was granted for the Northern Transportation Corridor on March 18, 2018. This corridor includes a 10 km corridor that includes the Tote Road and North Rail, and the marine shipping route, "the Mary River Transportation Corridor".

On April 23, Baffinland submitted a request to the NPC and NIRB to amend the North Baffin Regional Land Use Plan and Project Certificate No.005, respectively, to allow for a marginal increase in production and transportation of ore via the Tote Road through Milne Port from 4.2 Mtpa to 6.0 Mtpa (the Production Increase Proposal). This document is a request for an additional amendment (the Phase 2 Proposal). Phase 2 involves increasing the quantity of ore shipped through Milne Port to 12 Mtpa, via the construction of a new railway running largely parallel to the existing Tote Road (called the North Railway). The total mine production will eventually increase to 30 Mtpa, with 12 Mtpa being transported via the North Railway to Milne Port and 18 Mtpa transported via the South Railway to Steensby Port.

The Phase 2 Proposal builds on the extensive baseline studies and assessment carried out since 2011 for the larger Approved Project and is thus closely linked to the FEIS and previous addendums.

1.1 THE PROPONENT

Baffinland is owned by Nunavut Iron Ore Incorporated and Arcelor Mittal. While Nunavut Iron Ore has a majority stake in the company, the two companies have joint operational rights. Baffinland's head office is located in Oakville, Ontario, Canada. In addition to its head office, Baffinland maintains a year-round presence at Milne Inlet, Mary River, and community liaison offices in Iqaluit, Igloolik, Pond Inlet, Hall Beach, Clyde River, and Arctic Bay. ArcelorMittal is one of Canada's leading suppliers of iron ore to steel markets around the world. Recognized for the excellence of its products, the skills of its employees and its leadership in the industry, ArcelorMittal is one of the world's largest steel companies, operating in more than 60 countries. The Company's engineering and environmental teams have a wealth of Arctic development experience. Baffinland is also developing key partnerships with companies who have specific northern experience, for example, in shipping and ice-breaking.

1.2 THE PHASE 2 PROPOSAL

With the introduction of the Phase 2 Proposal, the Mary River Project will allow Baffinland to transport by rail and ship up to 12 Mtpa of ore from Milne Port, and to retain the current authorizations for the construction and operation of the Steensby Port and South (Mine to Steensby) Railway as proposed in 2012. The total mine production will eventually increase to 30 Mtpa, with 12 Mtpa being transported via the North Railway to Milne Port and 18 Mtpa transported via the South Railway to Steensby Port.

The additional or new facilities and activities required at each of the Project Sites for the implementation of Phase 2 are located at Mine Site, the Northern Transportation Corridor, and at the Milne Port.

For the Mine Site, the Project Development Area (PDA) defined in 2012 remains unchanged. However, some infrastructure within the PDA will be re-arranged in order to accommodate the construction of the North Railway line, support the increase in mine production and the construction of the northern section of the Steensby Railway. The Tote Road alignment will remain unchanged, some upgrades and minor realignments will be required to facilitate railway crossing.

The North Railway line will be 110 km in length, from the loading station at the Mine Site to the unloading station at Milne Port. For most of the length, the railway embankment will be constructed adjacent to the Tote Road. However, due to the steep topography, a 20 km section of the railway will deviate from the Tote Road alignment.

In order to accommodate the shipment of 12 Mtpa and the North Railway operation, the Milne Port PDA must be expanded. This will also involve upgrading or adding additional infrastructure at Milne Port, including a second ore dock. Shipping at Milne Port will continue to occur during the open water season, and may extend into periods when the landfast ice is not being used to support travel and harvesting by Inuit, up to November 15 of each year. Shipping transits will increase as will the size of a portion of the fleet of vessels that previously called on Milne Port.

Baffinland is investigating power alternatives through the proposed development of wind turbines; sites are being investigated near Milne Port, along the Tote Road, and close to the mine site. Locations will be chosen based on environmental and operational constraints, for the development of 2 sites – and the installation of a single turbine at each.

The South Railway operation will be constructed as soon as economically viable. Eventually total mine production will reach 30 million tonnes per year to accommodate the 12 million tonnes per year for the North Railway operation and the approved 18 million tonnes per year South Railway operation.

1.3 NEED FOR THE PROJECT

The world needs iron ore to continue to build and develop the materials our society uses every day. Global iron ore demand is expected to increase as countries such as China, India, and other emerging areas continue to grow and develop while the economies of western countries continue to grow. Baffinland proposes to develop the Project to supply high quality iron ore to world markets and provide acceptable profits for its investors. Expansion of the Project as contemplated by the Phase 2 Proposal is a necessity for Baffinland to continue to operate and provide benefits to Inuit, the public, local and regional Inuit organizations and hamlets, the Government of Nunavut, Federal agencies, and other interested parties.

For the people of Nunavut, the Project will continue to contribute to the development of infrastructure, skills, jobs, business opportunities, and will provide increased revenues to the Government of Nunavut and the Inuit birthright corporation (Nunavut Tunngavik Inc.). The Project is expected to bring benefits to local communities by providing an economic base and diverse range of employment options in a manner that is amenable to the continued practice of the traditional lifestyles of Inuit.

The renegotiation of the Inuit Impact and Benefits Agreement (IIBA) between Baffinland and the Qikiqtani Inuit Association (QIA) will describe how benefits from the Project flow to nearby Inuit communities and the Qikiqtaaluk Region of Nunavut. The development of the Project is consistent with the Nunavut Planning Commission's broad planning principles, policies, and goals as well as the Government of Nunavut's strategy for mining development, Parnautit. Overall, the Project should help to attract additional investment to a region with historically and comparatively low levels of developments.

The Project will also contribute to strengthening Canada's sovereignty in the North, protecting the country's environmental heritage, promoting economic and social development in the region, and improving Northern governance.

1.4 PROJECT DEVELOPMENT APPROACH

Baffinland will carry out the Phase 2 Proposal in an environmentally and socially responsible manner. The needs and values of Inuit will be respected throughout development and operation of the Project. Baffinland will comply with Nunavut and federal regulatory requirements. Where economically and technically feasible Baffinland will apply technically proven and cost-effective environmental protection measures. Baffinland's decision-making is guided by sound management principles where the sequence of "Policy – Planning – Implementation and Operation – Checking and Corrective Actions – Management Review" are systematically followed. At each of these stages community involvement is an important part of the process. An approach that emphasizes learning as you verify the effects of actions allows Baffinland to continuously improve and adapt quickly to changing conditions. Baffinland is committed to precaution to avoid and/or reduce potentially adverse effects of its operations to ensure the safety of its employees, the well-being of the residents of Nunavut, and the protection of the natural environment.

Baffinland has adopted progressive employment and business principles that will guide the Company through the life of the Project. Safety for employees is a cornerstone of all decisions. Baffinland provides a work environment that attracts, develops, and retains qualified personnel and maximizes Inuit participation. The company hires employees from the five communities closest to the Project (Igloolik, Pond Inlet, Clyde River, Arctic Bay, and Hall Beach). Baffinland works closely with the Qikiqtani Inuit Association (QIA) and others to deliver necessary training to employees and support community programs which increase the benefits of the Project and provides local residents with skills that continue to be important for them beyond the life of the Project. For example, Baffinland and QIA have partnered in the development of a \$19 million Qikiqtani Skills and Training for Employment Partnership (Q-STEP) training program.

While overall employment levels will be reduced marginally, they remain similar to those projected for the Approved Project. Furthermore, several new opportunities may be created because of the Phase 2 Proposal, from the new types of employment opportunities created (e.g. additional construction, port, shipping, and rail-related employment), and the opportunities for individuals to pursue career options in these and other areas.

All workers will be transported to and from the Mine Site by air. Ground transportation from the Mine Site will be provided for workers based at Milne Port. To achieve this goal, Baffinland is committed to covering all costs associated with flights, hotels, and meals related to travel for Baffinland employees from the Qikiqtani region to an existing pick-up point for the Mary River Mine. The existing pick-up locations are: Arctic Bay; Clyde River; Hall Beach; Igloolik; Iqaluit; and Pond Inlet.

1.5 PROJECT SCHEDULE AND PROJECT LIFE

Construction of the North Rail will commence in late 2019 once the Project Certificate is amended and issued by the NIRB, and subsequent permits, licenses, and approvals are issued. Completion of construction of the North Rail is expected by 2020. Shipping from Milne Port will increase to 12 Mtpa by 2020. Construction of the South Railway and Steensby Port will commence in 2021 with shipments of 18 Mtpa from Steensby Port beginning in 2025.

1.6 HIGHLIGHTS OF THE PHASE 2 PROPOSAL

Milne Port, the Mine Site, the Northern Transportation Corridor, and Shipping along the Northern shipping route are the four major Project components in the Phase 2 Proposal. The Phase 2 Proposal will involve the following additional facilities and activities:

Milne Port:

- Construction and operation of a second ore dock capable of berthing Cape-size ore carriers;
- Expansion of ore handling and stockpiling facilities;
- Railway and ore unloading infrastructure;
- A new ore crushing facility that will be indoors to reduce dust;
- An expanded camp and related facilities;
- An expanded power plant and installation of a wind turbine;
- A landfill;
- Increased shipping activities at the Port; and
- Increased shipping through Milne Inlet.

Mine Site:

- Increasing the mining rate to 12 million tonnes per year for transportation to Milne Port via the North Rail;
- Additional rail loading facilities for the North Railway;
- An expanded fuel tank farm;
- Installation of a wind turbine; and
- Expanded mine maintenance facilities and support administration buildings/facilities (warehouses, shops, etc.)

Mary River Transportation Corridor (Tote Road and North Railway):

- Construction of the railway embankment and railway;
- Construction of water crossings (4 bridges and 417 culverts);
- Construction and use of multiple laydown areas (up to 14), shelters and small equipment shops at each laydown;
- Use of the laydown area at km 58 as for starting transfer from ore haulage to rail and for commissioning the constructed portion of the rail line
- Construction and operation of four temporary camp pads and two mobile camps;
- Construction of several level crossings for the Tote Road; and
- Development and closure of up to 40 quarries along the railway corridor.

Shipping:

- Shipping during , between early July to mid-November. ; and
- Increased shipping frequency during open water period.

1.7 ORE PRODUCTS

The Mary River iron ore is of a very high-grade, and there is no need to have additional processing beyond crushing and sizing. Crushing and screening of the ore produce two iron ore “products”:

- a lump ore product in which the pieces of ore are between 6.3 mm and 31.5 mm in size (about golf ball size), and
- a fine ore product, in which the pieces of ore are less than 6.3 mm in size (about pea size).

1.8 CLOSURE AND POST-CLOSURE

Throughout all phases of the Project, Baffinland will plan and conduct operations in a manner designed to return the Project sites to a safe and environmentally stable condition. Baffinland will undertake ongoing reclamation activities throughout the mine life. Temporary facilities required for the construction camps will be decommissioned and removed at the end of their useful life. Borrow areas, quarries, temporary roads and other disturbed sites will be stabilized to limit erosion of ground surfaces and rehabilitated once they are no longer required. Environmental and safety monitoring will continue as long as necessary.

1.9 POTENTIAL FOR FUTURE DEVELOPMENT

The Phase 2 Proposal is designed to increase the production and transportation of iron ore to 12 Mtpa through Milne Inlet via the North Rail. The 18 Mtpa through Steensby Inlet via the South Rail is already approved. Annual production rates and the life of mine will vary with factors such as market conditions, ore grades and unanticipated events. All Project sites are thus capable of accommodating additional stockpiles, material handling equipment and personnel.

As well, regional exploration has enabled Baffinland to identify additional iron ore deposits that appear, based on surface sampling, to be of similar high-grade iron ore as Deposit No.1. Deposits No. 2 and No. 3 are located adjacent to Deposit No. 1 and have been investigated (drilled) more extensively than the other deposits. Given their close proximity to the current mine site, it is expected that these deposits will be developed either prior to or following exhaustion of ore in Deposit No. 1, utilizing much of the same Project infrastructure. Having the mine and associated shipping, road, and railway infrastructure in place will facilitate such future development in the region.

2 COMMUNITY INVOLVEMENT

There has been ongoing and extensive consultation with many communities and organizations that have an interest in the Project. Engagement has included the public, local and regional Inuit organizations, territorial and federal government departments and agencies, and other interested groups. There has been a particular focus on the predominantly Inuit communities near the Project sites.

Inuit of the Baffin Region enjoy a rich oral tradition and this has influenced how Baffinland has engaged local communities. The company has focused on establishing a presence in the region through local Community Liaison Officers, holding numerous face-to-face meetings with community members and arranging site tours when possible. With the dominant language through the north Baffin region being Inuktitut, and a number of regional dialects existing within the area, translation using local interpreters has been an important element in supporting effective communication. In all instances, detailed records are prepared for the various meetings and other in-person discussions.

There have been specific efforts at assembling, recording and integrating traditional knowledge into project design decisions. Inuit knowledge of the area is extensive and extremely valuable especially when integrated into scientific studies and understanding.

In addition, community acceptance and preferences were important factors considered in the evaluation of project alternatives such as the use of Milne Inlet, the location of Steensby Port, the shipping route in Foxe Basin and the work rotation schedule.

For the past two years, the engagement program has included considerable consultation related to the Phase 2 Proposal, including the identification and discussion of topics of interest and concern regarding the proposal and potential effects. The Phase 2 Proposal has been guided by the views and perspectives raised during ongoing regulatory, community, and stakeholder engagement initiatives.

Baffinland will continue to pursue a vigorous approach to engagement with Inuit, the public, local and regional Inuit organizations and hamlets, the Government of Nunavut, Federal agencies, and other interested parties, through meetings, workshops, surveys and dissemination of information via newsletters and internet. In this way, the communities, QIA, regulators and the public are informed in a timely and culturally sensitive manner of the Project's progress and the potential environmental and social impacts of ongoing operations. Baffinland has specifically committed to return to the five (5) North Baffin communities to provide further and more detailed information in relation to the Phase 2 Proposal, and associated regulatory processes. Baffinland will continue its engagement activities and comply with the terms and conditions of the Project Certificate and the IIBA.

3 PROJECT SETTING

3.1 PHYSICAL SETTING

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

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

Air quality is very good and noise levels are low in the Project area as is typical of a remote environment. Freshwater quality measurements in the Mary River area indicate naturally elevated concentrations of dissolved oxygen, aluminium, and iron. As well, significant dissolved solids lead to increased turbidity of the water. Some average values for pH, as well as cadmium and mercury in the fresh water environment are currently greater than levels recommended by the guidelines of Canadian Council of Ministers of the Environment.

3.2 BIOLOGICAL SETTING

The Project is situated in the Northern Arctic Ecozone. The climate is semi-arid and permafrost coverage is continuous extending to a depth of 500 metres, with an active layer of up to 2 metres. The extremely cold temperatures of the region, combined with the permafrost, result in a short period of runoff that typically occurs from June to September. All rivers and creeks, with the exception of the very largest systems, freeze completely during the winter months. Due to the combination of low temperatures and the low capacity of the soil to hold moisture, vegetation is minimal and surface water is abundant. The region is dotted with thousands of small lakes and streams.

Plant life is relatively sparse in much of the Project area and is generally consistent with the plants that usually occur in arctic regions. No plant species considered to be "rare" in Canada were found to occur in the survey locations.

Terrestrial mammals in the region include barren-ground caribou of the North Baffin herd, wolf, arctic and red fox, ermine, arctic hare, and lemmings. Marine mammals are found in abundance in the region, including polar bears, narwhals, beluga whales, bowhead whales, several species of seals, and walrus. Killer whales and northern bottlenose whales have been found in small numbers.

North Baffin caribou are currently present at low densities and their numbers seem to vary in accordance with a 60- to 70-year cycle. The last period of caribou abundance in the area was 1980 to 2000, and the previous period of low abundance was in the 1940s. Caribou are expected to remain at low numbers for the next couple of decades. However, there is evidence that caribou do occur throughout the entire region. While some populations of caribou migrate between preferred habitats in summer and winter, North Baffin caribou appear to be non-migratory and are likely to be found relatively equally in many locations throughout the Project area.

Migratory bird species observed in the Mary River area include snow geese, ducks, eiders, loons, and mergansers. Raptors found include rough-legged hawks, peregrine falcons, gyrfalcons, and snowy owls. Relatively low densities of songbirds and shorebirds were recorded throughout the region. There are also numerous sea birds in the area of the shipping route including thick billed murres and many types of gulls.

There are two fish species in the freshwater environment: arctic char and a minnow species named nine-spine stickleback. The inland waters near the Project mainly contain landlocked arctic char, though sea-run char are present in a lake next to Steensby Port and up the Cockburn River system next to a portion of the railway. Fish in the marine waters include arctic char, sculpin, and Atlantic lumpfish at Steensby Inlet, and Arctic char, sculpin and Greenland cod at Milne Inlet.

3.3 SOCIO-ECONOMIC SETTING

The Baffin Region of Nunavut has a rich and visible archaeological heritage dating back many thousands of years. There are many archeological sites with varying degrees of importance that have been found in the project area, particularly around Milne Port and Steensby Port but also along some sections of the rail line.

The five communities of the north Baffin region in the immediate vicinity of the Mary River Project, listed alphabetically, include Arctic Bay (280 km), Clyde River (415 km), Hall Beach (192 km), Igloolik (155 km), and Pond Inlet (160 km). Each of these communities has long term social, economic and environmental ties to the Project area. For many of these North Baffin households, harvest of country food provides an important contribution to their overall well-being, both physical and cultural. In all five communities, caribou, ringed seal, and arctic char are of major importance. In addition, walrus is a significant species in Hall Beach and Igloolik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet, and to a lesser degree, Clyde River.

The land-based economy is a major part of the livelihoods of many residents of the North Baffin. Harvesting from the land and sea produces food worth between \$12 million and \$20 million per year in this region. The amount of work to harvest this food is estimated to be 350 full-time jobs. In addition, residents of the region earn money through sales of arts and crafts, through employment, and from various government social programs such as Income Support.

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. In particular, initiatives such as residential schools, have affected family integrity and by implication, social cohesion. Elders are becoming increasingly engaged in community life and in promoting the learning of traditional culture for the younger generation. At the same time, a shift toward western middle-class expectations appears to be taking place among Inuit youth. These communities have experienced dramatic population growth over the last 20 years. Over 70 % of the population is under the age of 25. Underemployment and lack of opportunities are contributing to social stress.

Demand amongst residents for wage employment is very high, however, job opportunities in the North Baffin are limited. Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-time work would pay, and a small number earning full-time, year-round incomes. Most residents working in full-time jobs in Iqaluit do so year-round. In North Baffin, many more full-time workers are engaged in these jobs for only short periods. Women who work full-time jobs in North Baffin are more likely to work year-round than are men.

Still, there are good-paying, full-time, year-round employment opportunities available. These are often with the territorial or municipal government and require levels of education and kinds of experience that many residents do not have. Community Elders recognize that the communities need to position themselves to enter the wage economy.

The number of jobs occupied by women has generally increased at a greater pace than those occupied by men. However, women in the region are working mostly in the public sector. The past public sector growth is not likely to continue and this suggests that as young women start to look for employment, they may need to find work in sectors not traditionally filled by women.

Approximately one-in-five jobs in North Baffin and Iqaluit require a university education. One-quarter to one-third of jobs in the region require college or apprenticeship levels of training and skills. A similar number require high school education and/or occupation-specific training. The remainder can be accessed by unskilled workers with on-the-job training. The opportunities for employment are much more limited for those who do not have good education or training.

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

The North Baffin has seen some resource development in the past including the operation of the Polaris and Nanisivik mines. Panarctic Oil was also responsible for extensive petroleum exploration in the 1970's and even developed commercial production at the Bent Horn project. More recently mineral and petroleum exploration in the area have wavered and disappeared, respectively. The Mary River project is the only operating mine in the eastern Arctic and only a few other companies are running small exploration projects in any given year.

4 PROJECT INTERACTIONS AND EFFECTS ON VECS AND VSECS

Public consultation has enabled Baffinland to identify the key interests and concerns of the communities and stakeholders of the Project. These areas of focus are identified in the EIS as the "valued ecosystem components (VECs)" and "valued socio-economic components (VSECs)" of the Project.

4.1 Valued Ecosystem Components

The VECs include both the natural environment and the wildlife that depends on the health of that environment. The VECs can be grouped in theme areas related to key components of the environment. Significant indicator species were identified and provided a focus for the assessments.

Atmospheric Environment – Climate change; Air quality; Noise and vibration.

Land Environment – Landforms, soil and permafrost; Vegetation; Terrestrial wildlife and habitat; Birds.

Freshwater Environment – Surface water and sediment quality; Water quantity; Freshwater fish, fish habitats and other aquatic organisms.

Marine Environment – Sea ice; Marine water and sediment quality; Marine habitat and biota; Marine mammals.

4.2 Valued Socio-economic Components

The VSECs are related to the well-being of the people, their communities and the overall social and economic health of the area.

People: Population demographics; Education and training; Human health and well-being.

Community: Community infrastructure and public service; Cultural Resources; Resources and land use; Governance and leadership; Livelihood and employment; Cultural well-being.

Economy: Economic development and self-reliance; Contracting and business opportunities; Benefits, taxes and royalties.

4.3 VECs and VSECs Interaction with the Project

Through the review process the interactions of the Phase 2 Proposal with the various VECs and VSECs were identified and where appropriate, key indicator species were identified and analyzed. Extensive studies combined with traditional knowledge were used to establish the pre-Project conditions. Using scientific understanding, experience from past developments and traditional knowledge, predictions are made on the effects of various interactions. Where negative Phase 2 Proposal interactions could not be avoided, plans were developed to minimize or offset these effects. Mitigation measures are systematically addressed in the residual effect table.

Taking into account the adjustments and mitigation measures included in the Phase 2 Proposal to limit negative effects, residual effects of the Project were then assessed for their significance on the biophysical and socio-economic environments. This Phase 2 Proposal presents the outcomes of these assessments. A summary by theme area follows.

4.3.1 Project Effects on VECs

The Phase 2 Proposal design sought to minimize the interactions of the Project with the natural environment and to implement measures to minimize the potential negative effects of interactions. With these measures in place, the effects of the Phase 2 Proposal on the natural environment overall was assessed as not significant. The following sections summarize key project interactions and mitigation measures that will be implemented.

Atmospheric Environment - Climate change; Air quality; Noise and vibration

Climate change is predicted to have little effect on the very cold and deep permafrost conditions in the area over the planned life of the Approved Project. The Phase 2 Proposal facilities will also be designed to account for any changes in site conditions induced by climate change. The Phase 2 Proposal activities will produce Greenhouse gases. Releases of Greenhouse gases from the Project are anticipated to be small in comparison to Nunavut and Canadian totals and the Phase 2 Proposal will reduce current emissions by use of rail over road ore transport. Greenhouse gas releases will not have a measurable effect on global climate change.

Ore handling, as well as driving on access roads, and emissions from power plants, trucks, and camp incinerators will affect air quality through the generation of particulates and other gaseous emissions. The use of low-sulphur arctic diesel fuels and ensuring modern emission controls on equipment will reduce these emissions. As well, air pollution controls such as dust suppressants will prevent significant effects on air quality. Once the railroad is constructed and operating, it will replace trucking as the method of transporting the ore from the mine to the port, and dust emissions from ore transportation will be reduced. With the Phase 2 Proposal, secondary crushing will be moved from the Mine Site to Milne Port, where it will be enclosed, reducing dust emissions.

Phase 2 Proposal activities will increase noise levels but these will be limited to areas close to the activities. As well, the use of mufflers and regular maintenance of engines and equipment will prevent significant noise levels.

Land Environment: Landforms, soil and permafrost; Vegetation; Terrestrial wildlife and habitat; Birds

Sensitive landforms in the Project area include frozen soils that contain ice lenses or areas that could shift under pressure. Sensitive landforms will be avoided or appropriate engineering designs will be used to protect the sensitive areas. During site preparation adequate drainage to prevent water pooling during thaw periods will be used.

The design of all Phase 2 Proposal facilities minimizes the amount of land that the Project needs to disturb. Thus the amount of vegetation that is affected is minimal compared to the amount of vegetation cover in the North Baffin. Numerical modelling was done to predict the amount of dust that could settle on the vegetation in the area and these studies concluded that the dust suppression actions would prevent impacts on plants.

Caribou are the main indicator species used to assess potential effects on terrestrial animals. The main project interaction with caribou would be when caribou cross the road or rail lines. Although it is possible that individual caribou could be involved in collisions with trains or trucks, these numbers are expected to be limited and will not be significant compared with total numbers in the region. Several measures are in place to avoid collisions with caribou. Strict speed limits will be in place for trucks and trains, thus decreasing the probability of collision. Trucks will be required to stop if wildlife is observed on or next to the road. No sightings have been made at the Project sites.

There are many birds through the region and a small amount of habitat loss for migratory birds is expected to result from Phase 2 Proposal activities. These are not expected to lead to effects on populations of key species such as peregrine falcons, snow geese, eiders, and loons. Prior to initiating Phase 2 Proposal activities, nests and nesting areas will be identified and mitigation will be implemented to avoid direct effects to birds and bird habitat.

Freshwater Environment – Surface water and sediment quality; Water quantity; Freshwater fish, fish habitats and other aquatic organisms

A number of proven mitigation measures have been included in the Phase 2 Proposal to reduce potential effects on water quality, freshwater fish, fish habitat, and other aquatic organisms. Specific Management Plans detail the many ways that water will be protected.

Water use will be reduced to the minimum necessary and all used water will be tested and if required treated before it is released back to the environment. Sewage treatment facilities will ensure that all discharged water satisfies established standards. Run-off water from fuel storage and maintenance facility areas will be contained and wastewater from truck and rail maintenance facilities and explosives equipment-washing facilities will meet established standards before being discharged to the natural environment. An Emergency and Spill Response Plan will be in place and will ensure that there is prompt and appropriate clean-up of any spills should they occur.

In response to the non-compliant discharges from the Waste Rock Facility (WRF) in 2017, Baffinland has taken multiple corrective actions to prevent additional non-compliant discharges from the WRF and retained Golder Associates (Golder) to determine the appropriate corrective actions required to address the seepage observed at the WRF in 2017 and investigate the potential for ARD and develop mitigation measures, as required. Actions planned for 2018 include installing a water treatment system to manage captured runoff at the WRF pond, upgrading the WRF pond to address seepage and expand capacity and updating the Interim Waste Rock Management Plan. The revised plan will outline the management of waste rock and surface water at the WRF for the next five years and will incorporate geochemistry data collected during field programs in 2018, updated water quality modelling results and lessons learned from the 2017 events

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the potential for ARD and develop mitigation measures, as required. Actions planned for 2018 include installing a water treatment system to manage captured runoff at the WRF pond, upgrading the WRF pond to address seepage and expand capacity and updating the Interim Waste Rock Management Plan. The revised plan will outline the management of waste rock and surface water at the WRF for the next five years and will incorporate geochemistry data collected during field programs in 2018, updated water quality modelling results and lessons learned from the 2017 events

The Tote Road and North Railway, crosses a large number of watercourses and a portion of these contain fish habitat. New bridges will be constructed, and many culverts will be replaced and will be designed to limit barriers to fish movement. A habitat compensation plan is included as part of the assessment.

Marine Environment – Sea ice; Marine water and sediment quality; Marine habitat and biota; Marine mammals

At Milne Port, near-shore, including port activities, will be carefully managed to protect the marine environment. All sewage and wastewater from maintenance facilities and explosive residues will be treated before discharge and runoff from port site areas will be contained and monitored for water quality before discharge. Ship to shore fuel transfers will take place following the *Canada Shipping Act* regulations.

Pile driving during construction at the Milne Port has the potential to create an acoustic disturbance, which could affect the marine environment. Mitigation will be used to dampen sound transmission and marine mammal monitoring to avoid pile driving when marine mammals are present. Auditory disturbances are not expected to affect marine biota and mammals at the population level.

Shipping from Milne Port will be mainly during the open water season, but will extend into the shoulder seasons when the landfast ice is not in use for travel and harvesting by Inuit. Ore carriers will carry ballast water during their inbound trips to Milne Port. This water is required in order to keep the vessels stable and at an even draft. Ballast water will be managed in accordance with the Canada Shipping Act and its regulations which require mid-ocean exchange of ballast water. The water is pumped overboard as the vessels approach Milne Port. Ballast water will only be slightly different (in temperature and salinity) from the water in the Inlet. Modeling has shown that discharge will not alter the quality of water in Milne Inlet. There is a concern that ballast water could result in the unintended introduction of invasive species. Adherence to strict protocols developed by regulatory agencies will mitigate this concern.

The key marine mammal species include narwhals, beluga whales, and bowhead whales. Effects of Phase 2 Proposal activities were assessed for these species as well as ringed seals, bearded seals and walruses.

There is potential for acoustic disturbance from ship noise along the Northern shipping route as well as vessel strikes on marine mammals which can cause serious injury or mortality through physical harm. With respect to the Northern shipping route, ringed seals, narwhal, beluga whales and bowhead whales may all be expected to encounter ship traffic in low to high frequencies. There have been no vessel strikes to date with marine mammals. Polar bears and walruses are infrequent along the Northern shipping route in the open water season and are, therefore, not expected to experience acoustic disturbances from ship noise or vessel strikes. Given the relatively low likelihood and short duration of encounters between marine mammals and vessel traffic, acoustic disturbances are not expected to affect marine mammals at the population level. To mitigate potential vessel strikes, the Phase 2 Proposal includes mandatory nautical instructions including reduced speed limits when transiting within Milne Port or along the Northern shipping corridor, and the maintenance of a constant course and speed when in transit. Given the planned mitigation, and low likelihood for marine mammal vessel strikes, vessel strikes are not expected to affect marine mammals at the population level.

Ringed seals are present year-round along the northern shipping route, including the Milne Port site. Shipping and most construction activities at the Milne Port site will occur during the open-water period, which avoids pupping, nursing, mating, and moulting. Ringed seals are generally tolerant of industrial activity and shipping. The effects of Phase 2 Proposal activities on ringed seals are considered minor and are expected to occur in a localized area.

Bearded seals are expected to occur in small numbers along the northern shipping route during the open-water periods given that they predominately occur in areas of pack ice. Shipping during the Phase 2 Proposal does not overlap with bearded seal pupping and nursing. If bearded seals do occur along the northern shipping route or near the Milne Port, they may exhibit localized avoidance of shipping and construction activities. Given the small numbers of bearded seals expected to occur in Eclipse Sound and Milne Inlet, and the planned mitigation measures, predicted impacts are not significant.

Walruses may occur in small numbers along the northern shipping route during the open-water period. If walruses do occur along the northern shipping route or near the Milne Port, they may exhibit localized avoidance of shipping and construction activities. Given the small numbers of walruses expected to occur in Eclipse Sound and Milne Inlet, and the planned mitigation measures, predicted impacts are not significant.

Narwhals are present along the northern shipping route primarily during the open-water period when about 20,000 animals summer in the Eclipse Sound and Milne Inlet area. Narwhals are thought to calve and perhaps feed in this summering area. While there is little information on how narwhals respond to vessel traffic—there are relevant observations in the Milne Inlet area that indicated that narwhals exhibited variable responses to vessels (including the passage of an ore carrier, fuel tanker and sea lifts). Observations, including through the Bruce Head shore-based monitoring program, which involves local Inuit as observers, suggest that some narwhals may have left certain areas after a ship's passage but that others did not. It is predicted that narwhals will exhibit localized avoidance of ore carriers along the northern shipping route and vessel traffic in the Milne Port area. Potential effects are expected to be reduced by decreasing ship speed and hence, minimizing sound levels. Narwhals are predicted to habituate to repeat passages of ore carriers along the northern shipping route. Ongoing monitoring will be conducted to detect unexpected effects on narwhals and to identify any additional mitigation measures.

Beluga whales occur in relatively small numbers in Eclipse Sound and Milne Inlet during the open-water period. Beluga responses to vessels during periods of open water are variable, ranging from tolerance to avoidance, and likely depend on the type of vessel and its speed and course, and the whales' activity and previous exposure to industrial activity. It is likely that belugas will exhibit localized avoidance of ore carriers along the northern shipping route. Effects are expected to be reduced by decreasing ship speed. It is predicted that belugas will habituate to repeat passages of ore carriers along the northern shipping route. To address the uncertainty with this prediction ongoing monitoring will be conducted to detect unexpected effects on belugas and to identify any additional mitigation measures.

Bowhead whales regularly occur along the northern shipping route, and it is thought that this summering area is used for feeding. Behavioural responses to shipping activity by bowhead whales are variable and appear to depend on the whale's activity and the type of vessel. Based on previous studies, bowheads will likely avoid at least the immediate area around ore carriers and that effects can be minimized by reducing ship speed and by vessels maintaining a constant course and speed. It is predicted that bowheads will exhibit localized avoidance of ore carriers along the northern shipping route. It is predicted that bowheads will habituate to repeat passages of ore carriers along the northern shipping route. To address the uncertainty with this prediction ongoing monitoring will be conducted to detect unexpected effects on belugas and to identify any additional mitigation measures.

Polar bears occur along the northern shipping route throughout the year in relatively small numbers. Phase 2 Proposal activities will primarily occur during the open-water period and as such will not overlap with polar bear denning and mating. Bylot Island and coastal Baffin Island are used as summer retreats by polar bears. Polar bears are expected to avoid ships

and the port site; however, they may also approach these areas. Project personnel will be educated about bear safety and the strict management of waste will reduce the chances of human-bear interactions. Polar bear monitors will be hired to ensure worker safety.

4.3.2 Project Effects on VSECs

Introduction

The Phase 2 Proposal will provide many potential social and economic benefits to the residents of North Baffin. These will arise from employment and training opportunities as well as from opportunities for businesses and from payments made to government and Inuit organizations. Careful planning is needed in order to improve the ability of people to attain these opportunities. Individuals and families will also require support as they cope with the challenges associated with the fly-in/fly-out style of life and with the wealth and financial responsibilities that come with this lifestyle. The assessment of valued socio-economic components is an important way to identify issues and develop appropriate mitigation measures. Overall the Phase 2 Proposal represents important and significant socio-economic benefits to Nunavut.

People: Population demographics; Education and training; Human health and well-being

The potential for the Phase 2 Proposal to cause non-Inuit migration into communities, as well as the potential for Inuit to move out of the communities as a result of the Phase 2 Proposal was assessed. Neither of these possibilities is identified as significantly affecting the composition and numbers of the North Baffin populations or the community social fabric.

Baffinland's education and training commitments will help upgrade the skills of North Baffin residents. Baffinland is committed to supporting training programs that will enable residents of nearby communities to develop the skills needed to qualify and perform jobs at every level of the Phase 2 Proposal operation. Baffinland has been actively pursuing education and training partnership initiatives. Baffinland and the QIA recently developed the Q-STEP training program, a four-year initiative that will be undertaken by QIA in close partnership with Baffinland to provide Inuit with skills and qualifications to meet the employment needs of the Mary River Project as well as other employment opportunities in the region.

The Approved Project was predicted to deliver positive effects related to education and training through access to industrial work supported by pre-employment preparation and on-the-job training for young adults, incentives related to school attendance and success, and opportunities to gain skills. Monitoring supports that these predictions are being realized by individuals employed by the Project and their families (TSD-27). While the development of an adequately trained and skilled Inuit workforce will take time to achieve, Baffinland expects that training programs will eventually contribute to the development of a stronger local workforce and economy. Monitoring supports that these predictions are being realized by individuals employed by the Project and their families.

The rotation schedule is two weeks in two weeks outs. The challenges associated with fly-in/fly-out operation are recognized. Steps will continue to be taken to help workers and families to succeed in this type of work environment. Orientation and training will continue to be provided to help workers and families adapt to the work rotations and improve money management practices.

Concerns are sometimes raised about the potential effects of the Phase 2 Proposal or the Approved Project on the transport of illegal substances through Project sites and on the affordability of such substances. To counter the possibility of increased substance abuse the company has a strict no drug–no alcohol policy. Addiction counselling will also be available.

Community: Community infrastructure and public service; Cultural Resources; Resources and land use; Governance and leadership: Livelihood and employment; Cultural Well-being

The Project is expected to create competition for skilled workers. Hamlets have expressed concern that they may face difficulty in hiring the people they need to deliver local services. However, employment experience and ongoing training will significantly improve labour force capacity helping to equip local residents with the qualifications and experience. As a result, increased competition for workers will be balanced by increased capacity.

The Phase 2 Proposal will be making use of the public airstrips at Iqaluit and at the five nearest communities for transporting workers to and from worksites. The Phase 2 Proposal's transportation plans will be designed to avoid placing demands on the airport's facilities beyond its capacity. Some increased demand for infrastructure is also expected to arise indirectly due to the Phase 2 Proposal. For example, increased wealth might lead to more vehicles and a need for road improvements.

Education and training as well as on-the-job work experience and counseling will develop leadership skills that will significantly improve local governance. The participation of community residents and leaders in agreement negotiations with Baffinland and in initiatives to identify key indicators for regional monitoring programs has already contributed to local community leadership development.

Measures will continue to be taken to respect and preserve the culture of Inuit employees while they are working. Policies that encourage respect of other cultures and diversity are in place. Baffinland supports the use of Inuktitut onsite, for signage and in work units. Traditional country foods will be provided in the Project cafeterias. Policies encouraging safety, employment equity, and, preventing harassment will be strictly enforced.

Archaeological sites have been identified in Phase 2 Proposal areas that contain features and artifacts representing substantial degrees of area use throughout the human past to the present. A number of important archaeological sites will be avoided by relocating Phase 2 Proposal infrastructure, and others will require protection through excavation, mapping, and artifact retrieval by a licensed archaeologist.

The Phase 2 Proposal will interact with existing land uses by Inuit. Measures to support these activities include check-in procedures at Phase 2 Proposal sites and a focus on public safety for the Milne Inlet Tote Road.

Economy: Economic development and self-reliance; Contracting and business opportunities; Benefits, taxes and royalties

Direct and indirect economic growth generated by the Phase 2 Proposal will create new opportunities for employment and business. The Phase 2 Proposal will enhance labour force capacity and may increase Inuit business capacity. Businesses may gain opportunities to expand through the supply of business services to the Phase 2 Proposal as well as indirectly through an expanded market for consumer goods and services. Baffinland will help Inuit firms, and in particular smaller Inuit firms located in communities in the Baffin Region to develop capacity to bid on and carry out contracts for the Phase 2 Proposal.

The Phase 2 Proposal will provide substantial cash payments to Inuit organizations and to government. These will arise through the Inuit Impact and Benefits Agreement with QIA as well as through royalty payments for the iron ore made to NTI. Payments to the Government of Nunavut will arise from fuel taxes, property taxes, and taxes on the profits earned by Baffinland. Some of these payments will start as early as the construction phase, while other payments will not kick in until later in the operations phase.

Through its contribution to human skills, to household wealth and to economic growth, the Phase 2 Proposal will support achievement of overall economic development goals, including progress toward improved self-reliance of individuals, communities, and the territory.

5 ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

Baffinland is committed to protection of the health and safety of employees and the environment, and to ongoing community involvement and participation in the Phase 2 Proposal. The Phase 2 Proposal will meet or exceed the requirements of all applicable Nunavut and Canadian laws, regulatory requirements, agreements, permits, and licences.

Baffinland's Environment, Health, and Safety (EHS) Management System is the framework for adaptive management based on international best practices. The EHS embraces the Precautionary Principle and Sustainable Development. Within this framework, individual plans have been developed to address all aspects of the company's activities and contain the detailed mitigation measures and monitoring to be implemented throughout the life of the Project in order to eliminate, limit or minimize adverse effects. All Baffinland employees and contractors are required to comply with these management plans. The reporting and documentation requirements for these management plans, auditing, and process of management review and revisions are all specified in the EHS Management System.

The accountability for safety and environmental protection is shared among all employees and contractors and Baffinland is committed to providing the necessary training and awareness programs for effective implementation of its policies and management plans. These training programs will be documented, procedure manuals will be maintained, and retraining schedules will be established. Baffinland's Human Resource Management Plan outlines these commitments.

One of the key management plans is focused on Emergency Preparedness and Response. In the unlikely event that a major diesel fuel spill would occur along the shipping lane, such a spill would have a significant environmental effect. However, refuelling of fuel depots is a well mastered routine activity in Arctic communities. Furthermore, Baffinland will receive fuel only during the open water season. In order to respond to potential spill events along the shipping route, Baffinland has developed a Spill at Sea Response Plan and will draw on the expertise of OSRL to assist in spill management and clean up. OSRL is a leading world wide organization specializing in off shore spill response.

6 CUMULATIVE AND TRANSBOUNDARY EFFECTS

Consideration was given to potential cumulative effects from reasonably foreseeable projects. For the Approved Project, the main potential cumulative effects are thought to arise if development of the Mary River Project would lead to further iron ore production up to twice the currently proposed production rate. Other projects in the area will have only minor cumulative effects. A doubled production rate of one or more other deposits would increase effects to a number of valued ecosystem and socio-economic components, but not to the extent that any of the cumulative effects are expected to be significant. In relation to the Approved Project, the Phase 2 Proposal presents no significant cumulative effects.

Transboundary effects to marine mammals would occur as a result of shipping, however, because the effects to marine mammals within the study area are not significant, the transboundary effects are similarly not significant. Socio-economic effects will occur in other jurisdictions of Canada as a result of employment of the Phase 2 Proposal by people living outside of Nunavut. However, these effects are not deemed significant.

7 CONCERNS OF THE COMMUNITIES

Through the past years a number of community concerns have been raised and addressed. Some of the key issues are related to the essential balance between development and maintaining traditional lifestyles.

SOCIAL-CULTURAL CHANGE

The socioeconomic benefits offered by the Phase 2 Proposal will inevitably trigger social changes for the Inuit of the neighbourhood communities and Nunavut as a whole. The increased purchasing power of employees as well as the redistribution of wealth generated by Phase 2 Proposal activities has the potential to accelerate the changes currently being experienced by the Inuit society and families. Although such changes are inevitable and will continue to occur, with or without the Phase 2 Proposal or the larger Approved Project, the rate and direction of such changes remain legitimate concerns for many Inuit.

Concerns were expressed on the overall effect of the Phase 2 Proposal or the Approved Project on harvesting and land-use activities that could arise from the combined interactions of the Phase 2 Proposal or the Approved Project on a wide range of factors. These interacting effects have been carefully considered and the potential for beneficial outcomes on harvesting activities appears to be more likely than overall negative outcomes. Baffinland will continue to work with communities to undertake collaborative monitoring and address issues as they arise.

8 CONCLUSIONS OF THE EIS

The Phase 2 Proposal includes a thorough environmental impact assessment of Project development plans. The Phase 2 Proposal is based on extensive studies of the biophysical and socio-economic environments and builds on the knowledge acquired during the Approved Project FEIS and ERP review. Many consultations have been undertaken to identify and address the concerns and interests of Inuit, the public, local and regional Inuit organizations and hamlets, the Government of Nunavut, Federal agencies, and other interested parties and to benefit from the knowledge of the Elders in the region. The Phase 2 Proposal has addressed the topics identified by NIRB in the guidelines provided for the Project.

The Phase 2 Proposal will be designed to meet all relevant regulatory requirements and to avoid, limit, and, minimize negative effects where possible and to enhance socio-economic benefits. No outstanding issues have been identified which are not currently being addressed through adaptive management, and monitoring. Baffinland is confident that it has proposed a Phase 2 Proposal that will provide positive economic returns to investors and benefits to the people, the Government of Nunavut, and Inuit organizations. A comprehensive management and monitoring system has been developed to ensure that the commitments in the Phase 2 Proposal as well as the FEIS of the Approved Project will be respected. Baffinland is committed to ongoing consultations with stakeholders and will address public concerns throughout the life of the Phase 2 Proposal and the larger Approved Project.

NO SIGNIFICANT NEGATIVE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

The Phase 2 Proposal will be designed to meet relevant regulatory requirements and to avoid, limit, and, reduce negative effects where possible and to enhance socio-economic benefits. The environmental assessment concludes that in consideration of the environmental interactions and planned mitigation, the residual effects of the Project on the valued ecosystem component (VECs) of the biophysical environment will be not significant.

A comprehensive management and monitoring system has been developed to safeguard the commitments of the Project. Existing management practices will continue to be applied with the Phase 2 Proposal, and management plans will be updated if and as applicable to include the Phase 2 Proposal.

POSITIVE SOCIO-ECONOMIC IMPACTS

Assessments of potential effects on the socio-economic environment have concluded that there will be positive effects on local employment and skills development and that revenue will accrue to the Government of Nunavut. The IIBA will ensure that benefits from the Project flow to nearby Inuit communities and the Qikiqtaaluk Region of Nunavut. A major Phase 2 Proposal benefit will be a growing territorial economy that will increase economic stability in Nunavut. Increasing the number of ongoing mining projects in Nunavut will help stabilize the territorial economy.

The road, railway, and port infrastructure built by the Phase 2 Proposal will provide opportunities to access further mineral deposits in the North Baffin region and could improve access for Inuit harvesting and tourism. The two ports will provide opportunities for additional commercial uses and the bathymetry information collected and assembled as a result of the Project and Phase 2 Proposal will provide important information for shipping lanes through Foxe Basin and to Milne Port.

Table 1 presents a summary of the residual environmental effects on the VECs and VSECs.

9 FORMAT OF THE ENVIRONMENTAL IMPACT STATEMENT

The Phase 2 Proposal is designed to address the requirements of the Nunavut Agreement, NuPPAA, and the Amended Guidelines as BIM seeks to amend the Nunavut Impact Review Board's Project Certificate 005. Further to this, BIM is also seeking to modify its existing Type A Water License and plans to pursue a coordinated review process with the Nunavut Water Board. In addition, the Phase 2 Proposal will meet requirements from several federal and territorial agencies to permit certain activities and will be subject to all relevant legislation and regulation. Most of the operational approvals required for the Phase 2 Proposal are already in place, though amendments will be required. Several new approvals are also expected to be required.

The Phase 2 Proposal complies with the requirements of NIRB as outlined in the Guidelines for the Preparation of the EIS issued on November 16, 2009, and subsequently amended on November 3, 2010, and October 6, 2015. The Phase 2 Proposal submission consists of the main document (Sections 1-12), accompanied by administrative and technical appendices. The technical supporting documents (TSDs) present assessment information, supporting analysis, and modeling detail in greater detail than is presented within the main document. Taken together, and in consideration of what has been assessed in the FEIS and subsequent amendments as part of the Approved Project, these documents meet the Guideline requirements; a detailed concordance to these Guidelines is provided in Appendix B.

The Addendum consists of 12 sections, as follows:

Section 1: Introduction – provides a summary of the proposed Project, including background, and land tenure, as well as a description of the proponent including their environmental, social, health and safety performance, monitoring and environmental compliance, and reclamation security.

Section 2: Need and Purpose – provides a summary of the need and purpose of the proposed Project.

Section 3: Regulatory and Fiscal Regime – describes the regulatory process and requirements and provides a list of current and required approvals.

Section 4: Project Description – includes a description of the proposed Project, including factors considered in project design, and potential future development.

Section 5: Environmental Management System – presents Baffinland’s environmental management system and related plans for environmental protection, monitoring and mitigation of the biophysical and socioeconomic environments, and describes the Project phases and schedule.

Section 6: Project Alternatives – presents the alternatives considered for the Project.

Section 7: Public Consultation and IQ Study Outcomes – describes Baffinland’s approach to stakeholder and Inuit community engagement, including the results and outcomes of the consultation activities.

Section 8: Existing Conditions – provides a description of the existing conditions for the Project, including the regional context and the biophysical and socioeconomic baseline conditions.

Section 9: Environmental Effects Assessment Methods – identifies the assessment methods used to evaluate the environmental and social effects of the Project on valued components, including a descriptions of the Project activities and components, the valued components, and boundaries of the assessment.

Section 10: Environmental Effects Assessment – identifies and discusses the potential effects of accidents and malfunctions, effects of the environment on the Project, as well as cumulative and transboundary effects.

Section 11: Sustainability Assessment - contains an analysis of the ability of renewable resources affected by the Project to sustain current and future generations in Nunavut and Canada.

Section 12: Conclusion – provides a brief summary of the Project and conclusion of the document.

Additional information is provided in Technical Supporting Documents (TSDs):

- TSD 1 Alternatives Analysis
- TSD 2 Project Description
- TSD 3 Phase 2 Workshop Report
- TSD 4 Phase 2 Public Consultation Report
- TSD 5 Mary River Inuit Knowledge Study Mapbook
- TSD 6 Climate Change Assessment
- TSD 7 Atmospheric Assessments
- TSD 8 Landforms, Soils, and Permafrost Assessment
- TSD 9 Vegetation Baseline and Impact Assessment
- TSD 10 Terrestrial Wildlife Baseline and Impact Assessment
- TSD 11 Evaluation of Exposure Potential From Ore Dusting Events in Selected VECs
- TSD 12 Migratory Birds Baseline and Impact Assessment
- TSD 13 Surface Water Assessment
- TSD 14 Freshwater Biota and Habitat Assessment

- TSD 15 Freshwater Fish Habitat Offsetting Plan
- TSD 16 Ice Conditions Report
- TSD 17 Marine Environment Effects Assessment
- TSD 18 Ballast Water Dispersion Model
- TSD 19 Fuel Spill Modelling Report
- TSD 20 Hydrodynamic Modelling Report - Milne Port
- TSD 21 Invasive Species Risk Assessment
- TSD 22 Ship Wake and Propeller Wash Assessment
- TSD 23 Marine Fish Habitat Offsetting Plan
- TSD 24 Marine Mammal Effects Assessment
- TSD 25 Socio-Economic Assessment
- TSD 26 Labour Market Analysis
- TSD 27 Cumulative and Transboundary Effects

Table 1 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Atmospheric Environment VECs							
Meteorology and Climate (including Climate Change)	Greenhouse gases (GHGs): - Carbon dioxide (CO₂) - Methane (CH₄) - Nitrous oxide (N₂O)	Increase in GHG emissions	Review, update, and implement the Climate Change Strategy as necessary to incorporate GHG reduction, climate change adaptation, and monitoring and collaborative research initiatives specific to the Phase 2 Proposal.	Releases of GHGs from the Project are small in comparison to Nunavut and Canadian totals and will partially mitigate current emissions by use of rail over road transport of ore. GHG releases will not have a measurable effect on global climate change. Overall, the residual effect of the Project on climate change is predicted to be: - Adverse in direction (the Project will result in GHG emissions); - Low in magnitude (not expected to contribute notably to Canadian or global GHG totals or global climate change); - Geographically widespread (GHGs cause a global effect); - Continuous in frequency; and - Irreversible (following cessation of Project GHG releasing activities the GHGs will remain in the atmosphere for 20 years or more). There is a high probability of the residual effect occurring.	Not significant	Not significant	Not significant
Air Quality	Criteria air contaminants (CACs): - Total suspended particulate (TSP) - Sulphur dioxide (SO₂) - Nitrogen dioxide (NO₂) - Carbon monoxide (CO) - Sulphur and nitrogen deposition and potential acid input (PAI) - Particulate matter <2.5 µm (PM_{2.5}) - Particulate matter <10 µm (PM₁₀) - Fugitive dust and metal concentrations and deposition	Increase in CACs	- Review, update and implement the following plans, targeting dust suppression along the Northern Transportation Corridor: - Environmental Protection Plan; - Air Quality and Noise Abatement Management Plan; - Dust Management Protocol in the Roads Management Plan; and - the dust fall monitoring program outlined in the Terrestrial Environment Mitigation and Monitoring Plan.	Concentrations of SO₂, NO₂, and CO are not predicted to exceed thresholds outside of the PDAs. Exceedances of TSP are predicted under certain conditions. However, no exceedances are predicted at the HTO cabin near Milne Port, and at the HTO cabin on the west bank of Camp Lake. Once the new rail road is operational and ore is transported by rail instead of truck, dust emissions along the Northern Transportation Corridor will be reduced from current levels associated with ERP operations. Overall, the residual effect of the Project on air quality are predicted to be: - Adverse in direction, though positive along the transportation corridor once rail is operational; - Of a magnitude that exceeds thresholds for certain worst-case modeled scenarios, but with additional mitigation exceedances are not anticipated at sensitive receptors; - Geographically confined to the LSA; - Infrequent; and - Reversible with the cessation of Project activities. There is a high probability of the residual effect occurring. In consideration of the information available and the results of ongoing monitoring activities related to air quality, there is a moderate level of confidence in the residual effects predictions for air quality.	Not significant	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Noise and Vibration	Noise and vibration levels	• Increase in noise levels • The potential effects of increased vibration levels were assessed for the Approved Project (Baffinland, 2012), and were determined to be not significant. Vibration from the Phase 2 Proposal is expected to be very similar to that of the Approved Project. Therefore, vibration was treated as a subject of note for the Phase 2 Proposal.	• Review, update, and implement the Environmental Protection Plan and the Air Quality and Noise Abatement Management Plan. • Implement key mitigation measures outlined under the AER Directive 038 (AEUB 2007), such as: ○ Fitting internal combustion engines with appropriate muffler systems; ○ Using acoustical screening from existing on-site buildings, where appropriate, to shield dwellings from construction equipment noise; ○ Taking advantage of local topography to screen noise emissions, where possible; and ○ Enclosing Milne Port crushing/screening plant in a building.	Overall, the residual effect of the Project on noise and vibration is predicted to be: • Adverse in direction; • Of a magnitude that exceeds thresholds for certain worst-case modelled scenarios outside of the Mine Site and Milne Port PDAs and at times at the HTO Cabin east of Milne Port; • Geographically confined to the LSA; • Of a duration that extends throughout the life of the Project • Infrequent; and • Reversible with the cessation of Project activities. There is a high probability of the residual effect occurring. In consideration of the information available and the results of ongoing monitoring activities related to noise, there is a high level of confidence in the residual effects predictions for noise and vibration.	Not significant	Not significant	No transboundary effects
Terrestrial Environment VECs							
Landforms, Soils, and Permafrost	• Landforms: ○ Glaciofluvial deposits ○ Eskers ○ Drumlins ○ Bedrock outcrops (cliffs) • Geochemistry • Paleontology	• Effects on unique or valuable landforms • Increase in geohazard risks • Increase in geochemical risks • Effects on paleontological resources	• Review, update and implement the following plans: ○ Environmental Protection Plan; ○ Borrow Pit and Quarry Management Plan; ○ Railway Management Plan; ○ Railway Emergency Plan; and ○ Spill Contingency and Emergency Response Plan. • Thermal insulation may be used for the proposed Milne Port buildings, and adfreeze piles may be used for deep foundations.	The railway embankment will cross glaciofluvial deposits and a large esker. However, these landforms are not ecologically unique given the abundance of other similar glaciofluvial deposits (including eskers) in the RSA. The rail construction will also remove existing bedrock outcrop. However, bedrock outcrops that will be affected are not currently used by cliff-nesting raptors. The potential for ML/ARD occurring from quarrying and rock cuts is considered unlikely as most of the affected rock is sedimentary. Granitic rocks present in the area are predicted to be low potential for ML/ARD. Overall, the residual effects of the Project on landforms, soils, and permafrost are predicted to be: • Adverse in direction; • Low in magnitude; • Geographically confined to the LSA; • Permanent in duration; • Infrequent; and • Irreversible. The probability of the residual effect occurring is high for: • A residual change in the abundance and distribution of unique or valuable landforms; and • A residual ground disturbance of paleontological resources. The probability of the residual effect occurring is low for: • Residual effects related to geohazard risks (i.e., thaw settlement at Milne Port second ore dock, Milne Port infrastructure on land, and along the proposed North Railway); and • A residual increase in geochemical risks (i.e., exposure of potentially ML/ARD rock surfaces to the elements [along the North Railway]) have a low probability of occurring. In consideration of the information available and the results of ongoing monitoring related to landforms, soils, and permafrost, there is: • A moderate level of confidence in the residual effects predictions related to thaw settlement along the proposed North Railway and exposure of potentially ML/ARD rock surfaces to the elements; and	Not significant	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				A high level of confidence in the residual effects predictions for all other residual effects on landforms, soils, and permafrost.			
Vegetation	- Vegetation abundance and diversity - Vegetation health - Culturally valued vegetation	- Change in vegetation abundance and diversity - Change in vegetation health - Any Project-related effects to culturally valued vegetation will be negligible since blueberry abundance within the RSA is very low and was previously assessed for the Approved Project as being not significant at the RSA scale with a high confidence. No effect assessment for culturally valued vegetation was completed for the Phase 2 Proposal.	- Review, update and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan. - Take measures to keep equipment brought to the site clean of soils that could contain plant seeds that do not currently occur within the RSA. - Allow natural regeneration of disturbed areas.	The Phase 2 Proposal has the potential to affect vegetation abundance and diversity in the PDA, as construction of the Northern Transportation Corridor and expansion at the Milne Inlet Port will remove approximately 14 km² of terrestrial habitat. Changes in vegetation health resulting from TSP deposition and atmospheric emissions outside the PDA were predicted to be negligible from natural variation. Vegetated habitat has the potential to be exposed to some level of dust deposition generated at Milne Inlet, Tote Road, the Mine Site, and along the North Railway. Although all vegetation classes considered sensitive to dust deposition and may be affected by annual TSP deposition, most of the habitats will remain intact within the RSA. Overall, the residual effects of the Project on vegetation are predicted to be: - Adverse in direction; - Of a magnitude that exceeds thresholds for certain dust deposition parameters within the PDA; - Geographically confined primarily to the PDA (as well as adjacent to the PDA for dust deposition); - Infrequent; - Of a duration that lasts for the life of the Project; and - Reversible with the cessation of Project activities and with reclamation. A residual change in vegetation abundance and diversity has a high probability of occurring. The probability of the residual effect occurring is low for a residual change in vegetation health due to TSP and a residual change in vegetation health due to atmospheric emissions. In consideration of the information available and the results of ongoing monitoring activities related to vegetation, there is: - A high level of confidence in the residual effects predictions related to a change in vegetation abundance and diversity; and - A moderate level of confidence in the residual effects predictions related to changes in vegetation health due to TSP and to atmospheric emissions.	Not significant	Not significant	No transboundary effects
Birds and Bird Habitat	- Red-throated loon - Snow goose - Common eider - King eider - Thick-billed murre - Lapland longspur - Harlequin duck - Peregrine falcon - Red knot - Buff-breasted sandpiper - Red-necked phalarope - Ivory gull - Ross’s gull - Short-eared owl	- Effects on habitat - Effects on risk of mortality - Effects on health	- Review, update, and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan. - Make raptor nest sites temporarily inaccessible to breeding birds during the nesting seasons potentially affected by construction.	Overall, the residual effect of the Project on birds and bird habitat are predicted to be: - Adverse in direction; - Low in magnitude; - Geographically confined to the PDA in general, but extending to the LSA for indirect effects on habitat quality or availability; - In a range from infrequent (for occurrences of bird injury and mortality), to frequent (for sensory disturbance), to continuous (for habitat loss); - Of a duration that last for the life of the Project; and - Reversible with the cessation of Project activities. The probability of the residual effects occurring is considered low for residual effects on bird health and moderate for all other residual effects on birds and bird habitat. In consideration of the information available and the results of ongoing monitoring activities related to birds and bird habitat, there is a high level of confidence in the residual effects predictions for birds and bird habitat.	Not significant	Not significant	Not significant
Terrestrial Wildlife and Wildlife Habitat	- Caribou - Wolf	- Effects on habitat - Effects on movement - Effects on risk of mortality - Effects on health	- Review, update and implement the following plans: - Environmental Protection Plan; - Terrestrial Environment Mitigation and Monitoring Plan; - Roads Management Plan; - Railway Management Plan; and - Railway Emergency Plan.	Phase 2 Proposal components and activities at the Mine Site, the Tote Road and North Railway, and Milne Port have the potential to interact with terrestrial wildlife and habitat through collisions; increased harvesting; direct loss or alteration of terrestrial wildlife habitat; barriers to wildlife movement within or between habitats; and sensory disturbances.	Not significant	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
			- Implement the Caribou Protection Measures developed collaboratively with the QIA. - Continue engagement with stakeholders and the Terrestrial Environment Working Group.	Overall, the residual effects of the Project on terrestrial wildlife and wildlife habitat are predicted to be: - Adverse in direction; - Generally low in magnitude given planned mitigation, but moderate in magnitude with respect to potentially reduced caribou habitat effectiveness during the winter season; - Generally geographically confined to the PDA, but extending outside of the PDA (within a 14 km ZOI) for potential residual effects on caribou habitat; - In a range from infrequent (for occurrences of wildlife injury and mortality), to frequent (for sensory disturbance), to continuous (for habitat loss and barriers to movement) for the life of the Project; - Of a duration that lasts for the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities, except in the case of the residual change in risk of caribou mortality associated with improved harvester access and/or knowledge of the area, which may persist indefinitely. There is a high probability that the Project will result in residual changes in caribou movement and caribou mortality risk. The probability of the residual effects occurring is moderate for residual changes in caribou and wolf habitat and is low for residual changes in caribou health. In consideration of the information available and the results of ongoing monitoring related to terrestrial wildlife and wildlife habitat, there is: - A moderate level of confidence in the residual effects predictions related to caribou habitat, caribou movement, caribou health, and wolf habitat; and - A high level of confidence in the residual effects predictions related to caribou mortality risk.			
Freshwater Aquatic Environment VECs							
Freshwater Quantity and Quality	Freshwater quantity and quality	- Effects on water quantity - Effects on water quality	- Review, update and implement the following plans: - Environmental Protection Plan; - Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan; - Fresh Water Supply, Sewage, and Wastewater Management Plan; and - Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including: - Aquatic Effects Monitoring Plan; - Surface Water Sampling Program – Quality Assurance and Quality Control Plan; - Blasting Management Plan; and - Quarry Management Plans.	As a result of the Phase 2 Proposal, freshwater quantity and quality may change due to changes in sedimentation rates, hydrology, metal concentrations; and water flows via withdrawals and diversions. Overall, the residual effect of the Project on freshwater quantity and quality is predicted to be: - Adverse in direction, with the exception of a positive direction on water quality at the Mine Site due to changes associated with secondary ore processing; - Low in magnitude given planned mitigation and the small footprint affected relative to the watershed scale in the region; - Geographically confined to the LSA; - Infrequent effects are associated with the water withdrawals and continuous effects are associated with the stream diversions and water/sediment quantity and quality alterations; - Of a duration that will occur throughout the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to freshwater quantity and quality, there is a high level of confidence in the residual effects predictions for freshwater quantity and quality.	Not significant	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Freshwater Biota and Habitat	Arctic char	- Effects on health and condition of Arctic char - Effects on habitat of Arctic char - Effects on risk of mortality of Arctic char	- Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013b, 2016). - Obtain Project-specific <i>Fisheries Act</i> Authorization(s) from DFO, where required for water crossings and other in-water works, and comply with associated terms and conditions. - Develop an Offsetting Plan which will be submitted to DFO for review and approval as part of the application for <i>Fisheries Act</i> Authorization, to offset the serious harm to fish associated with construction of the North Rail and construction of the second ore dock at Milne Port.	As a result of the Phase 2 Proposal, Arctic char habitat loss/alteration due to construction of North Railway is expected. In-water infrastructures (i.e., bridge footings, culverts, diversion activities) may negatively affect fish passage. Water withdrawals for dust suppression may reduce shoreline habitat, and cause stranding or impingement on the water intakes. The water and sediment quality and quantity at the Mine Site and along the Northern Transportation Corridor may be negatively affected by sediment inputs from ore production, transport, and related activities. Overall, the residual effects of the Project on freshwater biota and habitat are predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation and the small footprint effected relative to available habitat in the region; - Geographically confined to the LSA; - Infrequent effects are associated with the water withdrawals and continuous effects are associated with the habitat and water/sediment quantity and quality alterations; - Of a duration that will occur throughout the life of the Project; and - Reversible with mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to freshwater biota and habitat, there is a high level of confidence in the residual effects predictions.	Not significant	Not significant	No transboundary effects
Marine Environment VECs							
Marine Ice, Water, and Sediment Quality	- Marine ice - Marine water quality - Marine sediment quality	- Effects on marine ice - Effects on marine water quality - Effects on marine sediment quality	- Review and update the following plans: - Environmental Protection Plan; - Marine Environmental Effects Monitoring Plan; - Shipping and Marine Wildlife Management Plan; - Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan; - Fresh Water Supply, Sewage, and Wastewater Management Plan; - Emergency Response Plan; - Spill Contingency Plan; - Oil Pollution Emergency Plan; - Spill at Sea Response Plan; and - Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including: - Aquatic Effects Monitoring Plan; and - Surface Water Sampling Program – Quality Assurance and Quality Control Plan. - Manage runoff, sewage, and wastewater discharges to comply with the effluent quality discharge limits specified in Type A Water Licence.	Phase 2 Proposal components and activities at Milne Port and the Northern shipping route have the potential to interact with marine ice, water, and sediment quality through the construction and removal of the ore dock and other marine facilities; vessel traffic; ballast water discharge; wastewater and site water discharge and; ore dust from the stockpiles and ship loading. Overall, the residual effects of the Project on marine ice, water, and sediment quality are predicted to be: - Adverse in direction; - Low in magnitude that is low given planned mitigation; - Geographically confined to the LSA but extending to the RSA for a residual increase in TSS and metals in water as well as a residual increase in metals and change in physical composition in sediments due to dispersion and deposition of dust; - Frequent; - Of a duration that lasts for the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine ice, water, and sediment quality, there is a high level of confidence in the residual effects predictions.	Not significant	Not significant	No transboundary effects
Marine Habitat and Biota	- Marine fish habitat - Arctic char	- Effects on marine fish habitat - Effects on Arctic char health and condition	- Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC. - Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013b, 2016). - Obtain Project-specific <i>Fisheries Act</i> Authorization(s) from DFO, where required for in-water works, and comply with associated terms and conditions. - Develop an Offsetting Plan, which will be submitted to DFO for review and approval as part of the application for <i>Fisheries Act</i> Authorization, to offset the serious harm to fish associated with	Phase 2 Proposal components and activities at Milne Port and Marine Shipping along the Northern shipping route have the potential to interact with marine biota and habitat through habitat loss/alteration, acoustic disturbances, and invasive species introduction. Overall, the residual effect of the Project on marine habitat and biota is predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation; - Of a duration that ranges from during construction (e.g., sediment resuspension) to extending beyond the life of the Project (e.g., introduction of aquatic invasive species);	Not significant	Not significant	Not significant

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
			construction of the second ore dock at Milne Port. TSD 23 outlines a conceptual Marine Offsetting Plan. Continue to implement existing plan for Aquatic Invasive Species Monitoring of Milne Inlet Marine Ecosystem.	- Geographically confined to the LSA, apart from aquatic invasive species introduction; - Continuous, apart from sediment resuspension concerns during construction; and - Reversible with additional mitigation and the cessation of Project activities, apart from aquatic invasive species introduction. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine habitat and biota, there is a high level of confidence in the residual effects predictions.			
Marine Mammals	- Ringed seal - Walrus - Beluga whale - Narwhal - Bowhead whale - Polar bear	- Change in habitat - Acoustic disturbance effects - Hearing impairment effects - Auditory masking effects - Effects on risk of mortality	- Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC. - Review and update the following additional plans: - Shipping and Marine Wildlife Management Plan; - Polar Bear Safety Plan; and - Biophysical Environmental Effects Monitoring Framework, Appendix 4 (Candidate Environmental Effects Monitoring Studies Marine Mammal). - Implement a ramp-up procedure for pile driving activities during construction and install a bubble curtain around the wetted pile to dampen sound transmission through water during active pile driving. - Engage a qualified and experienced Marine Mammal Observer (MMO) to undertake marine mammal monitoring, and communicate all marine mammal sightings to the piling contractor, during all pile driving activities. - Reduce vessel speeds when transiting along the established shipping corridor and operating in Milne Port.	Phase 2 Proposal components and activities at Milne Port and the Northern shipping route have the potential to interact with marine mammal populations through ship strikes, acoustic disturbances, contaminant loading, and habitat loss. Overall, the residual effects of the Project on marine mammals are predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation; - Geographically confined to the LSA; - Infrequent; - Of a duration that extends throughout the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities. In consideration of the information available and the results of ongoing monitoring related to marine mammals, there is: - A moderate to high level of confidence in the residual effects predictions related to a change in habitat; and - A moderate level of confidence in the residual effects predictions for all other residual effects on marine mammals. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine mammals, there is a high level of confidence in the residual effects predictions.	Not significant	Not significant	Not significant
Human Environment VSECs							
Population Demographics	Demographic stability	- Change in in-migration of non-Inuit Project employees into the North Baffin LSA - Change in out-migration of Inuit residents from the North Baffin LSA	Direct hire from within and outside the LSA.	While Inuit employment levels have the potential to increase over time, the overall magnitude of Inuit out-migration is not expected to change. Assessment outcomes for population demographics therefore remain the same as for the Approved Project. Potential residual effects arising from in-migration and out-migration are not expected to be sufficient to cause adverse effects on demographic stability of the affected communities. Overall, the residual effects of the Project on population demographics are predicted to be: - Adverse in direction; - Low to moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent in frequency; - Long-term in duration; and - Reversible. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to community population demographics, there is: - A moderate level of confidence in the residual effects predictions related to the out-migration of Inuit residents from the North Baffin LSA; and - A high level of confidence in the residual effects predictions related to the in-migration of non-Inuit Project employees into the North Baffin LSA.	Not significant	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Education and Training	- Life skills - Education and skills	- Improvement of life skills among LSA residents - Change in incentives related to school attendance and success - Change in opportunities to gain skills	- Review, update and implement Human Resources Plan. - Implement IIBA initiatives, and the Q-STEP training program	In general, the Phase 2 Proposal is expected to result in positive effects on education and training. These positive effects are anticipated to arise from access to industrial work supported by pre-employment preparation and on-the-job training. Overall, the residual effects of the Project on education and training are predicted to be: - Positive to mostly positive in direction; - Moderate to high in magnitude; - Occurring within point-of-hire communities; - Continuous in frequency; - Of a duration that extends throughout the life of the Project to long-term in duration; and - Non-reversible or spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to education and training, there is: - A moderate level of confidence in the residual effects predictions related to improved life skills among LSA residents; and - A high level of confidence in the residual effects predictions related to incentives for school attendance and success and opportunities to gain skills.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Livelihood and Employment	- Wage employment - Job progression and career advancement	- Creation of jobs in the LSA - Change in employment of LSA residents - New career paths	- Review, update and implement Human Resources Plan. - Implement IIBA initiatives, and the Q-STEP training program. - Designate all LSA communities as points-of-hire.	In general, the Phase 2 Proposal is expected to result in positive effects on livelihood and employment. These positive effects are anticipated to arise from new employment opportunities, local hiring commitments, and career progression opportunities provided by the Project. Overall, the residual effects of the Project on livelihood and employment are predicted to be: - Positive in direction; - Moderate to high in magnitude; - Occurring within point-of-hire communities; - Continuous in frequency; - Medium-term to long-term in duration; and - Spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to livelihood and employment, there is: - A moderate level of confidence in the residual effects predictions related to employment of LSA residents and new career paths; and - A high level of confidence in the residual effects predictions related to creation of jobs in the LSA.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Economic Development and Self-reliance	- Land - People - Community economies - Territorial economy	Specific residual effects were not identified or assessed for this VSEC. Rather, overall assessments of the key indicators ‘land’, ‘people’, ‘community economy’, and ‘territorial economy’ were conducted and conclusions were drawn based on this integrated analysis.	- Review, update and implement Human Resources Plan. - Implement IIBA initiatives, and the Q-STEP training program. - Designate all LSA communities as points-of-hire.	No new residual effects will result from the Phase 2 Proposal, as no new impact pathways for economic development and self-reliance will be created. The Phase 2 Proposal will not introduce any new activities that change the previously assessed effects to economic development and self-reliance, although positive effects in some areas may be enhanced. Similar to previous assessments of the Approved Project, direct and indirect economic expansion associated with the Project will create new opportunities for employment and business across the RSA, and particularly within the LSA. The Project will also enhance labour force capacity and increase Inuit business capacity. Residual effects were not characterized for this VSEC because the assessment was integrative in nature, relying primarily on the conclusions of other VEC and VSEC residual effect assessments to understand the Phase 2 Proposal’s interactions on economic development and self-reliance.	Significant (positive)	Positive cumulative effects	Positive transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				The overall direction of the Phase 2 Proposal’s effects on the economic development and self-reliance VSEC has been assessed, with a high level of confidence, to be positive.			
Human Health and Well-being	- Well-being of children - Substance abuse - Community social stability	- Changes in parenting - Change in household income and food security - Change in transport of substances through Project sites - Change in affordability of substances - Change in attitudes toward substances and addictions - Effects of absence from the community during work rotation	- Continue to implement a no drugs/no alcohol policy on site with baggage searches for all employees and contractors arriving at site, access to an EFAP for workers and their family members, and contributions to the INPK community wellness fund. - Implement IIBA initiatives.	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced. The Phase 2 Proposal is predicted to have a positive effect on parents gaining employment at the Project and an overall benefit by most children from the improved well-being their parents gain from having a good job, reduced financial stresses in the family, and improved food security. For a minority of children, challenges related to parental absence, the transition between parental comings and goings, changing parental expectations, and the response of parents to the stresses and concerns brought about by fly-in/fly-out employment are expected to lead to some adverse residual effects. The adverse residual effects of the Project on human health and well-being are predicted to be: - Low to moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent to continuous in frequency; - Medium-term to long-term in duration; and - Spontaneous. The probability of the adverse residual effects occurring is high for: - Residual changes in parenting; and - Residual effects of absence from the community during work rotations The probability of the adverse residual effect occurring is moderate for a residual change in the transport of substances through Project sites. In consideration of the information available and the results of ongoing monitoring related to human health and well-being, there is: - A moderate level of confidence in the adverse residual effects predictions related to changes in parenting; and - A high level of confidence in the adverse residual effects predictions related to the transport of substances through Project sites and absence from the community during work rotations.	Not significant	Not significant	Not significant
Community Infrastructure and Public Services	Hamlet staff recruitment and retention in the North Baffin LSA	- Effects on competition for skilled workers - Change in labour force capacity	Monitor employee-specific information (e.g., through surveys, and employment and training records), Project-related community infrastructure use, and government statistics (e.g., on health centre usage).	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced. The Phase 2 Proposal is predicted to have a positive effect on labour force capacity. However, an adverse residual effect on competition for skilled workers is also predicted from the creation of competition with local employers. This adverse residual effect of the Project on community infrastructure and public services is predicted to be: - Moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent in frequency; - Short-term in duration; and - Reversible. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to community infrastructure and public services, there is a high level of confidence in the residual effects predictions.	Not significant (adverse); significant (positive)	Not significant	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Contracting and Business Opportunities	Business opportunities	- Expansion of market for business services to the Project - Expansion of market for consumer goods and services	Monitor the value of procurement with Inuit-owned businesses and joint ventures, LSA employee payroll amounts, and the number of registered Inuit firms in the LSA.	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced as Baffinland looks to expand its operations (e.g., through additional capital expenditure and contracting opportunities associated with the Phase 2 Proposal) and boost its local contracting efforts. Overall, the residual effects of the Project on contracting and business opportunities are predicted to be: - Positive in direction; - Moderate to high in magnitude; - Occurring within the LSA, RSA, and point-of-hire communities; - Continuous in frequency; - Medium-term in duration; and - Spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to contracting and business opportunities, there is a high level of confidence in the residual effects predictions.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Culture, Resources, and Land Use	- Cultural resources - Harvesting - Travel and camps	- Effects related to ground disturbance - Effects on caribou harvesting - Effects on marine mammal harvesting - Effects on safe travel within Pond Inlet, Eclipse Sound, Milne Inlet during open water - Sensory disturbance at camps - Effects on safe travel inland through Milne Port - Sensory disturbance and effects on safety along the Milne Inlet Tote Road - Effects on difficulty and safety relating to railway crossing	Review, update, and implement Cultural Heritage Resource Protection Plan.	In general, the nature and magnitude of the effects to culture, resources and land use are consistent with the conclusions presented in the Approved Project. The Phase 2 Proposal will result in adverse effects associated with the culture, resource and land use VSEC related to the loss of cultural resources, change in access to or availability of harvesting resources, and change in access to travel corridors and camps. Overall, the residual effects of the Project on culture, resources, and land use are predicted to be: - Adverse in direction; - Low to moderate in magnitude; - Occurring generally within PDA and extending to areas that may experience additional noise and dust; - Infrequent, though in some cases continuous for effects related to access, throughout the life of the Project; and - Reversible in nature with the exception of potential ground disturbance effects on cultural resources. There is generally a high probability of the residual effects occurring, except for: - residual effects on marine mammal harvesting, which have a moderate probability of occurring; and - residual effects on caribou harvesting, which have a low probability of occurring. In consideration of the information available and the results of ongoing monitoring related to culture, resources, and land use, there is: - A high level of confidence in the residual effects predictions related to increased ground disturbance, sensory disturbance at camps, and difficulty and safety relating to railway crossing; and - A moderate level of confidence in the residual effects predictions for all other residual effects on culture, resources, and land use.	Not significant	Not significant	No transboundary effects
Benefits, Royalty, and Taxation	Benefits, royalties, and taxation	Change in benefits, royalties, and taxation	Implemen IIBA initiatives.	The Approved Project provides significant positive effects with respect to the benefits generated in Nunavut. The Phase 2 Proposal will provide an incremental increase to these already significant effects.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Governance and Leadership	Governance and leadership	Not applicable (assessed as subject of note)	Implement IIBA initiatives.	In the FEIS, Governance and Leadership was addressed as a subject of note. The Phase 2 Proposal does not change the effects of the Project on Governance and Leadership. Since the FEIS, Baffinland and the QIA have negotiated an IIBA, a number of initiatives have been launched, and socio-economic monitoring has been ongoing.	Significant (positive)	Positive cumulative effects	No transboundary effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				In line with the FEIS, the Project is considered to have a positive and significant effect on Governance and Leadership.			
Assessment of Effects of the Environment on the Project and Accidents, Malfunctions, and Unplanned Events							
Effects of the Environment on the Project	- Geo-hazards - Extreme Weather Events - Global Climate Change	- Ground Stability - Slope Stability - Seismic Events - Extreme Temperatures - Extreme Precipitation and Flooding - High Winds and Waves - Storm Surges - Severe Fog or White-Outs - Increasing Temperatures - Reduced Sea Ice - Sea Level Changes - Increasing Precipitation - Increasing Active Layer Thickness	Appropriate engineering design	Potential concerns are mitigated through the adoption of appropriate engineering design.	Not significant	Not applicable	Not applicable
Accidents, Malfunctions, and Unplanned Events	Accidents and malfunctions were assessed as part of the Approved Project, and a risk register was developed to identify the potential risks, the likelihood of the accidental event occurring, level of consequence associated with each accidental event, and applicable emergency response plans. The Phase 2 Proposal has not altered the risk register for the Project, apart from one accident scenario related to shipping during periods of ice break-up and ice formation. Overall, consequence and likelihood ratings have not changed from the Approved Project and the environmental effects of a spill in ice conditions would be no greater than, and often less than, those described in the Approved Project, and therefore the conclusions presented in the Approved Project remain unchanged for Phase 2 Proposal.					Not applicable	Not applicable

RÉSUMÉ

RÉSUMÉ DU PROJET

Le Projet de la rivière Mary est une mine de minerai de fer en activité dans le nord de l'île de Baffin, dans la région de Qikiqtani au Nunavut, dans l'Arctique canadien. Baffinland Iron Mines Corporation (Baffinland) est le propriétaire et l'exploitant du Projet. Le Projet initial de Baffinland consistait en l'extraction du minerai de fer de la réserve du gisement n° 1 à un taux de production de 18 millions de tonnes par année (Mt/an) et la construction d'un chemin de fer pour le transport du minerai au marché via un port dans la baie Steensby. La Commission du Nunavut chargée de l'examen des répercussions (CNER) a émis, le 28 décembre 2012, le certificat de Projet n° 005 pour ce Projet.

En 2013 et 2014, Baffinland a préparé un addenda à l'énoncé final des incidences environnementales (ÉFIE) pour le Projet. Le certificat de Projet a par la suite été modifié pour inclure l'extraction de 4,2 Mt/a de minerai supplémentaire et le transport de cette quantité de minerai vers le Nord par une route existante (le chemin Tote) jusqu'à un port de l'inlet Milne. La production totale approuvée de minerai de fer a été portée à 22,2 Mt/a (4,2 Mt/a transportés par route vers le port de Milne et 18 Mt/a transportés par chemin de fer jusqu'au port de Steensby). Ceci est maintenant considéré comme le Projet approuvé. Le Projet ferroviaire Steensby de 18 Mt/a n'a pas encore été construit, mais 4,2 Mt/a de minerai de fer sont actuellement transportés au nord par la route vers le port de Milne.

L'addenda à l'ÉFIE fait partie du processus d'évaluation environnementale établi pour un Projet en vertu de l'Accord sur les revendications territoriales du Nunavut. Dans le cadre de ce processus d'évaluation environnementale, le promoteur d'un Projet, tel que le Projet de la rivière Mary, décrit l'environnement et le développement proposé. Des effets potentiels sont ensuite prévus, puis des plans d'atténuation sont élaborés. La gravité ou l'importance des effets résiduels (effets subsistant après l'application des mesures d'atténuation) est évaluée en fonction de critères établis et d'avis d'experts.

Le 3 février 2017, Baffinland a soumis la Proposition de la phase 2 à la Commission d'aménagement du Nunavut (CAN) pour l'examen de la conformité. Le 18 mars 2018, un amendement au Plan d'aménagement de la région du Nord-de-Baffin (Annexe P) a été accordé pour le couloir de transport du nord. Ce couloir comprend un couloir de 10 km comprenant le chemin Tote et le chemin de fer du nord, ainsi que la route de navigation maritime « couloir de transport de la rivière Mary ».

Le 23 avril, Baffinland a présenté à la CAN et à la CNER une demande pour un amendement au Plan d'aménagement de la région du Nord-de-Baffin et au certificat de Projet n° 005, afin de permettre une minime augmentation de la production et du transport du minerai par la route du port de Milne de 4,2 Mt/a à 6,0 Mt/a. Le document actuel est une demande pour un autre amendement (la Proposition de la phase 2). Cela implique l'augmentation de la quantité de minerai expédiée par le port de Milne à 12 Mt/a, par la construction d'un nouveau chemin de fer longeant en grande partie l'actuel chemin Tote (appelé le chemin de fer du nord). La production totale de la mine passera à 30 Mt/a, dont 12 Mt/a seront transportées par le chemin de fer du nord jusqu'au port de Milne et 18 Mt/a transportées par le chemin de fer du sud jusqu'au port de Steensby.

La Proposition de la phase 2 est fondée sur les études préliminaires et l'évaluation extensives réalisées depuis 2011 pour l'ensemble du Projet approuvé et est donc étroitement liée à l'ÉFIE et aux addendas précédents.

LE PROMOTEUR DU PROJET

Baffinland appartient à Nunavut Iron Ore Incorporated et à Arcelor Mittal. Toutefois, bien que Nunavut Iron Ore détienne une participation majoritaire dans la société, les deux sociétés ont des droits d'exploitation conjoints. Le siège social de Baffinland est situé à Oakville, Ontario, Canada. En plus de son siège social, Baffinland assure une présence constante à l'inlet Milne, à la rivière Mary et dans les bureaux de liaison communautaires d'Iqaluit, d'Igloolik, de Pond Inlet, de Hall Beach, de Clyde River et d'Arctic Bay. ArcelorMittal est l'un des principaux fournisseurs canadiens de minerai de fer sur les

marchés de l'acier du monde entier. Reconnue pour l'excellence de ses produits, les compétences de ses employés et son leadership dans l'industrie, ArcelorMittal est l'une des plus grandes sociétés sidérurgiques au monde, en activité dans plus de 60 pays. Les équipes d'ingénierie et d'environnement de la société possèdent une vaste expérience en matière de développement dans l'Arctique. Baffinland développe également des partenariats clés avec des entreprises ayant une expérience spécifique liée au Nord, par exemple dans le transport maritime et le déglacage.

LA PROPOSITION DE PHASE 2

Grâce à l'introduction de la Proposition de la phase 2, le Projet de la rivière Mary permettra à Baffinland de transporter et d'expédier par chemin de fer jusqu'à 12 Mt/a de minerai à partir du port de Milne, et de conserver les autorisations actuelles pour la construction et l'exploitation du chemin de fer Steensby et du chemin de fer du sud (de Milne to Steensby) tel que proposé en 2012. La production minière totale augmenterait à 30 Mt/a, soit 12 Mt/a transportées par chemin de fer du nord au port de Milne et 18 Mt/a transportées par le chemin de fer du sud au port de Steensby.

Les installations et activités additionnelles ou nouvelles requises à chacun des sites du Projet pour la mise en œuvre de la phase 2 sont situées sur le site minier, dans le couloir de transport du Nord et au port de Milne.

Pour le site minier, la zone de développement du Projet (ZDP) définie en 2012 demeure inchangée. Cependant, certaines infrastructures de la ZDP seront réaménagées pour permettre la construction de la ligne de chemin de fer du nord, soutenir l'augmentation de la production minière et la construction de la section nord du chemin de fer Steensby. Le tracé du chemin Tote demeurera inchangé, mais des améliorations et des réalignements mineurs seront nécessaires pour faciliter le passage à niveau.

La ligne du chemin de fer du nord s'étendra sur 110 km, de la station de chargement du site minier à la station de déchargement du port de Milne. Pour la plus grande partie de la longueur, le remblai de chemin de fer sera construit à côté du chemin Tote. Cependant, une section de 20 km du chemin de fer dévie du tracé du chemin Tote, en raison de la topographie abrupte.

La ZDP du port de Milne doit être agrandie afin de permettre l'expédition de 12 Mt/a de minerai et d'exploiter le chemin de fer du nord. Cela impliquera également la modernisation ou l'ajout d'infrastructures supplémentaires au port de Milne, y compris un second quai minéralier. Les expéditions au port de Milne continueront d'avoir lieu pendant la saison des eaux libres et pourraient se prolonger pendant les périodes où la glace de rive n'est pas utilisée pour supporter les déplacements et les récoltes des Inuits, jusqu'au 15 novembre de chaque année. Les transits d'expédition augmenteront, de même que la taille d'une partie de la flotte de navires qui fait déjà escale au port de Milne.

Baffinland étudie des solutions de rechange à l'énergie par le développement proposé d'éoliennes; des sites sont étudiés près du port de Milne, le long du chemin Tote et à proximité du site minier. Les emplacements seront choisis en fonction des contraintes environnementales et opérationnelles, pour le développement de deux sites et pour l'installation d'une seule turbine à chaque site.

Le chemin de fer du sud sera construit dès qu'il sera économiquement viable. La production totale de la mine atteindra 30 millions de tonnes par an afin de supporter 12 millions de tonnes par an pour l'exploitation du chemin de fer du nord et 18 millions de tonnes par an autorisées pour l'exploitation du chemin de fer du sud.

NÉCESSITÉ DU PROJET

Le monde a besoin de minerai de fer pour continuer à construire et à développer les matériaux utilisés quotidiennement dans notre société. La demande mondiale de minerai de fer devrait augmenter suivant la croissance et le développement de pays comme la Chine, l'Inde et d'autres régions émergentes, tandis que les économies des pays occidentaux continueront de croître. Baffinland propose de développer le Projet pour offrir du minerai de fer de haute qualité aux marchés mondiaux et fournir des bénéfices acceptables pour ses investisseurs. Le Projet d'agrandissement prévu dans la

Proposition de la phase 2 est nécessaire à Baffinland pour continuer de fonctionner et d'offrir des avantages aux Inuits, au public, aux organismes inuits locaux et régionaux, au gouvernement du Nunavut, aux agences fédérales et aux autres parties intéressées.

Pour les habitants du Nunavut, le Projet continuera de contribuer au développement de l'infrastructure, des compétences, des emplois et des occasions d'affaires, et cela en augmentant les revenus du gouvernement du Nunavut et de la société formée d'Inuits de plein droit (Nunavut Tunngavik inc.). Le Projet devrait apporter des avantages aux collectivités locales en leur fournissant une base économique et une gamme variée d'options d'emploi d'une manière qui se prête à la pratique continue des modes de vie traditionnels des Inuits.

La renégociation de l'Entente sur les répercussions et les avantages pour les Inuits (ERA) entre Baffinland et la Qikiqtani Inuit Association (QIA) décrira les avantages du Projet pour les collectivités inuites avoisinantes et la région de Qikiqtaaluk, au Nunavut. L'élaboration du Projet est conforme aux grands principes, politiques et objectifs de planification de la Commission d'aménagement du Nunavut ainsi qu'à la stratégie de développement minier du gouvernement du Nunavut, Parnautit. Dans l'ensemble, le Projet devrait contribuer à attirer des investissements supplémentaires dans une région ayant historiquement des niveaux de développement relativement bas.

Le Projet contribuera également à renforcer la souveraineté du Canada dans le Nord, à protéger le patrimoine environnemental du pays, à promouvoir le développement économique et social dans la région et à améliorer la gouvernance du Nord.

APPROCHE DU DÉVELOPPEMENT DE PROJET

Baffinland mettra en œuvre la Proposition de phase 2 de manière responsable sur le plan environnemental et social. Les besoins et les valeurs des Inuits seront respectés tout au long du développement et de l'exploitation du Projet. Baffinland se conformera aux exigences réglementaires du Nunavut et du gouvernement fédéral. Baffinland appliquera des mesures de protection de l'environnement techniquement éprouvées et rentables lorsque possible des points de vue économiques et techniques. Le processus de prise de décisions de Baffinland est systématiquement suivi et guidé par de solides principes de gestion où la séquence « politique - planification - mise en œuvre et exploitation - vérification et actions correctives - révision par la direction ». À chaque étape, la participation communautaire sera une composante importante du processus. Une approche qui met l'accent sur l'apprentissage en vérifiant les effets des actions permet à Baffinland de s'améliorer continuellement et de s'adapter rapidement aux conditions changeantes. Baffinland s'engage à prendre des précautions pour éviter ou réduire les incidences indésirables potentielles liées à ses activités, afin d'assurer la sécurité de ses employés, le bien-être des résidents du Nunavut et la protection de l'environnement naturel.

Baffinland a adopté des principes progressistes en matière d'emploi et de gestion qui guideront la société tout au long du Projet. La sécurité des employés est une pierre angulaire dans toutes les décisions. Baffinland offre un environnement de travail qui attire, perfectionne et retient un personnel qualifié et qui maximise la participation des Inuits. L'entreprise embauche des employés des cinq collectivités les plus proches du Projet (Igloolik, Pond Inlet, Clyde River, Arctic Bay et Hall Beach). Baffinland travaille en étroite collaboration avec la Qikiqtani Inuit Association (QIA) et d'autres intervenants, afin d'offrir la formation nécessaire aux employés et d'appuyer les programmes communautaires, ce qui augmente les avantages du Projet et fournit aux résidents locaux des compétences durables au-delà du Projet. Par exemple, Baffinland et QIA ont collaboré à l'élaboration d'un programme de formation de Qikiqtani sur les compétences et la formation pour l'emploi (Q-STEP) de 19 millions de dollars.

Même si les niveaux d'emploi global seront légèrement moindres, ils demeureront similaires à ceux prévus pour le Projet approuvé. En outre, plusieurs nouvelles possibilités pourraient être créées grâce à la Proposition de la phase 2, tant pour de nouveaux types d'emplois (par ex. des emplois additionnels dans la construction, le port, le transport et le secteur

ferroviaire) que des occasions de développement pour des gens désireux de poursuivre un choix de carrière dans ces domaines ou d'autres.

Tous les travailleurs seront transportés par voie aérienne vers le site minier et depuis celui-ci. Un transport terrestre à partir du site minier sera fourni aux travailleurs basés au port de Milne. Pour atteindre cet objectif, Baffinland s'engage à couvrir tous les coûts associés aux vols, aux hôtels et aux repas liés aux déplacements des employés de Baffinland de la région de Qikiqtani vers un point de ramassage existant pour la mine de la rivière Mary. Les lieux de ramassage actuels sont : Arctic Bay; Clyde River; Hall Beach; Igloolik; Iqaluit; et Pond Inlet.

ÉCHÉANCIER ET DURÉE DU PROJET

La construction du chemin de fer du nord commencera à la fin de 2019, une fois que le certificat de Projet aura été amendé et émis par la CNER, et que les permis, licences et approbations subséquents seront délivrés. L'achèvement de la construction du chemin de fer du nord est prévu d'ici 2020. L'expédition à partir du port de Milne passera également à 12 Mt/a d'ici 2020. La construction du chemin de fer du sud et du port de Steensby débutera en 2021 avec l'expédition de 18 Mt/a de minerai à partir du port de Steensby qui commencera en 2025.

FAITS SAILLANTS DE LA PROPOSITION DE PHASE 2

Le port de Milne, le site minier, le couloir de transport du Nord et l'expédition par la route de navigation du Nord sont les quatre composantes majeures de la Proposition de la phase 2. La Proposition de la phase 2 comprendra les installations et activités supplémentaires suivantes au port de Milne :

Port de Milne :

- la construction et l'exploitation d'un second quai minéralier capable d'accoster des minéraliers de taille Cape;
- l'expansion des installations de manutention et de stockage du minerai;
- une infrastructure ferroviaire et de déchargement du minerai;
- une nouvelle installation de concassage du minerai qui sera à l'intérieur pour réduire la poussière;
- un camp agrandi et des installations connexes;
- une centrale électrique agrandie et l'installation d'une éolienne;
- une décharge;
- une augmentation des activités maritimes au port;
- une augmentation de l'expédition à l'inlet Milne.

Site minier :

- une augmentation du taux d'extraction à 12 millions de tonnes par an pour le transport au port de Milne par le chemin de fer du nord;
- des installations supplémentaires pour le chargement ferroviaire pour le chemin de fer du nord;
- un parc de stockage élargi;
- l'installation d'une éolienne; et
- l'agrandissement des installations d'entretien de la mine et des installations/bâtiments administratifs (entrepôts, magasins, etc.)

Le couloir de transport de la rivière Mary (chemin Tote et chemin de fer du nord) :

- la construction du chemin de fer et de son talus;
- la construction de passages de cours d'eau (4 ponts et 417 ponceaux);
- la construction et l'utilisation de plusieurs aires de dépôt (jusqu'à 14), d'abris et de petits magasins d'équipement à chaque aire de dépôt;

- l'utilisation de la zone de dépôt au kilomètre 58 pour le démarrage du transfert de la ligne de transport au rail et pour la mise en service de la partie construite de la ligne de chemin de fer;
- la construction et l'exploitation de quatre campements temporaires et de deux camps mobiles;
- la construction de plusieurs passages à niveau pour le chemin Tote; et
- l'exploitation et la fermeture de 40 carrières le long du couloir ferroviaire.

Expédition :

- l'expédition entre le début de juillet et la mi-novembre ; et
- l'augmentation de la fréquence d'expédition pendant la période des eaux libres.

PRODUITS DE MINÉRAI

Puisque le minerai de fer de la rivière Mary est de très bonne qualité, il n'est pas nécessaire de procéder à un traitement supplémentaire au-delà du concassage et du calibrage. Le concassage et le calibrage du minerai produisent deux « produits » de minerai de fer :

- un produit de bloc de minerai dont la taille des morceaux varie entre 6,3 mm et 31,5 mm (environ la taille d'une balle de golf);
- un produit de minerai fin dont la taille des morceaux mesure moins de 6,3 mm (environ la taille d'un pois).

FERMETURE ET POST-FERMETURE

Au cours de toutes les phases du Projet, Baffinland planifiera et mènera ses activités de manière à remettre les sites du Projet à un état sécuritaire et respectueux de l'environnement. Baffinland entreprendra des activités continues de remise en état tout au long de la vie de la mine. Les installations temporaires requises pour les camps de construction seront désaffectées et retirées des camps à la fin de leur vie utile. Les lieux d'emprunt, les carrières, les routes temporaires et les autres sites touchés seront stabilisés pour limiter l'érosion des surfaces au sol, puis réhabilités une fois qu'ils ne seront plus nécessaires. La surveillance environnementale et la surveillance de sécurité se poursuivront aussi longtemps que nécessaire.

POTENTIEL DE DÉVELOPPEMENT FUTUR

La Proposition de la phase 2 est conçue pour augmenter le taux de production et de transport du minerai de fer de 12 Mt/a par Milne Inlet et le chemin de fer du nord. Le 18 Mt/a par Steensby Inlet et le chemin de fer du sud a déjà été autorisé. Les taux de production annuels et la durée de la mine pourront varier en fonction de facteurs tels que les conditions du marché, les teneurs du minerai et des événements imprévus. Tous les sites du Projet sont donc en mesure d'accueillir des stocks supplémentaires, du matériel de manutention et de la main-d'œuvre.

De plus, l'exploration régionale a permis à Baffinland d'identifier d'autres gisements de minerai de fer qui, selon l'échantillonnage de surface, sembleraient être de la même teneur en minerai de fer que le gisement n° 1. Les gisements n° 2 et n° 3 sont adjacents au gisement n° 1 et ont fait l'objet d'une étude plus approfondie que les autres gisements. Compte tenu de leur proximité au site minier actuel, il est prévu que ces gisements seront exploités avant ou après l'épuisement du minerai dans le gisement n° 1, à l'aide d'une grande partie de la même infrastructure du Projet. La mise en place de la mine et des infrastructures maritimes, routières et ferroviaires connexes faciliteront ce développement futur dans la région.

PARTICIPATION COMMUNAUTAIRE

Des consultations approfondies ont eu lieu avec de nombreuses communautés et organisations intéressées au Projet. La participation a compris des organisations inuites publiques, locales et régionales, des ministères et organismes gouvernementaux territoriaux et fédéraux et d'autres groupes intéressés. Un accent particulier a été mis principalement sur les collectivités inuites près des sites du Projet.

Les Inuits de la région de Baffin bénéficient d'une riche tradition orale et celle-ci a influencé la façon dont Baffinland a mobilisé les collectivités locales. La société a mis l'accent sur l'établissement d'une présence dans la région par l'intermédiaire des agents de liaison communautaires locaux, en tenant de nombreuses réunions avec les membres de la collectivité et en organisant des visites du site lorsque possible. Puisque la langue dominante au nord de la région de Baffin est l'inuktitut et puisqu'un certain nombre de dialectes régionaux existent dans la région, la traduction à l'aide d'interprètes locaux a été un élément important pour soutenir une communication efficace. Dans tous les cas, des registres détaillés sont préparés pour les différentes réunions et autres discussions en personne.

Des efforts spécifiques ont été déployés pour assembler, consigner et intégrer les connaissances traditionnelles dans les décisions liées à la conception du Projet. Les connaissances inuites de la région sont approfondies et fort précieuses surtout lorsqu'elles sont intégrées aux études et à la connaissance scientifique.

De plus, l'acceptation et les préférences de la collectivité ont été des facteurs importants dans l'évaluation des solutions de rechange telles que l'utilisation de l'inlet Milne, l'emplacement du port Steensby, l'itinéraire maritime dans le bassin Foxe et l'échéancier des rotations de travail.

Au cours des deux dernières années, le programme de participation communautaire a inclus les résultats de consultations liées à la Proposition de la phase 2, notamment l'identification et la discussion des sujets d'intérêt et de préoccupation concernant la proposition et les incidences potentielles. La Proposition de la phase 2 a été guidée par les points de vue et les perspectives évoqués au cours des initiatives continues de participation en matière de réglementation, de communauté et d'intervenants.

Baffinland continuera d'appliquer une approche énergique de participation auprès des Inuits, du public, des organismes et des hameaux inuits locaux et régionaux, du gouvernement du Nunavut, des organismes fédéraux et d'autres parties intéressées par le biais de rencontres, d'ateliers, de sondages et de la diffusion d'informations par Internet et de lettres d'information électroniques. De cette façon, les communautés, le QIA, les régulateurs et le public sont informés en temps opportun et du point de vue culturel des progrès du Projet et des incidences environnementales et sociales potentielles des activités en cours. Baffinland s'est expressément engagée à retourner dans les cinq (5) collectivités du nord de l'île de Baffin, afin de fournir des renseignements plus détaillés sur la Proposition de la phase 2 et les processus réglementaires connexes. Baffinland poursuivra ses activités de participation et se conformera aux modalités et conditions du certificat de Projet et de l'ERAI.

CONTEXTE DU PROJET

MILIEU PHYSIQUE

Les reliefs et les gisements de minerai de fer dans la région du Projet de la rivière Mary sont associés aux grandes périodes glaciaires que l'île de Baffin a traversées au fil des ans. La géologie de surface se compose de dépôts de sédiments abondant localement et provenant des glaciers et des rivières. La région du nord de l'île de Baffin qui englobe la région de la rivière Mary est située dans la ceinture de la baie Comité, un terrain de granite et de roches vertes combiné à des roches sédimentaires et volcaniques. On y trouve également quelques affleurements rocheux et des formations granitiques et sédimentaires. Les montagnes à l'est ont plus de 540 millions d'années et les plateaux des basses terres à l'ouest ont entre 250 et 540 millions d'années.

L'obscurité règne près de 24 heures sur 24 dans la région et il y a moins de deux heures de crépuscule de novembre à janvier. Pendant les mois d'hiver, la topographie dépourvue d'arbres et la fine neige poudreuse produisent des conditions de poudrerie, ce qui entraîne une visibilité réduite. Il fait clair toute la journée de mai à août et la période exempte de gel s'étend de la fin de juin à la fin d'août. Les mois de juillet et août sont généralement les plus pluvieux. De septembre à novembre, la température et le nombre d'heures de clarté diminuent, et vers la mi-octobre la température quotidienne moyenne est généralement bien en dessous de 0° C. Les plus importantes chutes de neige surviennent généralement dans cette période.

La qualité de l'air est très bonne et les niveaux de bruit sont faibles dans la région du Projet, comme c'est souvent le cas dans une région éloignée. Les analyses de la qualité de l'eau douce dans la région de la rivière Mary indiquent des concentrations naturellement élevées d'oxygène dissous, d'aluminium et de fer. En outre, la quantité importante de matières dissoutes accroît la turbidité de l'eau. Certaines valeurs moyennes de pH, ainsi que le cadmium et le mercure présents dans l'eau douce sont actuellement supérieurs aux normes prescrites par les lignes directrices du Conseil canadien des ministres de l'Environnement.

MILIEU BIOLOGIQUE

Le Projet est situé dans l'écozone du Haut-Arctique. Le climat est semi-aride -et le pergélisol est continu, s'étendant à une profondeur de 500 mètres, avec une couche active d'une profondeur allant jusqu'à 2 mètres. Les températures extrêmement froides de la région, combinées au pergélisol, entraînent une courte période de ruissellement, généralement de juin à septembre. Toutes les rivières et les ruisseaux, à l'exception des plus grands systèmes, gèlent complètement pendant les mois d'hiver. En raison des basses températures combinées à la faible capacité du sol à retenir l'humidité, la couverture végétale est minimale et les eaux de surface sont abondantes. La région est parsemée de milliers de petits lacs et de cours d'eau.

Relativement clairsemée dans une grande partie de la région du Projet, la végétation est généralement représentative de la flore des régions de l'Arctique. Aucune espèce végétale considérée comme « rare » au Canada n'a été répertoriée dans les sites d'étude.

Les mammifères terrestres de la région comprennent le caribou de la toundra du troupeau du nord de l'île de Baffin, le loup, le renard arctique et le renard roux, l'hermine, le lièvre arctique et les lemmings. Les mammifères marins abondent dans la région, notamment les ours polaires, les narvals, les bélugas, les baleines boréales, plusieurs espèces de phoques et les morses. Un petit nombre d'épaulards et de baleines à bec boréales ont été constatés.

Les caribous du nord de l'île de Baffin sont actuellement présents en faible densité et leur nombre semble varier selon un cycle de 60 à 70 ans. La dernière période d'abondance du caribou dans la région est survenue de 1980 à 2000 et la précédente période de faible abondance était dans les années 1940. La population de caribous devrait demeurer peu

nombreuse au cours des deux prochaines décennies. Des preuves existent cependant indiquant que des caribous sont présents dans toute la région. Alors que certaines populations de caribous migrent entre les habitats préférés en été et en hiver, le caribou du nord de l'île de Baffin ne semble pas migrer et se retrouverait probablement relativement également dans de nombreux endroits de la zone du Projet.

Les espèces d'oiseaux migrateurs observées dans la région de la rivière Mary comprennent les oies des neiges, les canards, les eiders, les huardes et les harles. Les rapaces trouvés comprennent les buses pattues, les faucons pèlerins, les faucons gerfauts et les harfangs des neiges. Des densités relativement faibles d'oiseaux chanteurs et d'oiseaux de rivage ont été enregistrées dans toute la région. Il y a aussi de nombreux oiseaux marins dans la zone de la route de navigation, y compris des guillemots de Brünnich et de nombreux types de mouettes.

Il y a deux espèces de poissons dans l'environnement d'eau douce : l'omble chevalier et une espèce de vairons nommée épinoche à neuf épines. Des ombles arctiques, principalement, sont confinés dans les eaux intérieures près du Projet, bien que des ombles chevaliers soient présents dans un lac près du port de Steensby et dans le réseau hydrographique de la rivière Cockburn, à proximité d'une partie du chemin de fer. Les poissons d'eaux marines comprennent l'omble chevalier, le chabot et la lompe atlantique dans la baie Steensby, ainsi que l'omble chevalier, le chabot et la morue du Groenland à l'inlet Milne.

ENVIRONNEMENT SOCIOÉCONOMIQUE

La région de Baffin au Nunavut possède un riche patrimoine archéologique visible datant de plusieurs milliers d'années. Beaucoup de sites archéologiques, de différents degrés d'importance, ont été trouvés dans la zone du Projet, en particulier autour du port de Milne et du port de Steensby mais aussi le long de certaines sections de la ligne de chemin de fer.

Les cinq collectivités de la région du nord de l'île de Baffin aux environs immédiats du Projet de la rivière Mary comprennent, en ordre alphabétique, Arctic Bay (280 km), Clyde River (415 km), Hall Beach (192 km), Igloolik (155 km) et Pond Inlet (160 km). Chacune de ces collectivités a des liens sociaux, économiques et environnementaux à long terme avec la zone du Projet. Pour beaucoup de ces ménages du nord de l'île de Baffin, la récolte de nourriture traditionnelle apporte une contribution importante à leur bien-être général, tant physique que culturel. Dans les cinq collectivités, le caribou, le phoque annelé et l'omble chevalier sont d'une importance majeure. De plus, le morse est une espèce importante à Hall Beach et à Igloolik, tandis que le narval est un élément clé de la chasse des ménages d'Arctic Bay, de Pond Inlet et, dans une moindre mesure, de Clyde River.

L'économie basée sur la terre est une partie importante des moyens de subsistance de nombreux résidents du nord de l'île de Baffin. Les récoltes de la terre et de la mer produisent des aliments d'une valeur de 12 à 20 millions de dollars par année dans cette région. La quantité de travail nécessaire pour prélever cette nourriture est estimée à 350 emplois à temps plein. De plus, les résidents de la région gagnent de l'argent grâce à la vente d'objets d'art et d'artisanat, à l'emploi et à divers programmes sociaux gouvernementaux comme le soutien du revenu.

Les Inuits de la région du nord de l'île de Baffin ont connu d'énormes changements sociaux et culturels au cours de quelques décennies. En particulier, des initiatives telles que les pensionnats ont eu une incidence sur l'intégrité de la famille et, par conséquent, sur la cohésion sociale. Les aînés sont de plus en plus impliqués dans la vie communautaire et dans la promotion de l'apprentissage de la culture traditionnelle pour la jeune génération. En même temps, une évolution vers les attentes de la classe moyenne occidentale semble se produire chez les jeunes Inuits. Ces collectivités ont connu une croissance démographique spectaculaire au cours des 20 dernières années. Plus de 70 % de la population a moins de 25 ans. Le sous-emploi et le manque d'opportunités contribuent au stress social.

La demande parmi les résidents pour un emploi salarié est très élevée. Cependant, les possibilités d'emploi dans le nord de l'île de Baffin sont limitées. L'emploi inuit dans le nord de l'île de Baffin est caractérisé par de nombreuses personnes qui gagnent peu de revenus, bien en dessous de ce que le travail à temps plein paierait, et un petit nombre de personnes qui gagnent un revenu à temps plein toute l'année. La plupart des résidents qui travaillent à temps plein à Iqaluit le font toute l'année. Dans le nord de l'île de Baffin, beaucoup plus de travailleurs à temps plein occupent ces emplois pour de courtes périodes seulement. Les femmes qui travaillent à temps plein dans le nord de l'île de Baffin sont plus susceptibles de travailler toute l'année que les hommes.

Il existe pourtant des possibilités d'emploi bien rémunérées, à temps plein et à l'année. Ces emplois sont souvent auprès du gouvernement territorial ou municipal et exigent des niveaux d'éducation et des types d'expérience que de nombreux résidents n'ont pas. Les aînés de la communauté reconnaissent que les communautés doivent se positionner pour entrer dans l'économie des salaires.

Le nombre d'emplois occupés par des femmes a généralement augmenté plus rapidement que celui des hommes. Cependant, les femmes de la région travaillent principalement dans le secteur public. Il est peu probable que la croissance passée du secteur public se poursuive, ce qui laisse supposer que, lorsque les jeunes femmes commenceront à chercher un emploi, elles devront peut-être trouver du travail dans des secteurs qui ne sont pas traditionnellement occupés par des femmes.

Au nord de l'île de Baffin et à Iqaluit, environ un emploi sur cinq nécessite une formation universitaire. Un quart à un tiers des emplois dans la région exigent des niveaux de formation et de compétences de niveau collégial ou d'apprentissage. Un nombre d'emplois similaire nécessite une formation secondaire ou une formation professionnelle spécifique. Le reste des emplois peut être comblé par des travailleurs non qualifiés avec une formation en cours d'emploi. Les possibilités d'emploi sont beaucoup plus limitées pour ceux qui n'ont pas une bonne éducation ou une bonne formation.

Le gouvernement du Nunavut compte sur les paiements de transfert fédéraux pour au moins 90 % de ses revenus. L'emploi dans le secteur public est un pilier de l'économie salariale et de nombreuses petites entreprises et points de vente au Nunavut ont été créés pour répondre aux besoins du gouvernement ou à ceux des fonctionnaires. Les emplois gouvernementaux dans les domaines de l'administration, de l'éducation et de la santé représentent environ la moitié de tous les revenus d'emploi sur le territoire. L'emploi dans la construction a également augmenté pour soutenir le développement de l'infrastructure gouvernementale.

Le nord de l'île de Baffin a connu un certain développement des ressources dans le passé, y compris lors de l'exploitation des mines Polaris et Nanisivik. Panarctic Oil était également responsable d'une exploration pétrolière extensive dans les années 1970 et a même développé une production commerciale dans le cadre du Projet Bent Horn. Plus récemment, l'exploration minérale dans la région a vacillé et l'exploration pétrolière a disparu. Le Projet de la rivière Mary est la seule mine en exploitation dans l'est de l'Arctique et seules quelques autres sociétés mènent de petits projets d'exploration au cours d'une année donnée.

INTERACTIONS ENTRE LE PROJET ET EFFETS SUR LES CVÉ ET LES CSÉV

La consultation publique a permis à Baffinland d'identifier les principaux intérêts et préoccupations des communautés et des intervenants du Projet. Ces zones d'intérêt sont identifiées dans l'EIS comme les « composantes valorisées de l'écosystème (CVÉ) » et les « composantes socioéconomiques valorisées (CSÉV) » du Projet.

Composantes valorisées de l'écosystème

Les CVÉ comprennent à la fois l'environnement naturel et la faune qui dépendent de la santé de cet environnement. Les CVÉ peuvent être regroupées par domaines thématiques liés aux principaux éléments de l'environnement. Des espèces indicatrices significatives ont été identifiées et ont permis de mettre l'accent sur les évaluations.

Environnement atmosphérique — changement climatique; qualité de l'air; bruit et vibrations.

Environnement terrestre — relief, sol et pergélisol; végétation; faune et habitat terrestres; oiseaux.

Environnement d'eau douce — qualité de l'eau de surface et des sédiments; quantité d'eau; poissons d'eau douce, habitats du poisson et autres organismes aquatiques.

Environnement marin — glace de mer; qualité de l'eau et des sédiments marins; habitat et biote marins; mammifères marins.

Composantes socioéconomiques valorisées

Les CSÉV sont liées au bien-être des personnes, de leurs communautés et à la santé sociale et économique globale de la région.

Gens : caractéristiques sociodémographiques de la population; éducation et formation; santé humaine et bien-être

Communauté : infrastructure communautaire et service public; ressources culturelles; utilisation des ressources et des terres; gouvernance et leadership; moyens de subsistance et emploi; bien-être culturel

Économie : développement économique et autonomie; opportunités de contrats et d'affaires; avantages, taxes et redevances.

Interaction des CVÉ et des CSÉV avec le Projet

Grâce au processus d'examen, les interactions de la Proposition de la phase 2 avec les différentes CVÉ et CSÉV ont été identifiées et, le cas échéant, des espèces indicatrices clés ont été identifiées et analysées. Des études approfondies combinées avec des connaissances traditionnelles ont été utilisées pour établir les conditions préalables au Projet. En utilisant la compréhension scientifique, l'expérience des développements passés et les connaissances traditionnelles, des prédictions sont établies sur les effets de diverses interactions. Lorsque les interactions négatives de la Proposition de la phase 2 n'ont pas pu être évitées, des plans ont été élaborés pour minimiser ou compenser ces effets. Les mesures d'atténuation sont systématiquement traitées dans le tableau des effets résiduels.

En tenant compte des ajustements et des mesures d'atténuation contenus dans la Proposition de la phase 2 pour limiter les incidences négatives, les effets résiduels du Projet ont ensuite été évalués pour leur importance dans les environnements biophysiques et socioéconomiques. Cette Proposition de la phase 2 présente les résultats de ces évaluations. Un résumé par domaine thématique suit.

Effets du Projet sur les CVÉ

L'élaboration de la Proposition de phase 2 cherchait à minimiser les interactions du Projet avec l'environnement naturel et à mettre en œuvre des mesures pour minimiser les incidences négatives potentielles des interactions. Avec ces mesures, les incidences de la Proposition de phase 2 sur l'ensemble de l'environnement naturel ont été jugées non significatives. Les sections suivantes résument les interactions clés du Projet et les mesures d'atténuation qui seront mises en œuvre.

Environnement atmosphérique — changement climatique; qualité de l'air; bruit et vibrations.

Il est prévu que le changement climatique aura peu d'effet sur les conditions de pergélisol très froides et profondes de la région pendant la durée prévue du Projet approuvé. Les installations de la Proposition de la phase 2 seront également conçues pour tenir compte de tout changement dans les conditions du site induit par le changement climatique. Les activités de la Proposition de la phase 2 produiront des gaz à effet de serre. On anticipe que les rejets de gaz à effet de serre du Projet seront faibles comparativement aux rejets totaux du Nunavut et du Canada, et la Proposition de la phase 2 réduira les émissions actuelles par l'utilisation du transport ferroviaire du minerai plutôt que du transport routier. Les rejets de gaz à effet de serre n'auront pas d'effet mesurable sur les changements climatiques mondiaux.

La manutention du minerai, la conduite sur les routes d'accès et les émissions provenant des centrales électriques, des camions et des incinérateurs du camp affecteront la qualité de l'air par la production de particules et d'autres émissions gazeuses. L'utilisation de carburants diesel arctiques à faible teneur en soufre et la mise en place de contrôles modernes d'émissions sur les équipements permettront de réduire ces émissions. De plus, les mesures de contrôle de la pollution de l'air, comme les abat-poussières, préviendront les incidences importantes sur la qualité de l'air. Une fois le chemin de fer construit et exploité, celui-ci remplacera le camionnage comme moyen de transport du minerai de la mine au port, et les émissions de poussière provenant du transport du minerai seront réduites. Avec la Proposition de la phase 2, le concassage secondaire sur le site minier sera déplacé au port de Milne, où le concassage se fera à l'intérieur afin de réduire les émissions de poussière.

Les activités de la Proposition de la phase 2 augmenteront les niveaux de bruit, mais ceux-ci seront limités aux zones proches des activités. De plus, l'utilisation de silencieux et l'entretien régulier des moteurs et de l'équipement empêcheront des niveaux de bruit importants.

Environnement terrestre — Relief, sol et pergélisol; végétation; faune et habitat terrestres; oiseaux.

Les reliefs sensibles dans la zone du Projet comprennent les sols gelés qui contiennent des lentilles de glace ou des zones qui pourraient se déplacer sous la pression. Les reliefs sensibles seront évités ou des conceptions techniques appropriées seront utilisées pour protéger les zones sensibles. Un drainage adéquat sera mis en place pendant la préparation du site pour empêcher l'accumulation de l'eau pendant les périodes de dégel.

La conception de toutes les installations de la Proposition de la phase 2 minimise la superficie de terrain que le Projet doit perturber. Ainsi, la quantité de végétation touchée est minime par rapport à la couverture végétale dans le nord de l'île de Baffin. Une modélisation numérique a été faite pour prédire la quantité de poussière qui pourrait se déposer sur la végétation dans la région et ces études ont conclu que les mesures de suppression des poussières empêcheraient les impacts sur les plantes.

Le caribou est la principale espèce indicatrice utilisée pour évaluer les incidences potentielles sur les animaux terrestres. L'interaction principale du Projet avec le caribou serait lorsque le caribou traverse la route ou les voies ferrées. Bien qu'il soit possible que des caribous individuels puissent être impliqués dans des collisions avec des trains ou des camions, ces chiffres devraient être limités et ne seront pas significatifs par rapport au nombre total de caribous dans la région. Plusieurs mesures sont en place pour éviter les collisions avec le caribou. Des limites strictes de vitesse seront en place pour les

camions et les trains, réduisant ainsi la probabilité de collision. Les camions devront s'arrêter si des animaux sont aperçus sur la route ou à proximité de celle-ci. Aucune observation n'a été faite sur les sites du Projet.

Il y a beaucoup d'oiseaux dans la région et une petite perte d'habitat pour les oiseaux migrateurs devrait résulter des activités de la Proposition de la phase 2. Ceux-ci ne devraient pas avoir d'incidences sur les populations d'espèces clés comme le faucon pèlerin, l'oie des neiges, l'eider et le huard. Avant d'entreprendre les activités liées à la Proposition de la phase 2, les nids et les aires de nidification seront identifiés et des mesures d'atténuation seront mises en œuvre pour éviter les incidences directes sur les oiseaux et leur habitat.

Environnement d'eau douce — qualité de l'eau de surface et des sédiments; quantité d'eau; poissons d'eau douce, habitats du poisson et autres organismes aquatiques.

Un certain nombre de mesures d'atténuation éprouvées ont été incluses dans la Proposition de la phase 2 afin de réduire les incidences potentielles sur la qualité de l'eau, les poissons d'eau douce, l'habitat des poissons et d'autres organismes aquatiques. Des plans de gestion spécifiques détaillent les nombreuses façons dont l'eau sera protégée.

L'utilisation de l'eau sera réduite au minimum nécessaire et toute l'eau utilisée sera testée et, si nécessaire, traitée avant d'être rejetée dans l'environnement. Les installations de traitement des eaux usées veilleront à ce que toutes les eaux rejetées satisfassent aux normes établies. Les eaux de ruissellement des zones de stockage et d'entretien du combustible seront confinées et les eaux usées provenant des installations d'entretien des camions et des rails et des installations de lavage des explosifs respecteront les normes établies avant d'être rejetées dans l'environnement naturel. Un plan d'intervention en cas d'urgence et de déversement sera en place et assurera un nettoyage rapide et approprié de tout déversement éventuel.

En réponse aux rejets non conformes du bassin de décantation de l'amas de roches stériles, Baffinland a pris de multiples mesures correctives pour empêcher d'autres rejets non conformes du bassin de décantation de l'amas de roches stériles. Il a ainsi retenu les services de Golder Associates (Golder) afin de déterminer les mesures correctives appropriées pour remédier aux infiltrations observées en 2017 au bassin de décantation de l'amas de roches stériles, pour étudier le risque potentiel du forage à long déport et pour élaborer des mesures d'atténuation, au besoin. Les actions prévues pour 2018 comprennent l'installation d'un système de traitement de l'eau pour gérer le ruissellement capturé dans le bassin de décantation de l'amas de roches stériles, son amélioration pour remédier aux infiltrations et augmenter la capacité, et la mise à jour du plan provisoire de gestion des stériles. Le plan révisé décrira la gestion des amas de stériles et des eaux de surface au bassin de décantation de l'amas de roches stériles pour les cinq prochaines années et incorporera les données de géochimie recueillies en 2018 au cours des programmes sur le terrain, les résultats de la modélisation de la qualité de l'eau et les leçons tirées des événements de 2017.

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Le chemin Tote et le chemin de fer du nord traversent un grand nombre de cours d'eau et une partie de ceux-ci abritent des habitats de poissons. De nouveaux ponts seront construits, et de nombreux ponceaux seront remplacés et seront conçus pour limiter les obstacles au déplacement des poissons. Un plan de compensation de l'habitat est inclus dans l'évaluation.

Environnement marin — glace de mer; qualité de l'eau et des sédiments marins; habitat et biote marins; mammifères marins.

Au port de Milne, les activités près du littoral, y compris les activités portuaires, seront gérées avec soin pour protéger l'environnement marin. Toutes les eaux usées et les eaux usées provenant des installations d'entretien et des résidus d'explosifs seront traitées avant d'être rejetées et les eaux de ruissellement provenant des zones portuaires seront confinées et surveillées pour la qualité de l'eau avant rejet. Les transferts de carburant navire-côte se feront en conformité avec les règlements de la *Loi sur la marine marchande au Canada*.

L'enfoncement de pieux pendant la construction au port de Milne pourrait créer une perturbation acoustique susceptible d'affecter l'environnement marin. Des mesures d'atténuation seront utilisées pour atténuer la transmission du son et une surveillance des mammifères marins sera effectuée afin d'éviter la mise en place de pieux lorsque des mammifères marins sont présents. Les nuisances sonores ne devraient pas affecter le biote et les mammifères marins au niveau de la population.

Le transport à partir du port de Milne se fera principalement pendant la saison des eaux libres, mais il s'étendra jusqu'aux saisons intermédiaires lorsque les glaces de rive ne sont pas utilisées pour les déplacements et la récolte par les Inuits. Les minéraliers transporteront de l'eau de ballast pendant leurs voyages d'arrivée au port de Milne. Cette eau est nécessaire pour garder les vaisseaux stables et à un tirant d'eau régulier. L'eau de ballast sera gérée conformément à la Loi sur la marine marchande du Canada et à ses règlements qui exigent un échange d'eau de ballast au milieu de l'océan. L'eau est pompée par-dessus bord lorsque les navires s'approchent du port de Milne. L'eau de ballast sera seulement légèrement différente (en température et en salinité) de l'eau dans l'anse. La modélisation a montré que les rejets ne modifient pas la qualité de l'eau à l'inlet Milne. On craint que l'eau de ballast puisse entraîner l'introduction non intentionnelle d'espèces envahissantes. Le respect de protocoles stricts élaborés par les organismes de réglementation atténuera cette préoccupation.

Les principales espèces de mammifères marins comprennent les narvals, les bélugas et les baleines boréales. Les incidences des activités de la Proposition de la phase 2 ont été évaluées pour ces espèces ainsi que pour les phoques annelés, les phoques barbus et les morses.

Il y a un risque de perturbation acoustique du bruit des navires le long de la route de navigation du Nord ainsi que des collisions avec des navires sur les mammifères marins qui peuvent causer des blessures graves ou la mort par des dommages physiques. En ce qui concerne de la route de navigation du Nord, on peut s'attendre à ce que les phoques annelés, les narvals, les bélugas et les baleines boréales rencontrent du trafic maritime dans les basses et hautes fréquences. À ce jour, il n'y a pas eu de collision avec des mammifères marins. Les ours polaires et les morses sont peu fréquents le long de la route de navigation du Nord durant la saison des eaux libres et, par conséquent, ne devraient pas subir de perturbation acoustique causée par le bruit des navires ou les collisions avec les navires. Étant donné la probabilité relativement faible et la courte durée des rencontres entre les mammifères marins et le trafic maritime, les perturbations acoustiques ne devraient pas affecter les mammifères marins au niveau de la population. Pour atténuer les impacts potentiels sur les navires, la Proposition de la phase 2 comprend des instructions nautiques obligatoires, y compris des limites de vitesse réduites lors du transit dans le port de Milne ou le long du couloir maritime nordique et le maintien d'un cap constant en transit. Compte tenu de l'atténuation prévue et de la faible probabilité de collision avec des navires de mammifères marins, on ne s'attend pas à ce que les collisions avec des navires aient des répercussions sur les mammifères marins au niveau de la population.

Les *phoques annelés* sont présents toute l'année le long de la route de navigation du Nord, y compris au site du port de Milne. La navigation et la plupart des activités de construction sur le site du port de Milne se dérouleront pendant la période des eaux libres, ce qui permet d'éviter les périodes de mises bas, d'allaitement, d'accouplement et de mue. Les phoques annelés tolèrent généralement l'activité industrielle et la navigation. Les effets des activités de la Proposition de la phase 2 sur les phoques annelés sont considérés comme mineurs et devraient se produire dans une zone localisée.

Les *phoques barbus* devraient se manifester en petit nombre le long de la route de navigation du Nord pendant les périodes des eaux libres, puisqu'ils surviennent principalement dans les zones de banquise. La période d'expédition durant la Proposition de la phase 2 ne chevauche pas celle de la mise bas et de l'allaitement des phoques barbus. Si des phoques barbus se trouvent le long de la route de navigation du Nord ou près du port de Milne, ils pourraient éviter localement des activités d'expédition et de construction. Étant donné le petit nombre de phoques barbus qui devraient être présents dans le détroit d'Eclipse et l'inlet Milne, et les mesures d'atténuation planifiées, les impacts prévus ne sont pas significatifs.

Les *morses* se trouvent en petit nombre le long de la route de navigation du Nord pendant la période des eaux libres. Si des morses se trouvent le long de la route de navigation du Nord ou près du port de Milne, ils peuvent éviter localement les activités de transport et de construction. Étant donné le faible nombre de morses qui devraient être présents dans le détroit d'Eclipse et dans l'inlet Milne, et les mesures d'atténuation prévues, les impacts prévus ne sont pas significatifs.

Les *narvals* sont présents le long de la route de navigation du Nord, principalement pendant la période des eaux libres, alors qu'environ 20 000 animaux passent l'été dans la région du détroit d'Eclipse et de l'inlet Milne. On pense que les narvals mettent bas et allaitent dans ce lieu d'estivage. Bien qu'il y ait peu d'information sur la façon dont les narvals réagissent au trafic maritime, des observations pertinentes dans la région de l'inlet Milne indiquent que les narvals présentaient des réactions variables aux navires (y compris le passage d'un minéralier, d'un pétrolier et d'ascenseurs maritimes). Des observations, notamment dans le cadre du programme de surveillance des côtes de Bruce Head impliquant des Inuits locaux comme observateurs, suggèrent que certains narvals ont peut-être quitté certaines zones après le passage d'un navire, mais pas d'autres. On prévoit que les narvals éviteront localement les minéraliers le long de la route de navigation du Nord et le trafic maritime dans la région du port de Milne. Les incidences potentielles devraient être réduites par la diminution de la vitesse du navire et, par conséquent, la réduction des niveaux sonores. On s'attend à ce que les narvals s'habituent aux passages répétés des minéraliers le long de la route de navigation du Nord. Une surveillance continue sera effectuée pour détecter les incidences inattendues sur les narvals et pour identifier d'autres mesures d'atténuation.

Les *bélugas* se trouvent en nombre relativement faible dans le détroit d'Eclipse et dans l'inlet Milne pendant la période des eaux libres. Les réponses des bélugas aux navires pendant les périodes d'eaux libres varient, allant de la tolérance à l'évitement, et dépendent probablement du type de navire, de sa vitesse et de son cap, de l'activité des baleines et de leur exposition antérieure à l'activité industrielle. Il est probable que les bélugas feront preuve d'évitement localisé des minéraliers le long de la route de navigation du Nord. Les incidences devraient être réduites par la diminution de la vitesse du navire. On prévoit que les bélugas s'habitueront aux passages répétés des minéraliers le long de la route de navigation du Nord. Pour contrer l'incertitude liée à cette prédiction, une surveillance continue sera effectuée afin de détecter les incidences inattendues sur les bélugas et d'identifier d'autres mesures d'atténuation.

Les *baleines boréales* surviennent régulièrement le long de la route de navigation du Nord et l'on croit que cette zone d'estivage est utilisée pour l'alimentation. Les réactions comportementales à l'activité de la baleine boréale sont variables et semblent dépendre de l'activité de la baleine et du type de navire. D'après des études antérieures, les baleines boréales éviteront probablement au moins la région immédiate autour des minéraliers et les incidences peuvent être réduites au minimum par la réduction de la vitesse du navire et la conservation d'un cap et d'une vitesse constants. On prévoit que les baleines boréales éviteront localement les minéraliers le long de la route de navigation du Nord. On prévoit que les baleines boréales s'habitueront aux passages répétés des minéraliers le long du couloir de transport du Nord. Pour contrer

l'incertitude liée à cette prédiction, une surveillance continue sera effectuée afin de détecter les incidences inattendues sur les bélugas et d'identifier d'autres mesures d'atténuation.

Les *ours polaires* sont présents toute l'année, en nombre relativement faible, le long de la route de navigation du Nord. Les activités de la Proposition de la phase 2 se dérouleront principalement pendant la période des eaux libres et, à ce titre, ne chevaucheront pas les périodes de mise bas et d'accouplement des ours polaires. L'île Bylot et la côte de l'île de Baffin sont utilisées comme retraites d'été par les ours polaires. Les ours polaires devraient éviter les navires et le site portuaire; cependant, ils peuvent également aborder ces domaines. Le personnel du Projet sera éduqué sur la sécurité relative aux ours et la gestion rigoureuse des déchets réduira les risques d'interactions avec des ours. Des surveillants d'ours polaires seront embauchés pour assurer la sécurité des travailleurs.

Incidences du Projet sur les CSÉV

Introduction

La Proposition de la phase 2 offrira de nombreux avantages sociaux et économiques potentiels aux résidents du nord l'île de Baffin. Ceux-ci découleront des possibilités d'emploi et de formation ainsi que des possibilités offertes aux entreprises et des paiements versés aux gouvernements et aux organismes inuits. Une planification attentive est nécessaire afin d'aider les gens à avoir accès à ces opportunités. Les individus et les familles auront aussi besoin de soutien pour faire face aux défis associés au mode de vie de navette aérienne et aux responsabilités financières et aux richesses qui font partie de ce mode de vie. L'évaluation de composantes socioéconomiques valorisées est un moyen important de cerner les problèmes et de concevoir des mesures d'atténuation appropriées. Dans l'ensemble, la proposition de la phase 2 représente des avantages socioéconomiques importants et substantiels pour le Nunavut.

Gens : caractéristiques sociodémographiques de la population; éducation et formation; santé humaine et bien-être

On a évalué la possibilité que la Proposition de la phase 2 ait entraîné une migration non inuite dans les collectivités, ainsi que le potentiel des Inuits de quitter les collectivités en conséquence de la Proposition de la phase 2. Aucune de ces possibilités n'est considérée comme affectant significativement la composition et le nombre des populations du nord de l'île de Baffin ni le tissu social communautaire.

Les engagements de Baffinland en matière d'éducation et de formation contribueront à améliorer les compétences des résidents du nord de l'île de Baffin. Baffinland s'engage à soutenir des programmes de formation qui permettront aux résidents des collectivités avoisinantes d'acquérir les compétences nécessaires pour se qualifier et exécuter des tâches à tous les niveaux de l'exploitation de la Proposition de la phase 2. Baffinland poursuit activement des initiatives de partenariat en matière d'éducation et de formation. Baffinland et le QIA ont récemment développé le programme de formation Q-STEP, une initiative de quatre ans qui sera entreprise par QIA en étroite collaboration avec Baffinland afin de fournir aux Inuits les compétences et les qualifications nécessaires pour répondre aux besoins d'emploi du Projet de la rivière Mary, ainsi que d'autres possibilités d'emploi dans la région.

Le Projet approuvé devait apporter des effets positifs en matière d'éducation et de formation grâce à l'accès au travail industriel soutenu par la préparation préalable à l'emploi et la formation en cours d'emploi pour les jeunes adultes, des incitations liées à la fréquentation scolaire et au succès, et des opportunités d'acquérir des compétences. La surveillance confirme que ces prédictions sont en voie de réalisation par des gens employés par le Projet et leurs familles (DNT-27). Bien que le développement d'une main-d'œuvre inuite formée et qualifiée nécessite du temps, Baffinland s'attend à ce que les programmes de formation contribuent éventuellement au développement d'une main-d'œuvre et d'une économie locales plus fortes. La surveillance confirme que ces prédictions sont en voie de réalisation par des gens employés par le Projet et leurs familles.

Le calendrier de rotation est de deux semaines en deux semaines. Les enjeux associés aux activités de navette aérienne sont reconnus. Des mesures continueront d'être prises pour aider les travailleurs et les familles à réussir dans ce type d'environnement de travail. Des programmes d'orientation et de formation continueront d'être offerts aux travailleurs et à leurs familles, afin qu'ils s'adaptent au travail par rotation et qu'ils améliorent leurs pratiques de gestion de l'argent.

Des préoccupations sont parfois soulevées au sujet des incidences potentielles de la Proposition de phase 2 ou du Projet approuvé sur le transport de substances illicites à travers les sites du Projet et sur l'abordabilité de ces substances. Pour contrer la possibilité d'une augmentation des abus de substance, la société a adopté une politique stricte d'interdiction de drogues et d'alcool. Un service de counseling en matière de toxicomanie sera également disponible.

Communauté : infrastructure communautaire et service public; ressources culturelles; utilisation des ressources et des terres; gouvernance et leadership; subsistance et emploi; bien-être culturel

Le Projet devrait créer de la concurrence pour les travailleurs qualifiés. Les hameaux ont exprimé leurs préoccupations selon lesquelles ils pourraient rencontrer des difficultés pour l'embauche du personnel dont ils ont besoin pour fournir des services locaux. Cependant, l'expérience d'emploi et la formation continue amélioreront considérablement la capacité de la main-d'œuvre en aidant les résidents locaux à acquérir les qualifications et l'expérience nécessaires. Par conséquent, la concurrence accrue pour les travailleurs sera contrebalancée par une capacité accrue.

La Proposition de la phase 2 utilisera les pistes d'atterrissage publiques à Iqaluit et aux cinq collectivités les plus proches pour le transport des travailleurs vers les lieux de travail et à partir de ceux-ci. Les plans de transport de la Proposition de la phase 2 seront conçus de manière à éviter la surcharge des installations aéroportuaires. Une demande accrue d'infrastructure devrait également découler indirectement de la Proposition de la phase 2. Par exemple, une augmentation de la richesse pourrait entraîner une hausse du nombre de véhicules et la nécessité d'améliorer les routes.

L'éducation et la formation ainsi que l'expérience en milieu de travail et le conseil permettront l'acquisition de compétences en leadership qui amélioreront considérablement la gouvernance locale. La participation des résidents et des dirigeants des collectivités aux négociations des ententes avec Baffinland et aux initiatives visant à définir des indicateurs clés pour les programmes de surveillance régionaux a déjà contribué au développement du leadership communautaire local.

Des mesures continueront d'être mises en œuvre pour respecter et préserver la culture des employés inuits pendant qu'ils travaillent. Des politiques encourageant le respect des autres cultures et la diversité sont en place. Baffinland appuie l'utilisation de l'inuktitut sur le site, pour la signalisation et dans les unités de travail. Des aliments traditionnels seront offerts dans les cafétérias du Projet. Les politiques encourageant la sécurité, l'équité en matière d'emploi et la prévention du harcèlement seront strictement appliquées.

Des sites archéologiques ont été identifiés dans des régions concernées par la Proposition de la phase 2 qui contiennent des artefacts et des caractéristiques représentant des degrés substantiels d'utilisation de la région par des humains dans le passé jusqu'au présent. On évitera un certain nombre de sites archéologiques importants en déplaçant l'infrastructure de la Proposition de phase 2 et d'autres sites archéologiques nécessiteront une protection par l'excavation, la cartographie et la récupération des artefacts par un archéologue agréé.

La Proposition de la phase 2 interagira avec les utilisations actuelles des terres par les Inuits. Les mesures à l'appui de ces activités comprennent des procédures d'enregistrement aux sites de la Proposition de la phase 2 et mettent l'accent sur la sécurité publique pour le chemin de transport de l'inlet Milne.

Économie : développement économique et autonomie; contrats et opportunités d'affaires; avantages, taxes et redevances.

La croissance économique directe et indirecte générée par la Proposition de la phase 2 créera de nouvelles opportunités pour l'emploi et les affaires. La Proposition de la phase 2 améliorera la capacité de la main-d'œuvre et pourrait accroître la capacité des entreprises inuites. Des entreprises pourraient avoir l'occasion de prendre de l'expansion grâce à la fourniture de services commerciaux à la Proposition de la phase 2 et, de manière indirecte, grâce à un marché élargi pour les biens de consommation et les services. Baffinland aidera les entreprises inuites, particulièrement les plus petites entreprises situées dans les collectivités de la région de l'île de Baffin, afin de leur fournir la capacité de soumissionner pour un contrat et d'exécuter des contrats dans le cadre de la Proposition de la phase 2.

La Proposition de la phase 2 fournira des paiements en espèces substantiels aux organisations inuites et au gouvernement. Ceux-ci découleront de l'Entente sur les répercussions et les avantages pour les Inuits avec la QIA, ainsi que du paiement de redevances pour le minerai de fer fourni à NTI. Les paiements au gouvernement du Nunavut proviendront des taxes sur les carburants, des impôts fonciers et des taxes sur les profits réalisés par Baffinland. Certains de ces paiements commenceront dès la phase de construction, tandis que d'autres ne débiteront que plus tard, dans la phase d'exploitation.

Grâce à sa contribution aux compétences humaines, à la richesse des ménages et à la croissance économique, la Proposition de la phase 2 appuiera la réalisation des objectifs globaux de développement économique, y compris les progrès vers l'autonomie des individus, des collectivités et du territoire.

GESTION DE L'ENVIRONNEMENT, DE LA SANTÉ ET DE LA SÉCURITÉ

Baffinland s'engage à protéger la santé et la sécurité des employés et de l'environnement, et à assurer l'implication et la participation continues de la collectivité dans le cadre de la Proposition de la phase 2. La Proposition de la phase 2 respectera ou dépassera les exigences de toutes les lois, les exigences réglementaires, les ententes, les licences et tous les permis applicables au Nunavut et au Canada.

Le système de gestion de l'environnement, de la santé et de la sécurité de Baffinland est le cadre de travail d'une gestion adaptative basée sur les meilleures pratiques internationales. Ce système embrasse le principe de précaution et le développement durable. Dans ce cadre, des plans individuels ont été élaborés pour traiter tous les aspects des activités de l'entreprise et contiennent des mesures d'atténuation détaillées et la surveillance à mettre en œuvre tout au long de la durée du Projet afin d'éliminer, de limiter ou de minimiser les incidences indésirables. Tous les employés et entrepreneurs de Baffinland sont tenus de se conformer à ces plans de gestion. Les exigences en matière de registres et de documentation pour ces plans de gestion, la vérification et le processus d'examen et de révision par la direction sont tous précisés dans le système de gestion de l'environnement, de la santé et de la sécurité.

La responsabilisation en matière de sécurité et de protection de l'environnement est partagée entre tous les employés et sous-traitants, et Baffinland s'engage à fournir les programmes de formation et de sensibilisation nécessaires à la mise en œuvre efficace de ses politiques et plans de gestion. Ces programmes de formation seront documentés, des manuels de procédures seront maintenus et des échéanciers de perfectionnement seront établis. Le plan de gestion des ressources humaines de Baffinland décrit ces engagements.

L'un des principaux plans de gestion est axé sur la préparation et l'intervention en cas d'urgence. Dans l'éventualité peu probable qu'un déversement important de carburant diesel se produise le long du couloir de navigation, un tel déversement aurait des incidences environnementales importantes. Cependant, le réapprovisionnement des dépôts de carburant est une activité courante bien maîtrisée dans les collectivités de l'Arctique. De plus, Baffinland ne recevra du carburant que pendant la saison des eaux libres. Afin de réagir aux déversements potentiels le long de la route de

navigation, Baffinland a élaboré un plan d'intervention en cas de déversement en mer et s'appuiera sur l'expertise d'OSRL pour aider à la gestion des déversements et au nettoyage. OSRL est une organisation mondiale de premier plan spécialisée dans les interventions en cas de déversement en mer.

INCIDENCES CUMULATIVES ET TRANSFRONTALIÈRES

On a envisagé les incidences cumulatives potentielles des projets raisonnablement prévisibles. On pense que les principales incidences cumulatives potentielles pour le Projet approuvé se produiraient si le développement du Projet de la rivière Mary entraînait une augmentation de la production de minerai de fer allant jusqu'à deux fois le taux de production proposé actuellement. Les autres projets dans la région auront seulement des incidences cumulatives mineures. Un taux de production doublé d'au moins un des gisements augmenterait les incidences sur un certain nombre de composantes socioéconomiques, mais pas dans la mesure de s'attendre à ce que l'un ou l'autre des effets cumulatifs soit significatif. En ce qui concerne le Projet approuvé, la Proposition de la phase 2 ne présente aucun effet cumulatif important.

Des incidences transfrontières sur les mammifères marins pourraient survenir en raison de la navigation. Cependant, comme les incidences sur les mammifères marins dans la région étudiée ne sont pas significatives, les incidences transfrontalières sont également négligeables. Des incidences socioéconomiques se produiront dans d'autres régions du Canada en raison de l'emploi de personnes provenant de l'extérieur du Nunavut dans le cadre de la Proposition de phase 2. Cependant, ces incidences ne sont pas jugées significatives.

PRÉOCCUPATIONS DES COLLECTIVITÉS

Au cours des dernières années, un certain nombre de préoccupations ont été soulevées par des collectivités et des mesures ont été prises pour y répondre. Certaines des questions clés sont liées à l'équilibre essentiel entre le développement et le maintien des modes de vie traditionnels.

CHANGEMENTS SOCIOCULTURELS

Les bienfaits socioéconomiques de la Proposition de phase 2 entraîneront inévitablement des changements sociaux pour les Inuits des collectivités de la région et du Nunavut dans son ensemble. Le pouvoir d'achat accru des employés ainsi que la redistribution de la richesse générée par les activités de la Proposition de phase 2 sont susceptibles d'accélérer les changements que vivent actuellement la société et les familles inuites. Bien que de tels changements soient inévitables et continuent de survenir, avec ou sans la Proposition de phase 2 ou le Projet approuvé élargi, le rythme et la direction de ces changements demeurent des préoccupations légitimes pour de nombreux Inuits.

Des préoccupations ont été exprimées sur l'effet global de la Proposition de phase 2 ou du Projet approuvé élargi sur les activités de récolte et d'utilisation des terres qui pourraient découler des interactions combinées de la Proposition de phase 2 ou du Projet approuvé élargi sur un large éventail de facteurs. Ces incidences interactives ont été prises attentivement en considération et les résultats potentiellement bénéfiques sur les activités de récolte semblent plus probables que des résultats négatifs globaux. Baffinland continuera de collaborer avec les collectivités pour entreprendre une surveillance concertée et régler les problèmes au fur et à mesure qu'ils surviennent.

CONCLUSIONS DE L'EIE

La Proposition de phase 2 comprend une évaluation approfondie des plans de développement du Projet. La Proposition de phase 2 est basée sur des études approfondies des milieux biophysiques et socioéconomiques et s'appuie sur les connaissances acquises lors de l'examen de l'ÉFIE et de l'ERP du Projet approuvé. De nombreuses consultations ont été entreprises pour cerner et traiter les préoccupations et les intérêts des Inuits, du public, des organisations et des hameaux inuits locaux et régionaux, du gouvernement du Nunavut, des organismes fédéraux et des autres parties intéressées, ainsi que pour bénéficier des connaissances des Aînés de la région. La Proposition de phase 2 a abordé les sujets identifiés dans les lignes directrices de la CNER fournies pour le Projet.

La Proposition de phase 2 sera conçue pour répondre à toutes les exigences réglementaires pertinentes et pour éviter, limiter et minimiser, dans la mesure du possible les incidences négatives et pour améliorer les avantages socioéconomiques. Aucun problème en suspens n'a été déterminé, qui ne peut être abordé actuellement par la gestion adaptative et le suivi. Baffinland est sûre d'avoir proposé une Proposition de la phase 2 qui procurera des retombées économiques positives aux investisseurs et des avantages à la population, au gouvernement du Nunavut et aux organisations inuites. Un système complet de gestion et de suivi a été mis au point pour garantir le respect des engagements pris dans le cadre de la Proposition de la phase 2 ainsi que l'ÉFIE du Projet approuvé. Baffinland s'engage à continuellement tenir des consultations avec les intervenants et à répondre aux préoccupations du public tout au long de la durée de la Proposition de la phase 2 et du Projet approuvé élargi.

AUCUNE INCIDENCE NÉGATIVE SIGNIFICATIVE SUR L'ENVIRONNEMENT BIOPHYSIQUE

La Proposition de phase 2 sera conçue pour répondre à toutes les exigences réglementaires pertinentes et pour éviter, limiter et minimiser, dans la mesure du possible les incidences négatives et pour améliorer les avantages socioéconomiques. L'évaluation environnementale conclut que, compte tenu des interactions environnementales et des mesures d'atténuation prévues, les effets résiduels du Projet sur les composantes valorisées de l'écosystème (CVÉ) de l'environnement biophysique ne seront pas significatifs.

Un système complet de gestion et de suivi a été développé pour maintenir les engagements du Projet. Les pratiques de gestion existantes continueront d'être appliquées avec la Proposition de la phase 2, et les plans de gestion seront mis à jour, le cas échéant, pour inclure la Proposition de la phase 2.

INCIDENCES SOCIOÉCONOMIQUES POSITIVES

Les évaluations des incidences potentielles sur l'environnement socioéconomique ont conclu qu'il y aura des incidences positives sur l'emploi local et le développement des compétences et que les revenus reviendront au gouvernement du Nunavut. L'ERAI veillera à ce que les retombées du Projet profitent aux collectivités inuites voisines et à la région Qikiqtaaluk du Nunavut. Un avantage important de la Proposition de phase 2 sera la croissance de l'économie territoriale qui favorisera la stabilité économique au Nunavut. L'augmentation du nombre de projets miniers en cours au Nunavut aidera à stabiliser l'économie territoriale.

Les infrastructures routières, ferroviaires et portuaires construites dans le cadre de la Proposition de phase 2 offriront des possibilités d'accéder à d'autres gisements minéraux dans la région du nord l'île de Baffin et pourraient améliorer l'accès à la cueillette et au tourisme pour les Inuits. Les deux ports offriront des possibilités d'utilisations commerciales supplémentaires et les données bathymétriques recueillies et assemblées suite au Projet et à la Proposition de la phase 2 fourniront des informations importantes pour les voies de navigation dans le bassin Foxe et au port de Milne.

Le tableau 1 présente un résumé des incidences environnementales résiduelles sur les CVÉ et les CSÉV.

FORMAT DE LA DÉCLARATION DES INCIDENCES ENVIRONNEMENTALES

La Proposition de la phase 2 est conçue pour répondre aux exigences de l'Accord du Nunavut, de la NuPPAA et des lignes directrices amendées, alors que la BIM veut amender le certificat de Projet 005 du Conseil d'examen des répercussions du Nunavut. En outre, BIM souhaite également modifier son permis existant de type A d'utilisation de l'eau et prévoit poursuivre un processus d'examen coordonné avec l'Office des eaux du Nunavut. De plus, la Proposition de la phase 2 répondra aux exigences de plusieurs organismes fédéraux et territoriaux pour permettre certaines activités et sera assujettie à toutes les lois et à tous les règlements pertinents. La plupart des approbations opérationnelles requises pour la Proposition de la phase 2 sont déjà en place, bien que des modifications soient nécessaires. Plusieurs nouvelles approbations devront également être requises.

La Proposition de la phase 2 est conforme aux exigences de la CNER énoncées dans les lignes directrices pour la préparation de l'EIE publiées le 16 novembre 2009 et amendées par la suite le 3 novembre 2010 et le 6 octobre 2015. La Proposition de la phase 2 est constituée du document principal (sections 1 à 12), accompagné d'annexes administratives et techniques. Les documents techniques justificatifs (DTJ) présentent des informations d'évaluation, des analyses à l'appui et des détails de modélisation plus détaillés que ceux présentés dans le document principal. Pris ensemble, et compte tenu de ce qui a été évalué dans l'ÉFIE et des modifications ultérieures dans le cadre du Projet approuvé, ces documents satisfont aux exigences des lignes directrices; une concordance détaillée avec ces lignes directrices est fournie à l'annexe B.

L'addenda comprend 12 sections, comme suit :

Section 1 : Introduction — fournit un résumé du Projet proposé, y compris les antécédents et la forme juridique d'exploitation, ainsi qu'une description du promoteur, y compris son rendement environnemental, social, de santé et de sécurité, de surveillance et de respect de l'environnement et de remise en état.

Section 2 : Besoins et objectif — fournit un résumé des besoins et des objectifs du Projet proposé.

Section 3 : Régime réglementaire et fiscal — décrit le processus et les exigences réglementaires et fournit une liste des approbations actuelles et requises.

Section 4 : Description du Projet — comprend une description du Projet proposé, y compris les facteurs pris en compte dans la conception du Projet et le développement futur potentiel.

Section 5 : Système de gestion environnementale — présente le système de gestion environnementale de Baffinland et les plans connexes pour la protection de l'environnement, la surveillance et l'atténuation des incidences indésirables dans les environnements biophysiques et socioéconomiques, et décrit les phases et l'échéancier du Projet.

Section 6 : Alternatives du Projet — présente les alternatives envisagées pour le Projet.

Section 7 : Résultats des consultations publiques et des études de QI — décrit l'approche de Baffinland à l'égard de l'implication communautaire des intervenants et des Inuits, y compris les résultats des activités de consultation.

Section 8 : Conditions existantes - fournit une description des conditions existantes pour le Projet, y compris le contexte régional et les conditions biophysiques et socioéconomiques de base.

Section 9 : Méthodes d'évaluation des incidences environnementales — identifie les méthodes d'évaluation utilisées pour évaluer les incidences environnementales et sociales du Projet sur les composantes valorisées, y compris une description des activités et des composantes du Projet, des composantes valorisées et des limites de l'évaluation.

Section 10 : Évaluation des incidences environnementales — identifie et discute les incidences potentielles des accidents et des défaillances, les effets de l'environnement sur le Projet, ainsi que les incidences cumulatives et transfrontalières.

Section 11 : Évaluation de la durabilité — contient une analyse de la capacité des ressources renouvelables touchées par le Projet à soutenir les générations actuelles et futures au Nunavut et au Canada.

Section 12 : Conclusion — fournit un bref résumé du Projet et une conclusion du document.

Des informations supplémentaires sont fournies dans les documents techniques justificatifs (DTJ) :

- TSD 1 Analyse des alternatives
- TSD 2 Description du Projet
- TSD 3 Rapport d'atelier de la phase 2
- TSD 4 Rapport de consultation publique de la phase 2
- TSD 5 Carnet de l'étude des connaissances inuites de la rivière Mary
- TSD 6 Évaluation du changement climatique
- TSD 7 Évaluations atmosphériques
- TSD 8 Évaluation du relief, des sols et du pergélisol
- TSD 9 Base de référence de la végétation et évaluation d'impact
- TSD 10 Base de référence sur la faune terrestre et évaluation de l'impact
- TSD 11 Évaluation du potentiel d'exposition des épandages de poussière de minerai dans certaines CVÉ
- TSD 12 Base de référence sur les oiseaux migrateurs et évaluation de l'impact
- TSD 13 Évaluation de l'eau de surface
- TSD 14 Évaluation de l'habitat et du biote d'eau douce
- TSD 15 Plan de compensation de l'habitat des poissons d'eau douce
- TSD 16 Rapport sur les conditions de la glace
- TSD 17 Évaluation des effets sur le milieu marin
- TSD 18 Modèle de dispersion de l'eau de ballast
- TSD 19 Rapport de modélisation des déversements de carburant
- TSD 20 Rapport de modélisation hydrodynamique — port de Milne
- TSD 21 Évaluation des risques liés aux espèces envahissantes
- TSD 22 Évaluation du sillage et du remous de l'hélice des navires

TSD 23 Plan de compensation de l'habitat des poissons marins

TSD 24 Évaluation des effets sur les mammifères marins

TSD 25 Évaluation socioéconomique

TSD 26 Analyse du marché du travail

TSD 27 Effets cumulatifs et transfrontaliers

Tableau 1 Résumé des effets résiduels

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
CVÉ de l'environnement atmosphérique							
Météorologie et climat (y compris les changements climatiques)	Gaz à effet de serre (GES) : - dioxyde de carbone (CO₂) - méthane (CH₄) - oxyde nitreux (N₂O)	Augmentation des émissions de GES	Examiner, mettre à jour et mettre en œuvre la stratégie sur les changements climatiques, au besoin, pour incorporer la réduction des émissions de GES, l'adaptation au changement climatique et les initiatives de surveillance et de recherche en collaboration propres à la Proposition de la phase 2.	Les rejets de GES provenant du Projet sont faibles comparativement aux rejets totaux du Nunavut et du Canada et atténueront en partie les émissions actuelles grâce à l'utilisation du transport ferroviaire plutôt qu'au transport routier du minerai. Les rejets de gaz à effet de serre n'auront pas d'effet mesurable sur les changements climatiques mondiaux. Dans l'ensemble, les effets résiduels du Projet sur les changements climatiques devraient être : - de direction négative (le Projet entraînera des émissions de GES); - d'une ampleur faible (ne devraient pas contribuer de façon notable aux totaux de GES canadiens ou mondiaux ou aux changements climatiques mondiaux); - répandus géographiquement (les GES provoquent un effet global); - de fréquence continue; et - de nature irréversible (après l'arrêt des activités du Projet rejetant des GES, ceux-ci resteront dans l'atmosphère pendant 20 ans ou plus). - Il est fort probable que les effets résiduels se produiront.	Négligeable	Négligeable	Négligeable
Qualité de l'air	Principaux contaminants atmosphériques (PCA) : - total des particules en suspension (TPS) - dioxyde de soufre (SO₂) - dioxyde d'azote (NO₂) - dioxyde de carbone (CO) - dépôt de soufre et d'azote et apport d'acide potentiel (PAI) - matière particulaire <2,5 µm (PM_{2,5}) - matière particulaire <10 µm (PM₁₀) - poussières fugitives et concentrations et dépôts de métaux	Augmentation des PCA	- Examiner, mettre à jour et mettre en œuvre les plans suivants, ciblant la suppression des poussières le long du couloir de transport du Nord : - un plan de protection de l'environnement; - un plan de gestion de la qualité de l'air et de réduction du bruit; - un protocole de gestion de la poussière dans le plan de gestion des routes; et - un programme de surveillance des chutes de poussière décrit dans le Plan d'atténuation et de surveillance de l'environnement terrestre.	Les concentrations de SO₂, de NO₂ et de CO ne devraient pas dépasser les seuils à l'extérieur des ZDP. Des dépassements de MPT sont prévus sous certaines conditions. Cependant, aucun dépassement n'est prévu au camp d'hébergement près du port de Milne, ni au camp d'hébergement sur la rive ouest du lac Camp. Lorsque le nouveau chemin de fer sera opérationnel et que le minerai sera transporté par voie ferroviaire plutôt que par voie terrestre, les émissions de poussière le long du corridor de transport du Nord seront réduites par rapport aux niveaux actuels des opérations de l'ERP. Dans l'ensemble, les effets résiduels du Projet sur la qualité de l'air devraient être : - direction négative, bien que positive le long du corridor de transport une fois le chemin de fer opérationnel; - d'une ampleur qui dépasse les seuils pour certains scénarios modélisés dans le pire des cas, mais avec des dépassements d'atténuation supplémentaires qui ne sont pas prévus aux récepteurs sensibles; - géographiquement confiné à la ZEL; - rares; et - de nature réversible à la cessation des activités du Projet. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats des activités de surveillance continue liées à la qualité de l'air, le degré de confiance est modéré pour les prédictions des effets résiduels liés à la qualité de l'air.	Négligeable	Négligeable	Incidences transfrontières

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Bruit et vibrations	Niveaux de bruit et de vibration	- Augmentation des niveaux de bruit - Les effets potentiels de l'augmentation des niveaux de vibration ont été évalués pour le Projet approuvé (Baffinland, 2012) et ont été jugés non significatifs. Les vibrations dans le cadre de la Proposition de phase 2 devraient être très semblables à celles du Projet approuvé. Par conséquent, les vibrations ont été traitées comme une note d'information pour la Proposition de la phase 2.	- Examiner, mettre à jour et mettre en œuvre le plan de protection de l'environnement et le plan de gestion de la qualité de l'air et du bruit. - Mettre en œuvre les principales mesures d'atténuation décrites dans la Directive 038 de l'ARE (AEUB 2007), telles que : - le montage de moteurs à combustion interne avec des systèmes de silencieux appropriés; - l'utilisation, le cas échéant, d'écrans acoustiques des bâtiments existants sur le site pour protéger les habitations contre le bruit de l'équipement de construction; - l'utilisation à profit de la topographie locale pour filtrer les émissions de bruit, si possible; et - l'enclavement de l'usine de concassage / calibrage du port dans un bâtiment.	Dans l'ensemble, les effets résiduels du Projet sur le bruit et les vibrations devraient être : - direction négative; - d'une ampleur qui dépasse les seuils pour certains scénarios modélisés dans le pire des scénarios à l'extérieur des ZDP du site minier et du port de Milne, et parfois au camp d'hébergement à l'est du port de Milne; - géographiquement confiné à la ZEL; - d'une durée qui s'étend sur toute la durée du Projet - rares; et - de nature réversible à la cessation des activités du Projet. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats des activités de surveillance continue liées au bruit, le degré de confiance est élevé pour les prédictions des effets résiduels liés au bruit et aux vibrations.	Négligeable	Négligeable	Incidences transfrontières
CVÉ d'environnement terrestre							
Relief, sols et pergélisol	- Reliefs : - dépôts fluvio-glaciaires - eskers - drumlins - affleurements rocheux (falaises) - Géochimie - Paléontologie	- Incidences sur les reliefs uniques ou précieux - Augmentation des risques géologiques - Augmentation des risques géochimiques - Incidences sur les ressources paléontologiques	- Revoir, mettre à jour et mettre en œuvre les plans suivants : - un plan de protection de l'environnement; - un plan de gestion des bancs d'emprunt et des carrières; - un plan de gestion du chemin de fer; - un plan d'urgence ferroviaire; et - un plan d'intervention en cas d'urgence et en cas de déversement. - Une isolation thermique peut être utilisée pour les bâtiments proposés du port de Milne, et des pieux du type qui favorise l'adhérence due au gel peuvent être utilisés pour des fondations profondes.	Le remblai du chemin de fer traversera des dépôts fluvio-glaciaires et un grand esker. Ces reliefs ne sont cependant pas uniques sur le plan écologique étant donné l'abondance d'autres dépôts fluvio-glaciaires similaires (y compris les eskers) dans la ZER. La construction du chemin de fer éliminera également des affleurements rocheux existants. Cependant, ceux qui seront touchés ne sont pas utilisés à l'heure actuelle par des rapaces qui nichent sur des falaises. Le potentiel de LM/DRA provenant des carrières et des coupes de roche est considéré improbable, car la plus grande partie de la roche affectée est sédimentaire. Les roches granitiques présentes dans la zone devraient présenter un faible potentiel de LM/DRA. Dans l'ensemble, les effets résiduels du Projet sur les reliefs, les sols et le pergélisol devraient être : - de direction négative; - d'une ampleur faible; - géographiquement confinés à la ZEL; - d'une durée permanente; - rares; et - de nature irréversible. La probabilité est élevée que des effets résiduels surviennent au niveau : - un changement résiduel dans l'abondance et la distribution des reliefs uniques ou appréciables; et - une perturbation résiduelle des ressources paléontologiques dans le sol. La probabilité est faible que des effets résiduels surviennent au niveau : - des effets résiduels liés aux risques géologiques (c.-à-d. un tassement dû au dégel au deuxième quai minéralier du port de Milne, l'infrastructure terrestre du port de Milne et le long du chemin de fer du Nord proposé); et	Négligeable	Négligeable	Incidences transfrontières

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
				- d'une augmentation résiduelle des risques géochimiques (c.-à-d. une exposition des surfaces rocheuses potentiellement LM/DRA aux éléments [le long du chemin de fer du Nord]) a une faible probabilité de se produire. En tenant compte de l'information disponible et des résultats de la surveillance continue liée aux reliefs, aux sols et au pergélisol, il y a : - un niveau de confiance modéré dans les prédictions des effets résiduels liés au tassement dû au dégel le long du chemin de fer du Nord proposé et à l'exposition des surfaces de roches potentiellement LM/DRA aux éléments; et - un niveau de confiance élevé dans les prévisions des effets résiduels pour tous les autres effets résiduels sur les reliefs, les sols et le pergélisol.			
Végétation	- Abondance et la diversité de la végétation - Santé de la végétation - Végétation appréciée culturellement	- Un changement dans l'abondance et la diversité de la végétation - Un changement de la santé de la végétation - Toutes les incidences liées au Projet sur la végétation appréciée culturellement seront négligeables puisque les bleuets sont peu abondants dans la ZER et que les incidences ont déjà été évaluées pour le Projet approuvé avec un degré élevé de confiance comme étant négligeables à l'échelle de la ZER. Aucune évaluation des effets de la végétation culturellement valorisée n'a été effectuée pour la Proposition de la phase 2.	- Examiner, mettre à jour et mettre en œuvre le plan de protection de l'environnement et le plan d'atténuation et de surveillance de l'environnement terrestre. - Prendre des mesures pour garder l'équipement apporté sur le site exempt de sols pouvant contenir des graines de plantes qui ne se produisent pas actuellement dans le ZER. - Permettre la régénération naturelle des zones perturbées.	La Proposition de la phase 2 pourrait influencer sur l'abondance et la diversité de la végétation dans la ZDP, car la construction du couloir de transport du Nord et l'agrandissement du port de l'inlet Milne soustrairont environ 14 km² d'habitat terrestre. Les changements dans la santé de la végétation résultant des dépôts de PST et des émissions atmosphériques à l'extérieur de la ZDP étaient prédits comme négligeables par rapport à la variation naturelle. L'habitat végétal est susceptible d'être exposé à un certain niveau de dépôts de poussières générés à l'inlet Milne, au chemin Tote, au site minier et le long du chemin de fer du Nord. Bien que toutes les classes de végétation soient considérées comme sensibles au dépôt de poussière et qu'elles puissent être affectées par les dépôts annuels de PTS, la plupart des habitats demeureront intacts dans la ZER. Dans l'ensemble, les effets résiduels du Projet sur les changements climatiques devraient être : - de direction négative; - d'une ampleur qui dépasse les seuils pour certains paramètres de dépôt de poussières dans la ZDP; - confinés géographiquement principalement à la ZDP (ainsi qu'à la ZDP adjacente à la ZDP pour le dépôt de poussières); - rares; - d'une durée qui dure toute la vie du Projet; et - de nature réversible à la cessation des activités du Projet et avec la remise en état. Il est fort probable qu'un changement résiduel de l'abondance et de la diversité de la végétation se produira. La probabilité est faible que des effets résiduels surviennent au niveau d'un changement résiduel de la santé de la végétation dû au PST et d'un changement résiduel de la santé de la végétation dû aux émissions atmosphériques. Compte tenu des informations disponibles et des résultats des activités de surveillance continue liées à la végétation, il y a : - un niveau élevé de confiance dans les prédictions des effets résiduels liés à un changement de l'abondance et de la diversité de la végétation; et - un niveau modéré de confiance dans les prédictions des effets résiduels liés aux changements de la santé de la végétation dus au PST et aux émissions atmosphériques.	Négligeable	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Oiseaux et leurs habitats	• Plongeon catmarin • Oie des neiges • Eider à duvet • Eider à tête grise • Guillemot de Brünnich • Bruant lapon • Arlequin plongeur • Faucon pèlerin • Bécasseau maubèche • Bécasseau roussâtre • Phalarope à bec étroit • Mouette blanche • Mouette rosée • Hibou des marais	• Effets sur l'habitat • Effets sur le risque de mortalité • Effets sur la santé	• Examiner, mettre à jour et mettre en œuvre le plan de protection de l'environnement et le plan d'atténuation et de surveillance de l'environnement terrestre. • Rendre les sites de nidification des rapaces temporairement inaccessibles aux oiseaux nicheurs pendant les saisons de nidification potentiellement affectées par la construction.	Dans l'ensemble, les effets résiduels du Projet sur les changements climatiques devraient être : • de direction négative; • d'une ampleur faible; • géographiquement limitée à la ZDP en général, mais s'étendant à la ZEL pour les effets indirects sur la qualité ou la disponibilité de l'habitat; • Dans une gamme allant de peu fréquente (pour les occurrences de blessures d'oiseaux et de mortalité), à fréquente (pour les perturbations sensorielles), à continue (pour la perte d'habitat); • d'une durée qui dure toute la vie du Projet; et • de nature réversible à la cessation des activités du Projet. La probabilité est faible que des effets résiduels surviennent au niveau de la santé des oiseaux et est modérée pour tous les autres effets résiduels sur les oiseaux et l'habitat des oiseaux. Compte tenu de l'information disponible et des résultats des activités de surveillance continue liées au bruit ,le degré de confiance est élevé pour les prédictions des effets résiduels liés aux oiseaux et à leurs habitats.	Négligeable	Négligeable	Négligeable
Habitat terrestre et faunique	• Caribou • Loup	• Effets sur l'habitat • Effets sur le mouvement • Effets sur le risque de mortalité • Effets sur la santé	• Revoir, mettre à jour et mettre en œuvre les plans suivants : ○ un plan de protection de l'environnement; ○ un plan d'atténuation et de surveillance de l'environnement terrestre; ○ un plan de gestion des routes; ○ un plan de gestion du chemin de fer; et ○ un plan d'urgence ferroviaire. • Mettre en œuvre les mesures de protection du caribou élaborées en collaboration avec le QIA. • Poursuivre l'implication avec les intervenants et le Groupe de travail sur l'environnement terrestre.	Les composantes et les activités de la phase 2 du site minier, du chemin Milne et du chemin de fer du nord, ainsi que du port de Milner ont le potentiel d'interagir avec la faune et l'habitat terrestres par des collisions; une augmentation des récoltes; une perte directe ou une altération de l'habitat faunique terrestre; des obstacles aux déplacements de la faune dans les habitats ou entre ceux-ci; et des perturbations sensorielles. Dans l'ensemble, les effets résiduels du Projet sur la faune terrestre et l'habitat faunique devraient être : • de direction négative; • d'une ampleur faible en général compte tenu des mesures d'atténuation prévues, mais d'ampleur modérée par rapport à l'efficacité potentiellement réduite de l'habitat du caribou pendant la saison hivernale; • généralement confinés géographiquement à la ZDP, mais s'étendant à l'extérieur de la ZDP (dans un ZOI de 14 km) pour les effets résiduels potentiels sur l'habitat du caribou; • dans une gamme allant de peu fréquente (pour les occurrences de dommages causés par la faune et de mortalité) à fréquente (pour les perturbations sensorielles), à continue (pour la perte d'habitat et les obstacles au mouvement) pour la vie du Projet; • d'une durée qui dure toute la vie du Projet; et • de nature réversible avec atténuation additionnelle et cessation des activités du Projet, sauf dans le cas de la variation résiduelle du risque de mortalité du caribou associée à l'amélioration de l'accès à la cueillette ou à la connaissance de la zone, qui peut persister indéfiniment. Il est fort probable que le Projet entraînera des changements résiduels dans les déplacements du caribou et le risque de mortalité du caribou. La probabilité est modérée que des effets résiduels surviennent au niveau de l'habitat du caribou et du loup et elle est faible pour les changements résiduels dans la santé du caribou.	Négligeable	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
				En tenant compte de l'information disponible et des résultats de la surveillance continue liée à la faune terrestre et à l'habitat de la faune, il y a : - un niveau modéré de confiance pour les prédictions des effets résiduels liés à l'habitat du caribou, à ses déplacements et à sa santé, ainsi qu'à l'habitat du loup; et - un niveau élevé de confiance des prévisions des effets résiduels liés à la création d'emplois dans la ZEL.			
CVÉ de l'environnement aquatique d'eau douce							
Quantité et qualité de l'eau douce	Quantité et qualité de l'eau douce	- Effets sur la quantité d'eau - Effets sur la qualité de l'eau	- Revoir, mettre à jour et mettre en œuvre les plans suivants : - un plan de protection de l'environnement; - plan de gestion de l'eau de surface, des écosystèmes aquatiques et des poissons et de leurs habitats; - plan de gestion de l'approvisionnement en eau douce, des eaux usées et des eaux usées; et - les plans requis en vertu du permis d'utilisation de l'eau de type A, qui seront soumis à l'OEN pour examen et approbation, y compris : - un plan de surveillance des répercussions sur le milieu aquatique; - programme d'échantillonnage des eaux de surface — plan d'assurance et de contrôle de la qualité; - plan de gestion du dynamitage; et - plans de gestion de la carrière.	À la suite de la Proposition de la phase 2, la quantité et la qualité de l'eau douce peuvent changer en raison des changements dans les taux de sédimentation, l'hydrologie et les concentrations de métaux, ainsi que de l'écoulement de l'eau par des retraits et des détournements. Dans l'ensemble, les effets résiduels du Projet sur la quantité et la qualité de l'eau douce devraient être: - de direction négative, à l'exception d'une direction positive sur la qualité de l'eau au site minier en raison des changements associés au traitement secondaire du minerai; - d'une ampleur faible compte tenu des mesures d'atténuation prévues et de la faible empreinte concernée par rapport à l'échelle des bassins hydrographiques dans la région; - géographiquement confinés à la ZEL; - des effets peu fréquents sont associés aux prélèvements d'eau et des effets continus sont associés aux dérivations de cours d'eau et à la quantité et à la qualité de l'eau et des sédiments; - d'une durée qui se produira tout au long de la vie du Projet; et - de nature réversible avec des mesures d'atténuation supplémentaires et la cessation des activités du Projet. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à la quantité et à la qualité de l'eau douce, il y a niveau élevé de confiance des prévisions sur les effets résiduels liés à la quantité et la qualité de l'eau douce.	Négligeable	Négligeable	Aucune incidence transfrontière
Biote d'eau douce et habitat	Omble chevalier	- Effets sur la santé et l'état de l'omble chevalier - Effets sur l'habitat de l'omble chevalier - Effets sur le risque de mortalité de l'omble chevalier	- Respecter les exigences d'autorisation et de compensation applicables du MPO (MPO, 2013b, 2016). - Si nécessaire, obtenir du MPO une ou des autorisation(s) spécifique(s) au Projet en vertu de la <i>Loi sur les pêches</i> pour les traversées de cours d'eau et autres travaux dans l'eau, et se conformer aux modalités et conditions connexes. - Élaborer un plan de compensation qui sera soumis au MPO pour examen et approbation dans le cadre de la demande de l'autorisation en vertu de la <i>Loi sur les pêches</i>, pour compenser les dommages sérieux aux poissons associés à la construction du chemin de fer du nord et à la construction du deuxième quai minéralier au port de Milne.	À la suite de la Proposition de la phase 2, une perte ou une altération de l'habitat de l'omble chevalier est prévue en raison de la construction du chemin de fer du Nord. Les infrastructures dans l'eau (c.-à-d. les fondations de ponts, les ponceaux, les activités de dérivation) peuvent nuire au passage des poissons. Les prélèvements d'eau pour la suppression des poussières peuvent réduire l'habitat riverain et causer des échouages ou des impacts sur les prises d'eau. La qualité et la quantité de l'eau et des sédiments sur le site minier et le long du corridor de transport du Nord pourraient être affectées négativement par les apports de sédiments provenant de la production, du transport et des activités connexes. Dans l'ensemble, les effets résiduels du Projet sur le biote et l'habitat en eau douce devraient être : - de direction négative; - d'une ampleur faible compte tenu des mesures d'atténuation prévues et de la faible empreinte affectée par rapport à l'échelle de l'habitat disponible dans la région; - géographiquement confinés à la ZEL;	Négligeable	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
				- des effets peu fréquents sont associés aux prélèvements d'eau et des effets continus sont associés aux dérivations de cours d'eau et à la quantité et à la qualité de l'eau et des sédiments; - d'une durée qui se produira tout au long de la vie du Projet; et - de nature réversible avec des mesures d'atténuation et la cessation des activités du Projet. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à la quantité et à la qualité de l'eau douce, il y a un niveau élevé de confiance des prévisions sur les effets résiduels.			
CVÉ de l'environnement marin							
Qualité de la glace, de l'eau et des sédiments marins	- Glace marine - Qualité de l'eau marine - Qualité des sédiments marins	- Effets sur la glace marine - Effets sur la qualité de l'eau marine - Effets sur la qualité des sédiments marins	- Passer en revue et mettre à jour les plans suivants : - un plan de protection de l'environnement; - un plan de surveillance des effets sur l'environnement marin; - un plan de gestion du transport maritime et de la faune marine; - un plan de gestion de l'eau de surface, des écosystèmes aquatiques et des poissons et de leurs habitats; - un plan de gestion de l'approvisionnement en eau douce, des eaux usées et des eaux usées; et - un plan d'intervention d'urgence; - un plan d'urgence en cas de déversement; - un plan d'urgence contre la pollution par les hydrocarbures; - un plan d'intervention en cas de déversement en mer; et - les plans requis en vertu du permis d'utilisation de l'eau de type A, qui seront soumis à l'OEN pour examen et approbation, y compris : - un plan de surveillance des répercussions sur le milieu aquatique; et - un programme d'échantillonnage des eaux de surface — plan d'assurance et de contrôle de la qualité; - Gérer les eaux de ruissellement, les eaux d'égout et les eaux usées pour se conformer aux limites de rejet de qualité de l'effluent, telles que spécifiées dans le permis d'utilisation de l'eau de type A.	Les composantes et les activités de la Proposition de la phase 2 au port de Milne et sur la route de navigation du Nord sont susceptibles d'interagir avec la qualité des glaces marines, de l'eau et des sédiments pendant la construction et l'enlèvement du quai minéralier et d'autres installations maritimes; le trafic maritime; la vidange d'eau de ballast; l'évacuation de l'eau et des eaux usées du site; la poussière de minerai provenant des stocks et le chargement des navires. Dans l'ensemble, les effets résiduels du Projet sur la qualité de la glace, de l'eau et des sédiments marins sont les suivants : - de direction négative; - d'une ampleur faible compte tenu des mesures d'atténuation prévues; - géographiquement confinés à la ZEL mais s'étendant à la ZER pour une augmentation résiduelle dans les MES et les métaux dans l'eau ainsi qu'une augmentation résiduelle des métaux et un changement de la composition physique dans les sédiments en raison de la dispersion et du dépôt de poussière; - fréquents; - d'une durée qui dure toute la vie du Projet; et - de nature réversible avec des mesures d'atténuation supplémentaires et la cessation des activités du Projet. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à la quantité et à la qualité de l'eau douce, il y a un niveau élevé de confiance des prévisions sur les effets résiduels.	Négligeable	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Habitat marin et biote	- Habitat des poissons marins - Ombre chevalier	- Effets sur l'habitat des poissons marins - Effets sur la santé et l'état de l'ombre chevalier	- Mettre en œuvre les engagements énumérés ci-dessus pour la CVÉ relative à la qualité de la glace, de l'eau et des sédiments marins. - Respecter les exigences d'autorisation et de compensation applicables du MPO (MPO, 2013b, 2016). - Si nécessaire, obtenir du MPO une ou des autorisation(s) spécifique(s) au Projet en vertu de la <i>Loi sur les pêches</i> pour les travaux dans l'eau, et se conformer aux modalités et conditions connexes. - Élaborer un plan de compensation qui sera soumis au MPO pour examen et approbation dans le cadre de la demande de l'autorisation en vertu de la <i>Loi sur les pêches</i>, pour compenser les dommages sérieux aux poissons associés à la construction du deuxième quai minéralier au port de Milne. Le DNT 23 présente un plan de compensation maritime conceptuel. - Continuer de mettre en œuvre le plan existant de surveillance des espèces aquatiques envahissantes de l'écosystème marin de l'inlet Milne.	Les composantes et les activités de la Proposition de la phase 2 au port de Milne et l'expédition maritime le long de la route de navigation du Nord sont susceptibles d'interagir avec le biote marin et son habitat par la perte ou l'altération de l'habitat, les perturbations acoustiques et l'introduction d'espèces envahissantes. Dans l'ensemble, les effets résiduels du Projet sur les changements climatiques devraient être : - de direction négative; - d'une ampleur faible compte tenu des mesures d'atténuation prévues; - d'une durée allant de la construction (p. ex., la remise en suspension des sédiments) à la prolongation de la durée de vie du Projet (p. ex. introduction d'espèces aquatiques envahissantes); - géographiquement confiné à la ZEL, à l'exception de l'introduction d'espèces aquatiques envahissantes; - continus, mis à part les problèmes de remise en suspension des sédiments pendant la construction; et - de nature réversible avec atténuation supplémentaire et cessation des activités du Projet, à l'exception de l'introduction d'espèces aquatiques envahissantes. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à l'habitat marin et au biote, il y a un niveau élevé de confiance des prévisions sur les effets résiduels.	Négligeable	Négligeable	Négligeable
Mammifères marins	- Phoque annelé - Morse - Béluga - Narval - Baleine boréale - Ours polaire	- Changement d'habitat - Effets de perturbation acoustique - Effets de déficience auditive - Effets de masquage auditif - Effets sur le risque de mortalité	- Mettre en œuvre les engagements énumérés ci-dessus pour la CVÉ relative à la qualité de la glace, de l'eau et des sédiments marins. - Passer en revue et mettre à jour les plans supplémentaires suivants : - un plan de gestion du transport maritime et de la faune marine; - plan de sécurité de l'ours polaire; et - cadre de surveillance des effets sur l'environnement biophysique, Annexe 4 (Études sur la surveillance des effets sur l'environnement chez les mammifères marins). - Mettre en œuvre une procédure de montée en charge pour les activités de battage des pieux pendant la construction et installer un rideau de bulles autour de la pile mouillée pour amortir la transmission du son dans l'eau pendant l'enfoncement des pieux. - Impliquer un observateur des mammifères marins (MMO) qualifié et expérimenté pour entreprendre la surveillance des mammifères marins et communiquer toutes les observations de mammifères marins à l'entrepreneur pour l'enfoncement des pieux, pendant toutes les activités d'enfoncement des pieux. - Réduire la vitesse des navires lors du passage le long du corridor de navigation établi et dans le port de Milne.	Les composantes et les activités de la Proposition de la phase 2 au port de Milne et dans la route de navigation du Nord sont susceptibles d'interagir avec les populations de mammifères marins, en raison des collisions avec les navires, des perturbations acoustiques, de la charge de contaminants et de la perte d'habitat. Dans l'ensemble, les effets résiduels du Projet sur les mammifères marins devraient être : - de direction négative; - d'une ampleur faible compte tenu des mesures d'atténuation planifiées; - géographiquement confinés à la ZEL; - rares; - d'une durée qui s'étend sur toute la durée du Projet - de nature réversible avec des mesures d'atténuation supplémentaires et la cessation des activités du Projet. En tenant compte de l'information disponible et des résultats de la surveillance continue liée aux mammifères marins, il y a : - un niveau modéré à élevé de confiance pour les prévisions des effets résiduels liés à un changement d'habitat; et - un niveau modéré de confiance pour les prévisions des effets résiduels pour tous les autres mammifères marins. Il est fort probable que les effets résiduels se produiront. Compte tenu de l'information disponible et des résultats de la surveillance continue liée aux mammifères marins, le degré de confiance est élevé pour les prédictions des effets résiduels.	Négligeable	Négligeable	Négligeable

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
VSEC de l'environnement humain							
Caractéristiques sociodémographiques de la population	Stabilité démographique	- Changement de la migration interne des employés du Projet non inuit vers la ZEL du nord de l'île de Baffin - Évolution de la migration des résidents inuits de la ZEL du nord de l'île de Baffin	Embauche directe de l'intérieur et de l'extérieur de la ZEL.	Bien que les niveaux d'emploi des Inuits sont susceptibles d'augmenter au fil du temps, l'ampleur globale de l'émigration des Inuits ne devrait pas changer. Les résultats de l'évaluation pour les caractéristiques sociodémographiques de la population demeurent donc les mêmes que pour le Projet approuvé. Les effets résiduels potentiels découlant de l'influx migratoire et de l'émigration ne devraient pas être suffisants pour causer des effets néfastes sur la stabilité démographique des collectivités touchées. Dans l'ensemble, les effets résiduels du Projet sur les caractéristiques sociodémographiques de la population devraient être : - de direction négative; - d'une ampleur faible à modérée; - localisés dans les collectivités où se fera l'embauche; - de fréquence intermittente; - d'une durée à long terme; et - de nature réversible. Il est fort probable que les effets résiduels se produiront. En tenant compte de l'information disponible et des résultats de la surveillance continue liée aux caractéristiques sociodémographiques de la population, il y a : - un niveau modéré de confiance dans les prévisions des effets résiduels liés à l'émigration des résidents inuits de la zone d'étude locale du nord de l'île de Baffin; et - un niveau élevé de confiance dans les prévisions des effets résiduels liés à l'influx migratoire des employés du Projet non inuit dans la ZEL du nord de l'île de Baffin.	Négligeable	Négligeable	Aucune incidence transfrontière
Éducation et formation	- compétences de vie - Éducation et compétences	- Amélioration des compétences de vie chez les résidents de la ZEL - Changement dans les incitations liées à la fréquentation scolaire et au succès - Changement dans les opportunités d'acquérir des compétences	- Examiner, mettre à jour et mettre en œuvre le plan des ressources humaines. - Mettre en œuvre les initiatives de l'ERAI et le programme de formation Q-STEP	En général, la Proposition de la phase 2 devrait avoir des effets positifs sur l'éducation et la formation. Ces effets positifs devraient découler de l'accès au travail industriel appuyé par la préparation préalable à l'emploi et la formation en cours d'emploi. Dans l'ensemble, les effets résiduels du Projet sur l'éducation et la formation devraient être : - d'une direction positive à principalement positive; - d'une ampleur modérée à élevée; - localisés dans les collectivités où se fera l'embauche; - de fréquence continue; et - d'une durée qui s'étend sur toute la vie du Projet à une durée à long terme; et - de nature irréversible ou spontanée. La probabilité est élevée que des effets résiduels surviennent. En tenant compte de l'information disponible et des résultats de la surveillance continue liée à l'éducation et à la formation, il y a : - Un niveau modéré de confiance pour les prédictions des effets résiduels liés à l'amélioration des compétences de vie chez les résidents de la ZEL; et - un niveau élevé de confiance dans les prévisions des effets résiduels liés aux incitations à la fréquentation scolaire et à la réussite scolaire, ainsi qu'aux possibilités d'acquérir des compétences.	Significatif (positif)	Effets cumulatifs positifs	Effets transfrontières positifs

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Moyens de subsistance et emploi	• Emploi salarié • Progression du travail et avancement professionnel	• Création d'emplois dans la ZEL • Changement dans l'emploi des résidents de la ZEL • Nouveaux parcours de carrière	• Examiner, mettre à jour et mettre en œuvre le plan des ressources humaines. • Mettre en œuvre les initiatives de l'ERAI et le programme de formation Q-STEP. • Désigner toutes les collectivités de la ZEL comme points d'embauche.	En général, la Proposition de la phase 2 devrait avoir des effets positifs sur les moyens de subsistance et l'emploi. Ces effets positifs devraient découler de nouvelles possibilités d'emploi, d'engagements locaux en matière d'embauche et d'occasions de progression de carrière offertes par le Projet. Dans l'ensemble, les effets résiduels du Projet sur les moyens de subsistance et l'emploi devraient être : • de direction positive; • d'une ampleur modérée à élevée; • localisés dans les collectivités où se fera l'embauche; • de fréquence continue; et • d'une durée à moyen et à long terme; et • spontanés. La probabilité est élevée que des effets résiduels surviennent. En tenant compte de l'information disponible et des résultats de la surveillance continue liée aux moyens de subsistance et à l'emploi, il y a : • Un niveau modéré de confiance dans les prédictions des effets résiduels relatifs à l'emploi des résidents de la ZEL et de plans de carrière; et • Un niveau élevé de confiance dans les prévisions des effets résiduels liés à la création d'emplois dans la ZEL.	Significatif (positif)	Effets cumulatifs positifs	Effets transfrontières positifs
Développement économique et autonomie	• Terre • Gens • Économies communautaires • Économie territoriale	Les effets résiduels spécifiques n'ont pas été identifiés ou évalués pour cette CSÉV. Au lieu de cela, des évaluations globales des indicateurs clés « terre », « gens », « économie communautaire » et « économie territoriale » ont été menées et des conclusions ont été tirées sur la base de cette analyse intégrée.	• Examiner, mettre à jour et mettre en œuvre le plan des ressources humaines. • Mettre en œuvre les initiatives de l'ERAI et le programme de formation Q-STEP. • Désigner toutes les collectivités de la ZEL comme points d'embauche.	Aucun nouvel effet résiduel ne résultera de la Proposition de la phase 2, car aucune nouvelle voie d'impact pour le développement économique et l'autosuffisance ne sera créée. La Proposition de la phase 2 n'introduira pas de nouvelles activités qui modifient les effets précédemment évalués pour le développement économique et l'autonomie, bien que les effets positifs dans certains domaines puissent être améliorés. À l'instar des évaluations antérieures du Projet approuvé, l'expansion économique directe et indirecte associée au Projet créera de nouvelles possibilités d'emploi et d'affaires dans l'ensemble de la ZER, en particulier dans la ZEL. Le Projet améliorera la capacité de la main-d'œuvre et pourrait accroître la capacité des entreprises inuites. Les effets résiduels n'ont pas été caractérisés pour cette CSÉV parce que l'évaluation était de nature intégrative, s'appuyant principalement sur les conclusions d'autres évaluations des effets résiduels CVÉ et CSÉV pour comprendre les interactions de la Proposition de la phase 2 sur le développement économique et l'autonomie. L'orientation générale des effets de la Proposition de la phase 2 sur le développement économique et l'autonomie de la CSÉV a été évaluée avec un niveau de confiance positif élevé.	Significatif (positif)	Effets cumulatifs positifs	Effets transfrontières positifs

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Santé humaine et bien-être	- Bien-être des enfants - Abus de substance - Stabilité sociale de la collectivité	- Changements dans la parentalité - Évolution du revenu des ménages et de la sécurité alimentaire - Changement dans le transport des substances à travers les sites du Projet - Changement d'abordabilité des substances - Changement d'attitude envers les substances et les dépendances - Effets de l'absence de la collectivité pendant les rotations de travail	- Continuer de mettre en œuvre une politique sans drogue / sans alcool sur le site avec des recherches de bagages pour tous les employés et entrepreneurs arrivant sur le site, un accès au PAEF pour les travailleurs et les membres de leur famille et des contributions au fonds INPK. - Mettre en œuvre les initiatives de l'ERAI.	La nature des activités associées à la Proposition de la phase 2 est telle que les effets positifs associés au Projet approuvé continueront d'être réalisés et éventuellement améliorés. La Proposition de la phase 2 devrait avoir un effet positif sur les parents qui gagnent un emploi au Projet et un avantage global pour la plupart des enfants du bien-être amélioré que leurs parents gagnent d'avoir un bon travail, une réduction des contraintes financières dans la famille et une amélioration des aliments. Sécurité. Pour une minorité d'enfants, les défis liés à l'absence des parents, à la transition entre les allées et venues des parents, aux attentes changeantes des parents et à la réaction des parents aux stress et aux préoccupations engendrés par l'emploi par navette aérienne devraient engendrer certains effets résiduels négatifs. Les effets résiduels négatifs du Projet sur la santé humaine et le bien-être devraient être : - d'une ampleur faible à modérée; - localisés dans les collectivités où se fera l'embauche; - de fréquence intermittente à continue; - d'une durée à moyen et à long terme; et - spontanés. La probabilité est élevée des effets résiduels surviennent au niveau : - des changements résiduels dans la parentalité; et - des effets de l'absence de la collectivité pendant les rotations de travail. La probabilité est modérée que des effets résiduels surviennent au niveau du transport de substances à travers les sites du Projet. En tenant compte de l'information disponible et des résultats de la surveillance continue liée à l'éducation et à la formation, il y a : - un niveau modéré de confiance dans les prédictions d'effets résiduels négatifs liés aux changements dans la parentalité; et - un niveau élevé de confiance dans les prédictions d'effets résiduels négatifs liés au transport de substances à travers les sites du Projet et l'éloignement de la collectivité pendant les rotations de travail.	Négligeable	Négligeable	Négligeable
Infrastructure communautaire et services publics	Recrutement et rétention du personnel dans les hameaux de la ZEL du nord de l'île de Baffin	- Effets sur la concurrence pour les travailleurs qualifiés - Changement de la capacité de la main-d'œuvre	Surveiller les informations spécifiques aux employés (par exemple, à travers des enquêtes et des dossiers d'emploi et de formation), l'utilisation de l'infrastructure communautaire liée au projet et les statistiques gouvernementales (par exemple, sur l'utilisation des centres de santé).	La nature des activités associées à la Proposition de la phase 2 est telle que les effets positifs associés au Projet approuvé continueront d'être réalisés et éventuellement améliorés. La Proposition de la phase 2 devrait avoir un effet positif sur la capacité de la main-d'œuvre. Cependant, un effet résiduel négatif sur la concurrence pour les travailleurs qualifiés est également prévu à partir de la création de la concurrence avec les employeurs locaux. Cet effet résiduel négatif du projet sur l'infrastructure communautaire et les services publics devrait être : - d'une ampleur modérée; - localisé dans les collectivités où se fera l'embauche; - de fréquence intermittente; - d'une durée à court terme; et - de nature réversible. La probabilité est élevée que des effets résiduels surviennent. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à l'habitat marin et au biote, le degré de confiance est élevé pour les prédictions des effets résiduels.	Non significatif (négatif); significatif (positif)	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Opportunités de contrats et d'affaires	Opportunités professionnelles	- Expansion du marché des services aux entreprises pour le projet - Expansion du marché des biens et services de consommation	Surveiller la valeur de l'approvisionnement avec les entreprises et coentreprises appartenant aux Inuits, les montants de la masse salariale des employés de la ZEL et le nombre d'entreprises inuites inscrites dans la ZEL.	La nature des activités associées à la Proposition de la phase 2 est telle que les effets positifs associés au Projet approuvé continueront d'être réalisés et possiblement améliorés au fur et à mesure que Baffinland cherchera à étendre ses activités (p. ex. Phase 2) et dynamiser ses efforts contractuels locaux. Dans l'ensemble, les effets résiduels du Projet sur les contrats et les occasions d'affaires devraient être: - de direction positive; - d'une ampleur modérée à élevée; - au sein des collectivités de la zone d'étude locale, de la zone d'étude régionale et dans les collectivités où se fera l'embauche; - de fréquence continue; et - d'une durée à moyen terme; et - spontanés. La probabilité est élevée que des effets résiduels surviennent. Compte tenu de l'information disponible et des résultats de la surveillance continue liée à l'habitat marin et au biote, il y a un niveau élevé de confiance des prévisions sur les effets résiduels.	Significatif (positif)	Effets cumulatifs positifs	Effets transfrontières positifs
Culture, ressources et utilisation des terres	- Ressources culturelles - Récolte - Déplacements et camps	- Effets liés à la perturbation du sol - Effets sur la chasse au caribou - Effets sur la récolte des mammifères marins - Effets sur la sécurité des déplacements à Pond Inlet, dans le détroit d'Eclipse et à l'inlet Milne, en période d'eaux libres - Perturbation sensorielle dans les camps - Effets sur les déplacements sécuritaires à l'intérieur des terres à travers le port de Milne - Perturbation sensorielle et effets sur la sécurité le long du chemin Tote et de l'inlet Milne - Effets sur les difficultés liées aux passages à niveau et sur leur sécurité	Revoir, mettre à jour et mettre en œuvre le plan de protection des ressources du patrimoine culturel.	En général, la nature et l'ampleur des effets sur la culture, les ressources et l'utilisation des terres sont conformes aux conclusions présentées dans le Projet approuvé. La Proposition de la phase 2 entraînera des effets négatifs associés à la culture, aux ressources et à l'utilisation des terres, à la perte de ressources culturelles, au changement dans l'accès ou la disponibilité des ressources de récolte et à l'accès aux corridors de déplacements et aux camps. Dans l'ensemble, les effets résiduels du projet sur la culture, les ressources et l'utilisation des terres devraient être : - de direction négative; - d'une ampleur faible à modérée; - Se produisant généralement dans la ZDP et s'étendant à des zones susceptibles de faire l'objet de bruit et de poussières supplémentaires; - peu fréquents, quoique dans certains cas, continus pour les effets liés à l'accès, pendant toute la durée du projet; et - de nature réversible, à l'exception des effets potentiels de perturbation du sol sur les ressources culturelles. Il est fort probable généralement que des effets résiduels se produiront, sauf pour : - des effets résiduels sur la récolte des mammifères marins, qui ont une probabilité modérée de se produire; et - des effets résiduels sur la récolte du caribou, qui ont une faible probabilité de se produire. En tenant compte de l'information disponible et des résultats de la surveillance continue liée à la culture, aux ressources et à l'utilisation des terres, il y a : - un niveau élevé de confiance dans les prédictions des effets résiduels liés à l'augmentation des perturbations du sol, aux perturbations sensorielles dans les camps et à la difficulté et à la sécurité liées au passage à niveau; et - un niveau modéré de confiance dans les prévisions des effets résiduels pour tous les autres effets résiduels sur la culture, les ressources et l'utilisation des terres.	Négligeable	Négligeable	Aucune incidence transfrontière

CVÉ / CSÉV	Indicateur clé	Effet(s) potentiel(s)	Atténuation, surveillance, gestion environnementale et suivi	Caractérisation des effets résiduels	Degré d'importance	Effets cumulatifs	Effets transfrontières
Avantages, redevances et fiscalité	Avantages, redevances et fiscalité	Changement dans les avantages, les redevances et la fiscalité	Mettre en œuvre les initiatives de l'IIBA.	Le Projet approuvé a des effets positifs importants sur les avantages générés au Nunavut. La Proposition de la phase 2 fournira une augmentation progressive de ces effets déjà significatifs.	Significatif (positif)	Effets cumulatifs positifs	Effets transfrontières positifs
Gouvernance et leadership	Gouvernance et leadership	Sans objet (évalué comme sujet de note)	Mettre en œuvre les initiatives de l'IIBA.	Dans l'ÉFIE, la gouvernance et le leadership ont été abordés comme sujet de discussion. La Proposition de la phase 2 ne modifie pas les effets du Projet sur la gouvernance et le leadership. Depuis l'EFIE, Baffinland et le QIA ont négocié l'ERAI, un certain nombre d'initiatives ont été mises en œuvre et un suivi socioéconomique est en cours. Conformément à l'ÉFIE, le Projet est considéré comme ayant un effet positif et significatif sur la gouvernance et le leadership.	Significatif (positif)	Effets cumulatifs positifs	Aucune incidence transfrontière
Évaluation des effets de l'environnement sur le projet et des accidents, défaillances et événements imprévus							
Effets de l'environnement sur le projet	- Aléas géologiques - Événements météorologiques extrêmes - Changement climatique mondial	- Stabilité du sol - Stabilité des pentes - Événements sismiques - Températures extrêmes - Précipitations extrêmes et inondations - Vents et vagues - Ondes de tempête - Brouillard sévère ou blanc dehors - Températures croissantes - Glace de mer réduite - Changements du niveau de la mer - Précipitations croissantes - Augmentation de l'épaisseur de la couche active	conception technique appropriée	Les préoccupations potentielles sont atténuées par l'adoption d'une conception technique appropriée.	Négligeable	Sans objet	Sans objet
Accidents, défaillances et événements imprévus	Les accidents et défaillances ont été évalués dans le cadre du Projet approuvé et un registre des risques a été instauré pour identifier les risques potentiels, la probabilité qu'un accident survienne, le niveau de conséquence associé à chaque événement accidentel et les plans d'intervention d'urgence applicables. La Proposition de la phase 2 n'a pas modifié le registre des risques du projet, à l'exception d'un scénario d'accident lié à la navigation pendant les périodes de débâcle et de formation de la glace. Dans l'ensemble, les évaluations des conséquences et des probabilités n'ont pas changé par rapport au Projet approuvé et les effets environnementaux d'un déversement dans les glaces ne seraient pas plus grands et seraient même souvent inférieurs à ceux décrits dans le Projet approuvé. Les conclusions présentées dans le Projet approuvé demeurent inchangées pour la Proposition de la phase 2.					Sans objet	Sans objet

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LIST OF ABBREVIATIONS AND ACRONYMS

Term.....	Abbreviation/Acronym
acid rock drainage	ARD
Annual Security Review	ASR
Arctic Ice Regime Shipping System	AIRSS
Arctic Waters Pollution Prevention Act	AWPPA
Baffinland Community Liaison Officer	BCLO
Baffinland Iron Mines Corporation	Baffinland
Ballast Water Management Convention	BWM Convention
Canadian Rail Operating Rules.....	CROR
Crown-Indigenous Relations and Northern Affairs.....	CIRNA
dead weight tonnage.....	DWT
Early Revenue Phase.....	ERP
environmental effects monitoring	EEM
Environmental impact statement	EIS
environmental management plan	EMP
environmental management system.....	EMS
environmental protection plan.....	EPP
Early Revenue Phase.....	ERP
environmental, health and safety.....	EHS
environmental, health and safety.....	EHS
final environmental impact statement	FEIS
Fisheries and Oceans Canada	DFO
for example.....	e.g.
greenhouse gas	GHG
gross domestic product	GDP

Hunter and Trappers Organization	HTO
EHunter and Trappers Organization	HTO
Interim Closure and Reclamation Plan	ICRP
Inuit Impact and Benefits Agreement	IIBA
Inuit Owned Land.....	IOL
Inuit Qaujimajatuqangit.....	IQ
Marine Environment Working Group	MEWG
Metal leaching	ML
million tonnes	Mt
million tonnes per annum.....	Mtpa
Mittimatalik Hunters and Trappers Organization.....	MHTO
nautical miles.....	NM
North Baffin Regional Land Use Plan	NBRLUP
Nunavut Impact Review Board	NIRB
Nunavut Land Claims Agreement	Nunavut Agreement
Nunavut Planning and Project Assessment Act	NuPPAA
Nunavut Planning Commission	NPC
Nunavut Settlement Area	NSA
Nunavut Tunngavik Inc.	NTI
Nunavut Water Board.....	NWB
Oil Pollution Emergency Plan	OPEP
particulate matter	PM
Project Development Areas	PDAs
Pre-feasibility Study.....	PFS
Project Certificate	PC
Qikiqtaaluk Socio-economic Monitoring Committee	QSEMC
Qikiqtani Inuit Association	QIA

Qulliq Energy Corporation	QEC
return on investment.....	ROI
run-of-mine.....	ROM
Shipping and Marine Wildlife Management Plan	SMWMP
Socio-Economic Monitoring Committee.....	SEMC
such as	i.e.,
technical supporting document.....	TSD
Terrestrial Environment Mitigation and Monitoring Plan	TEMMP
Terrestrial Environment Working Group	TEWG
total suspended particulate	TSP
Tote Road Earthworks Execution Plan	TREEP
valued component	VC
Valued Ecosystem Component	VEC
valued socio-economic component	VSEC

LIST OF SYMBOLS AND UNITS

Symbol/ Unit	Unit of Measure
%	percent
°C.....	degrees Celsius
cm	centimetre
dBA.....	decibel A-Weighting
kg	kilogram
km	kilometre
m	metre
M.....	million
mg	milligram
mm.....	millimetre
Mt	million tonnes
Mtpa	million tonnes per annum

1 INTRODUCTION

The Mary River Project is an operating open pit iron ore mine, located on northern Baffin Island in the Qikiqtani Region of Nunavut (Figure 1.1). The mine site is connected to a port at Milne Inlet (Milne Port) via the 100-km long Tote Road (the Tote Road).

In 2012, the Nunavut Impact Review Board (NIRB) completed a review of the potential ecosystemic and socio-economic effects of the Mary River Project, pursuant to the Nunavut Land Claims Agreement (Nunavut Agreement), and issued Project Certificate No. 005 on December 28, 2012. NIRB's review included consideration of a Final Environmental Impact Statement (FEIS) prepared by Baffinland Iron Mines Corporation (Baffinland; the Proponent) in support of the Mary River Project (Baffinland 2012). Baffinland subsequently applied for NIRB to conduct further assessment and reconsideration of the terms and conditions in Project Certificate No. 005 to reflect additional activities proposed to be carried out under the Early Revenue Phase (ERP) and submitted an Addendum to the FEIS (FEIS Addendum; Baffinland 2013). Following assessment of the potential ecosystemic and socio-economic effects of the ERP, NIRB issued an amended Project Certificate No. 005 (the Project Certificate) on May 28, 2014. The scope of the project approved under the Project Certificate (the Approved Project) includes both the Mary River Project and the ERP, as described in the FEIS and FEIS Addendum, respectively.

The Nunavut Water Board (NWB) issued Type 'A' Water Licence No. 2AM-MRY1325 (the Water Licence) in support of the Mary River Project on June 10, 2013. Baffinland subsequently applied to the NWB for an amendment to authorize the ERP, and, received Amendment No. 1 to the Water Licence on July 21, 2015. The amended Water Licence authorizes Baffinland to use water and deposit waste in support of all phases of the Approved Project.

This Amendment Document provides an assessment of the Phase 2 Proposal, which includes changes to the rate of mining, an additional transportation method, and infrastructure and shipping improvements at Milne Inlet. Planned improvements also include the installation of wind turbines near Milne Port and/or the Mine Site.

1.1 Background

The Mary River Project is an operating iron ore mine located on northern Baffin Island, in the Qikiqtani Region of Nunavut, in the Canadian Arctic. Baffinland is the owner and operator of the Project. Baffinland's initial Project consisted of mining iron ore from the reserve at Deposit No. 1 at a production rate of 18 Million tonnes per year (Mt/a) and constructing a railway to transport the ore to market via a port at Steensby Inlet. The NIRB issued Project Certificate No. 005 for this Project on December 28, 2012.

In 2013-2014, Baffinland prepared an addendum to the FEIS for the ERP and the Project Certificate was subsequently amended to include the trucking of 4.2 Mtpa of ore by an existing road (the Tote Road) north to a port at Milne Inlet. The approved iron ore production is 4.2 Mtpa to be transported by road to Milne Port, and 18 Mtpa to be transported by rail to Steensby Port. This is now considered the Approved Project. The 18 Mtpa Steensby rail project has not yet been constructed, however 4.2 Mtpa of iron ore is currently being transported north by road to Milne Port.

The Addendum to the FEIS is part of the environmental assessment process established for a project under the Nunavut Agreement. Under this environmental assessment process, the proponent of a project, such as the Mary River Project, describes the surrounding environment and the proposed development. Potential effects are then predicted and mitigation plans are developed. The severity or significance of residual effects (effects remaining after mitigation measures have been applied), are evaluated based on established criteria and expert opinion.

On February 3, 2017, Baffinland submitted the Phase 2 Proposal for conformity review to the NPC. An amendment to the North Baffin Regional Land Use Plan was granted for the Northern Transportation Corridor on March 18, 2018. This corridor includes a 10 km corridor that includes the Tote Road and North Rail, and the marine shipping route, “the Mary River Transportation Corridor”.

On April 23, Baffinland submitted a request to the NPC and NIRB to amend the North Baffin Regional Land Use Plan and Project Certificate No.005, respectively, to allow for a marginal increase in production and transportation of ore via the Tote Road through Milne Port from 4.2 Mtpa to 6.0 Mtpa (the Production Increase Proposal). This document is a request for an additional amendment (the Phase 2 Proposal). Phase 2 involves increasing the quantity of ore shipped through Milne Port to 12 Mtpa, via the construction of a new railway running largely parallel to the existing Tote Road (called the North Railway). The total mine production will eventually increase to 30 Mtpa, with 12 Mtpa being transported via the North Railway to Milne Port and 18 Mtpa transported via the South Railway to Steensby Port.

The Phase 2 Proposal builds on the extensive baseline studies and assessment carried out since 2011 for the larger Approved Project and is thus closely linked to the FEIS and previous addendums.

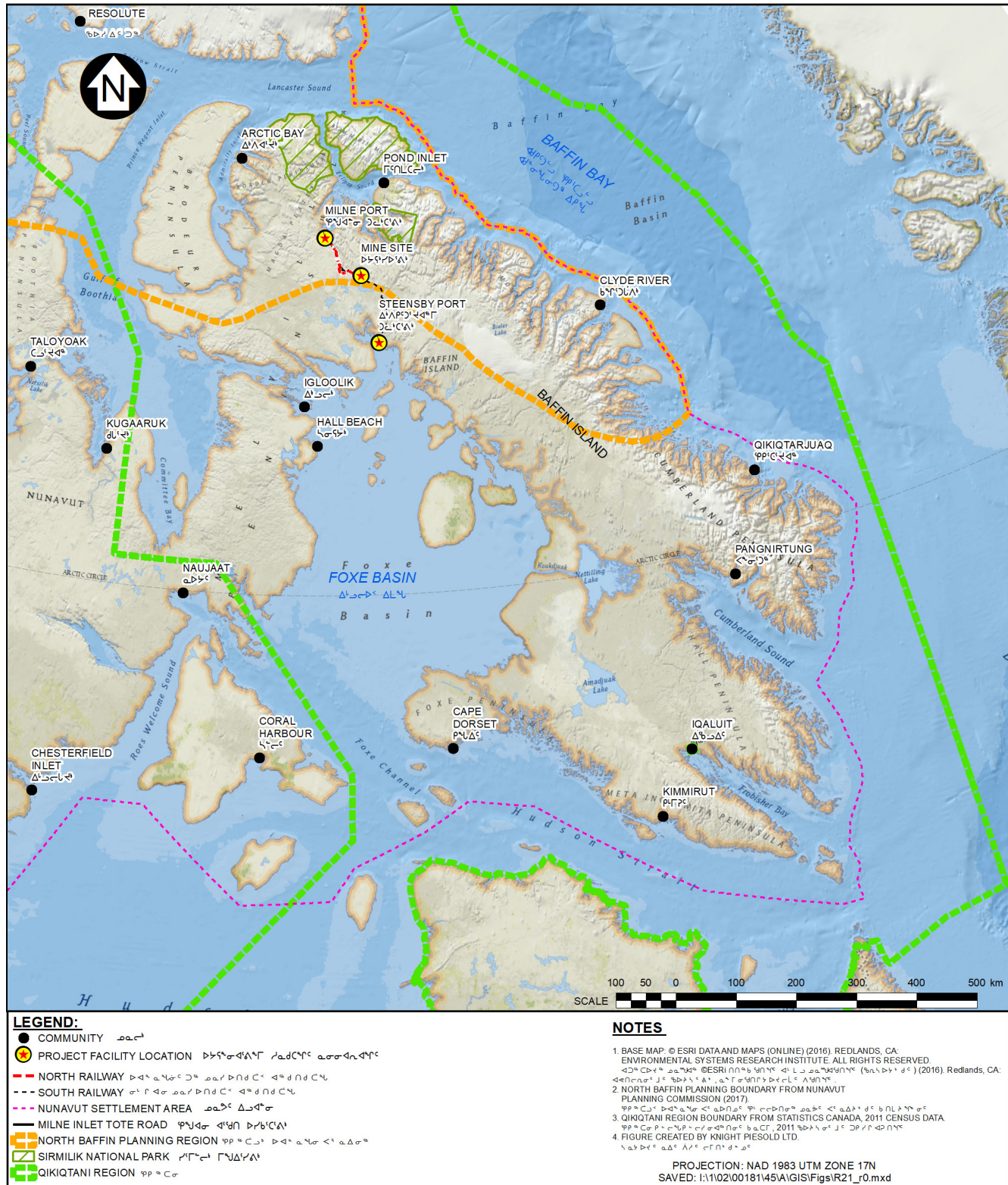


Figure 1.1 Project Location

1.2 Overview of the Phase 2 Proposal

The Mary River Project is an operating iron ore mine located in the Qikiqtani Region of Nunavut. Baffinland is the owner and operator of the Project. As part of the regulatory approval process, Baffinland submitted an FEIS to the Nunavut Impact Review Board (NIRB), which presented in-depth analyses and evaluation of potential environmental and socioeconomic effects associated with the Project.

The Phase 2 Proposal involves increasing the quantity of ore shipped through Milne Port to 12 Mtpa, via the construction of a new railway running parallel to the existing Tote Road (called the North Railway). Construction on the North Railway is planned to begin in late 2019. Completion of construction of the North Railway is expected by 2020 with transportation of ore to Milne Port by trucks and railway ramping up as mine production increases to 12 Mtpa by 2020. Shipping from Milne Port will also increase to 12 Mtpa by 2020. Construction of the approved South Railway and Steensby Port will commence in 2021 with commissioning by 2024.

Phase 2 also involves the development of additional infrastructure at Milne Port, including a second ore dock. Shipping at Milne Port will continue to occur during the open water season, and, may extend into the shoulder periods when the landfast ice is not being used to support travel and harvesting by Inuit. Various upgrades and additional infrastructure will also be required at the Mine Site and along the northern transportation corridors to support the increase in production and construction of the two rail lines.

Mine Site (Figure 1.2): The Mine Site will eventually accommodate North Railway and South Railway infrastructure

Transportation: Northern Transportation Corridor (Figure 1.3): Ore will continue to be trucked along Tote Road during the North Railway construction. The trucked volume of ore will increase temporarily during construction. Once operational, 12 Mtpa will be transported to Milne Inlet via rail.

Milne Port: A second ore dock capable of berthing capesize vessels will be constructed as part of Phase 2 (Figure 1.4). For the ore shipped from Milne Port, the secondary crushing and screening activities will be relocated to Milne Port from the Mine Site.

Shipping: Northern Shipping Route (Figure 1.5): The tonnage shipped annually will increase to 12 Mtpa. The use of capesize vessels and the extension of the shipping season to approximately July 1 – November 15, or up to when the landfast ice is being used by Inuit.

A summary of the changes associated with the Phase 2 Proposal are presented in Table 1.1; additional details are provided in Sections 2 through 6, and TSD 02 (Project Description).

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
Mine Site Construction, Facilities and Activities					
PDA	Potential Development Area (PDA)	2740 ha	No Change	2740 ha	No Change
RAIL	Railway switch yard (South Railway)	Approved	No Change	Deferred to 2021	No Change
	Railway switch yard (North Railway)	Not applicable	Not applicable	Not applicable	North Railway turning loop added
ORE HANDLING	Open Pit Mine	Mining Deposit No. 1 365 Mt at > 64% iron	No Change	Mining Deposit No. 1	No Change
	Mining Rate	18 Mtpa (	22.2 Mtpa (18 Mtpa through Steensby; 4.2Mtpa though Milne)	4.2 Mtpa	30 Mtpa (18 Mtpa through Steensby; 12 Mtpa though Milne)
	Waste Rock Stockpile	Waste Rock Management Plan (2012) approved, 640Mt waste rock estimated	No Change	Waste Rock Management Plan (2018) approved, 630 Mt waste rock estimated	No Change
	Ore Crushing Facilities	Permanent crushing/screening facilities to process 18 Mtpa for southern shipping	Mobile crushing/screening facilities to process 4.2 Mtpa for northern shipping	Semi-portable crushing/screening facilities to process 4.2 Mtpa for northern shipping	Relocation of primary crushing facilities within PDA at Mine Site. Secondary ore crushing relocated to Milne Port.
	Ore Stockpiles	Run of Mine: 0.4 Mt Crushed ore: 1.4 Mt	Truck loading stockpile: 0.2 Mt	Truck loading stockpile: 0.2 Mt	Run of Mine: 0.4 Mt Crushed ore: 1.4 Mt
POWER AND FUEL STORAGE	Power Plant	28 MW installed capacity	No Change	8.1 MW installed capacity	28 MW install capacity
	Wind turbines	Not applicable	Not applicable	Not applicable	1 turbine, up to 4.2MW
	Fuel storage (Arctic Diesel, Jet Fuel, Other Fuels)	15.6 ML arctic diesel 3 ML Jet A 400,000 L other fuel	No Change	2 ML arctic diesel	47.6 ML arctic diesel 3 ML Jet A fuel 400,000 L other fuel

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
ACCOMMODATIONS	Accommodation complex	Construction (Peak): 1200 Beds Operations: 500 Beds	Construction (Peak): 1220 Beds Operations: 710 Beds	800 Beds	Construction (Peak): 1200 Beds Operations: 800 Beds
	Water Supply (Domestic & Industrial)	Type A Water License limits (Camp Lake): Construction - 657 m3/day Operations - 367.5 m3/day	No Change	Current water usage within Type A Water License limits	Anticipated water usage within Type Water Licence limits
WASTE MANAGEMENT	Sewage Treatment Plant	Described in Water Supply, Sewage and Wastewater Management Plan (2012) approved under Type A Licence 2AM-MRY1325	Described in Water Supply, Sewage and Wastewater Management Plan (2014) approved under Type A Licence 2AM-MRY1325	Described in Water Supply, Sewage and Wastewater Management Plan (2018) approved under Type A Licence 2AM-MRY1325	Water Supply, Sewage and Wastewater Management Plan updated as required and submitted to NWB for approval under Type A Licence MRY-1325
	Incinerator	Incineration Management Plan (Waste Management Plan) approved under Type A Licence MRY-1325 (2013)	No Change	Waste Management Plan (2018) updated and approved 1-2T mobile incinerator	Incineration Management Plan (Waste Management Plan) to be updated with camp expansion and to be submitted under Type A Licence MRY-1325
	Landfill	Mine Site landfill - Landfill Management Plan (Waste Management Plan) approved under Type A Licence 2AM-MRY1325	No change	Expansion of Mine Site landfill to be undertaken in 2018 under the terms and conditions of Type A Licence 2AM-MRY1325.	Extend operation of Mine Site landfill for the duration of the Project Life.

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
	Landfarm	Landfarms approved under Type A Licence 2AM-MRY1325	No change	Landfarms approved under Type A Licence 2AM-MRY1325	No Change
	Hazardous Waste Storage	Hazardous Materials and Hazardous Waste Management Plan (2012) approved under Type A Licence 2AM-MRY1325	No change	Hazardous Materials and Hazardous Waste Management Plan (2017) approved under Type A Licence 2AM-MRY1325	No Change
WATER MANAGEMENT	Mine Site water management infrastructure (drainage, ponds and ditches)	As necessary to capture runoff from Mine Site facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2012) approved under Type A Licence 2AM-MRY1325	No Change	As necessary to capture runoff from Mine Site facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2018) approved under Type A Licence 2AM-MRY1325	Rerouting/additional drainage, ponds, and ditches as required. As necessary to capture runoff from Mine Site facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2018) approved under Type A Licence 2AM-MRY1325
SUPPORTING FACILITIES	Quarries	Three quarries identified	No Change	One quarry operating under QMR2 Quarry Management Plan (2017)	Two quarries identified
	Stream/river crossing	Two stream crossings (bridges)	No Change	Two stream crossings (bridges)	No Change
	Equipment Maintenance Facilities	Permanent mine maintenance facilities approved	Temporary mine maintenance facilities approved	Mine truck shop under construction	No change
	Temporary construction facilities	Multiple shelters and temporary workshops as required for construction activities	Multiple shelters and temporary workshops as required for construction activities	In operation	Multiple temporary facilities as per 2012 FEIS; NWB will be notified as necessary for any additions, modifications, or changes in locations of facilities

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
	Communication facilities	Satellite communications systems	No Change	Existing system is being upgraded	No Change
	Explosives	Permanent Emulsion Mixing Plant Ammonium storage pad; Multiple magazines	No Change	Permanent Emulsion Mixing Plant Ammonium storage pad; Multiple magazines	Expansion of explosives area to accommodate increases in volume of ammonium nitrate; storage of pre-packaged explosives
AIRSTRIP	Airstrip	Airstrip (gravel) extended from 1600 m to 2000 m length	No Change	2000 m airstrip (gravel)	No Change
	Air Traffic	Construction: 550 flights/year Operations: 365 flights/year	No Change	220 flights/year	No Change
Tote Road Construction, Facilities and Activities					
PDA	Potential Development Area (PDA)	865 ha	No change	865 ha	No Change
ORE HANDLING	Transportation of ore by trucks	Not applicable	4.2 Mtpa Average 90 round trips/day	4.62 Mtpa Average 98 round trips/day	Commissioning of the North Railway includes a temporary increase to 12 Mtpa at an average of 280 round trips/day
CONSTRUCTION	Upgrade of the existing Tote Road	Improved road base Minor realignments Grade improvements	Not applicable	In operation	Modified for Indexer at Port
	Realignment of sections of Tote Road	Not applicable	Several realignments	In operation	Several realignments to facilitate railroad crossings
	Replacement of water crossings	Not applicable	114 stream crossings	In operation	Up to 13 new culverts and relocation of 5 existing culverts

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
North Railway (Mine Site to Milne Port) Construction, Facilities and Activities					
PDA	Potential Development Area (PDA)	Not applicable	Not applicable	Not applicable	1,306 ha
RAIL	Railway alignment and railway bed	Not applicable	Not applicable	Not applicable	110 km single track railway, one passing track midway in rail circuit; Approximate 7 km deviation over a 20 km in length from Tote Road; Up to 3 passing sidings
	Transportation of ore by railway	Not applicable	Not applicable	Not applicable	2 to 3 trains with 60 to 90 cars completing 5 to 8 loads loads per day, respectively
CONSTRUCTION	Bridges and culvert water crossings	Not applicable	Not applicable	Not applicable	Up to 425 crossings (421 culverts and 4 bridges)
	Staging area for railway construction	Not applicable	Not applicable	Not applicable	14 laydowns
	Quarries	Not applicable	Not applicable	Not applicable	Up to 30 quarries will be sourced for construction materials
	Construction camp	Not applicable	Not applicable	Not applicable	4 locations, 3 remote camps
Milne Port Construction, Facilities and Activities					
PDA	Potential Development Area (PDA)	245 ha	No Change	245 ha	415 ha
RAIL	Railway switch yard	Not applicable	Not applicable	Not applicable	Railway switch yard
	Railway unloading station	Not applicable	Not applicable	Not applicable	Railway unloading station
	Railway maintenance facility	Not applicable	Not applicable	Not applicable	Railway maintenance building

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
ORE HANDLING	Truck ore unloading station	Not applicable	4.2 Mtpa capacity	4.2 Mtpa capacity	No Change
	Ore crushing and sizing facilities	Not applicable	Not applicable	Not applicable	12 Mt secondary crushing capacity, housed in new building
	Ore stockpiles	Not applicable	4 Mt	4 Mt	7.8 Mt
	Ore loading facilities – dock #1	Not applicable	Supra-panamax capacity	4.2 Mtpa capacity	Realigned conveyor / ore reclaiming system
	Ore loading facilities - dock #2	Not applicable	Not applicable	Not applicable	Capesize capacity
	Shipping of ore	Not applicable	Ore Shipped: 4.2 Mtpa Number of Sailings: 55	Ore Shipped: 4.2 Mtpa Number of Sailings: 55	Ore Shipped: 12 Mtpa Number of Sailings: 134 - 164
FREIGHT	Freight dock	Floating freight dock	No Change	Barge Landing Area	No Change
	Peak Annual Freight Deliveries	20	14	8	18
	Peak Annual Fuel Deliveries	3	2	4	12
ELECTRICAL POWER	Power Plant	Temporary generators	9.45 MW installed capacity	9.45 MW installed capacity	22 MW installed capacity
	Wind turbines for power generation	Not applicable	Not applicable	Not applicable	1 turbine, up to 4.2 MW
FUEL STORAGE	Fuel storage (Arctic diesel, jet fuel, other)	45 ML arctic diesel storage 3 ML Jet A storage 400,000 L other fuel storage	Additional: 1 ML arctic diesel fuel storage 200,000L marine diesel	64 ML arctic diesel fuel storage 3 ML jet fuel storage 200,000 L marine diesel	No Change
ACCOMMODATIONS	Accommodation complex	Construction: 150 Operations: 40	Construction: 225 Operations: 60	Operations: 500 beds	Construction: 800 Operation: 680

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
WATER SUPPLY	Water Supply (Domestic & Industrial)	Type A Water License limits: Construction - 367.5 m ³ /day Operations - 367.5 m ³ /day	No Change	Type A Water License limits: Construction - 367.5 m ³ /day Operations - 367.5 m ³ /day	Anticipated water usage within Type Water Licence limits
	Mine Site water management infrastructure (drainage, ponds and ditches)	As necessary to capture runoff from Milne Port facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2012) approved under Type A Licence 2AM-MRY1325	No Change	As necessary to capture runoff from Milne Port facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2018) approved under Type A Licence 2AM-MRY1325	Rerouting/additional drainage, ponds, and ditches as required. As necessary to capture runoff from Milne Port facilities. Drainage plans and design criteria detailed in Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (2018) approved under Type A Licence 2AM-MRY1325
WASTE MANAGEMENT	Sewage Treatment Plant and PWSP	Described in Water Supply, Sewage and Wastewater Management Plan (2012) approved under Type A Licence 2AM-MRY1325	Described in Water Supply, Sewage and Wastewater Management Plan (2014) approved under Type A Licence 2AM-MRY1325	Described in Water Supply, Sewage and Wastewater Management Plan (2018) approved under Type A Licence 2AM-MRY1325	Water Supply, Sewage and Wastewater Management Plan updated as required and submitted to NWB for approval under Type A Licence MRY-1325
	Incinerator	Incineration Management Plan (Waste Management Plan) approved under Type A Licence MRY-1325 (2013)	Incineration Management Plan (Waste Management Plan) approved under Type A Licence MRY-1325 (2013)	Waste Management Plan (2018) updated and approved 1-2 T mobile incinerator	Incineration Management Plan (Waste Management Plan) to be updated with camp expansion and to be submitted under Type A Licence MRY-1325
	Hazardous Waste Storage	Hazardous Materials and Hazardous Waste Management Plan (2012) approved under Type A Licence 2AM-MRY1325	No change	Hazardous Materials and Hazardous Waste Management Plan (2017) approved under Type A Licence 2AM-MRY1325	Hazardous Materials and Hazardous Waste Management Plan will be updated and submitted for approval

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
SUPPORT FACILITIES	Laydown areas	Multiple laydown areas authorized	Reconfiguration of site plan to accommodate expanded laydown areas	Laydown construction ongoing	No Change
	Permanent warehouse, administrative buildings, and Emergency Response Facilities	Multiple buildings for warehouse, workshops, maintenance shops, emergency response, administration within the PDA.	Facilities added as required within the PDA as authorized under Type A Licence MRV 2AA-1325.	In operation	Existing building augmentation, Rail workshop, and Crusher work shop; NWB will be notified as necessary for any additions, modifications, or changes in locations of facilities
	Temporary construction facilities	Multiple shelters and temporary workshops as required for construction activities	Multiple shelters and temporary workshops as required for construction activities	In operation	Up to 6 temporary structures will be built to support Phase 2 activities; NWB will be notified as necessary for any additions, modifications, or changes in locations of facilities
	Quarries	1 quarry identified	7 quarries identified	One quarry operating under Q1 Management Plan (2017)	2 quarries identified
AIRSTRIP	Airstrip	Maintain existing airstrip	Relocated	Deferred until 2020	No Change

Table 1.1 Comparison of the Approved Project to the Phase 2 Proposal

Components		FEIS Project Description	ERP Project Description	Current Facilities and Activities	Phase 2 Project Description
		28-Dec-12	28-May-14		Total
Shipping General					
SHIPPING	Shipping Mtpa - Steensby Port	18 Mtpa	No Change	Deferred until 2025	No Change
	Shipping Mtpa - Milne Port	Not applicable	4.2 Mtpa	4.2 Mtpa	12 Mtpa
	Shipping Route - Steensby Port	Foxe Basin / Hudson Strait	No Change	Deferred until 2025	No Change
	Shipping Route - Milne Port	Not applicable	Milne Inlet / Eclipse Sound	Milne Inlet / Eclipse Sound	No Change
	Shipping Season - Steensby Port	Year Round	No Change	Deferred until 2025	No Change
	Shipping Season - Milne Port	Not applicable	Open Water (98 days) July 25 - October 30	Open Water (98 days) July 25 - October 31	Extended Season (138 days) July 1 - November 15
	Ice Management - Steensby Port	Ice Breaking (Foxe Basin)	No Change	Deferred until 2025	No Change
	Ice Management - Milne Port	Not applicable	Not applicable	Not applicable	Limited Ice Management at Milne Port during shoulder seasons

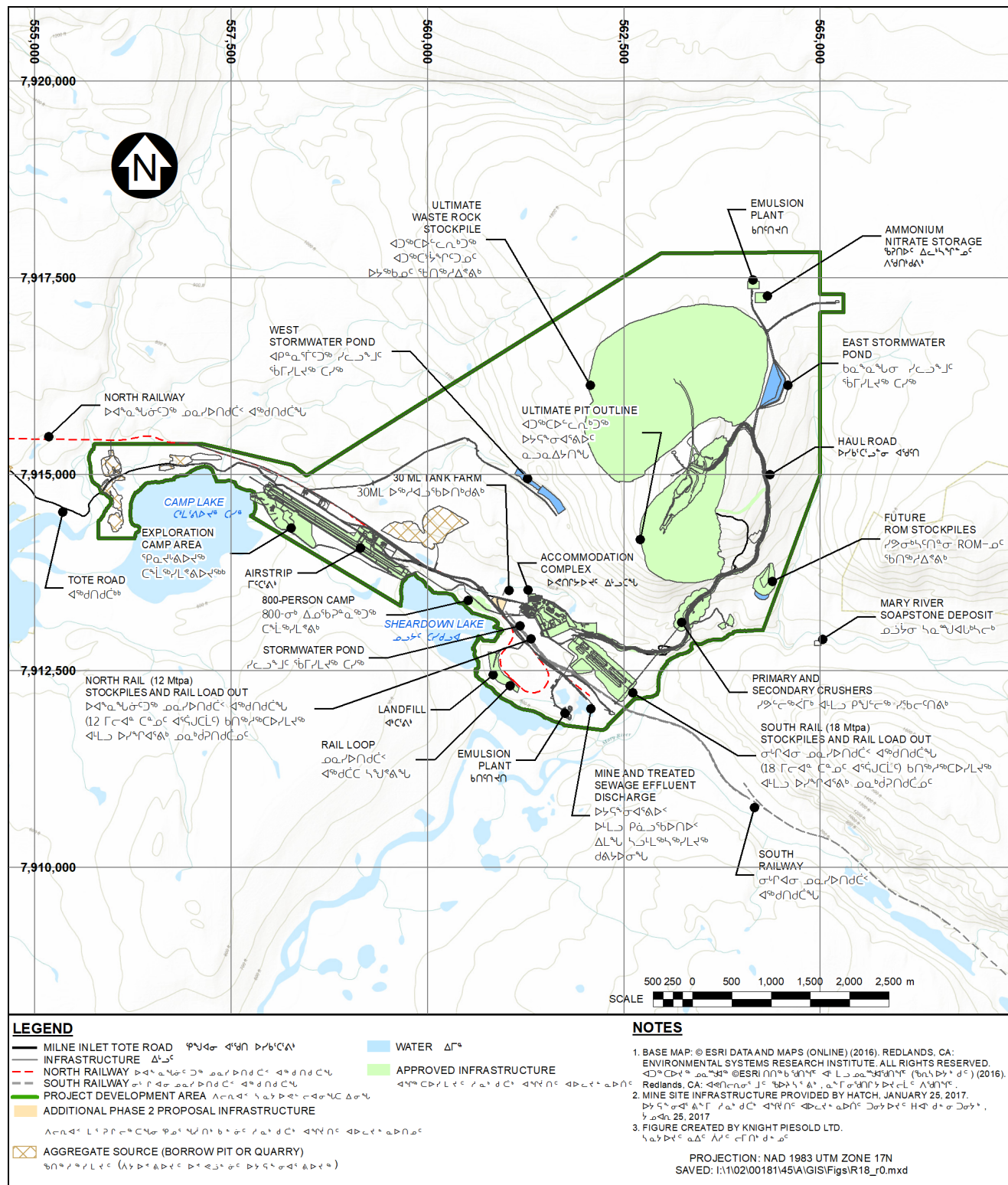


Figure 1.2 Mine Site – Layout to Accommodate North and South Railway Infrastructure

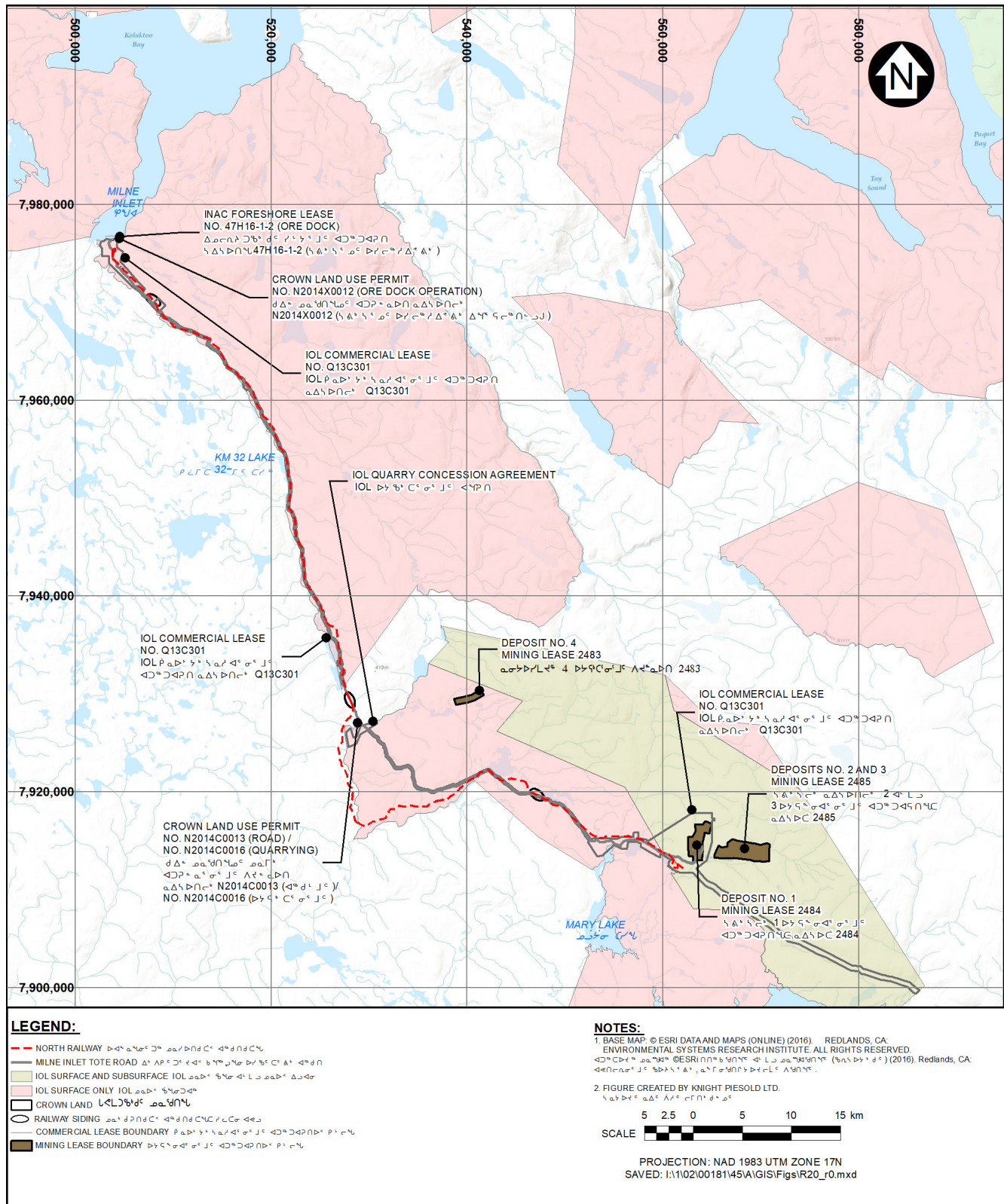


Figure 1.3 Northern Transportation Corridor – Phase 2 Proposal

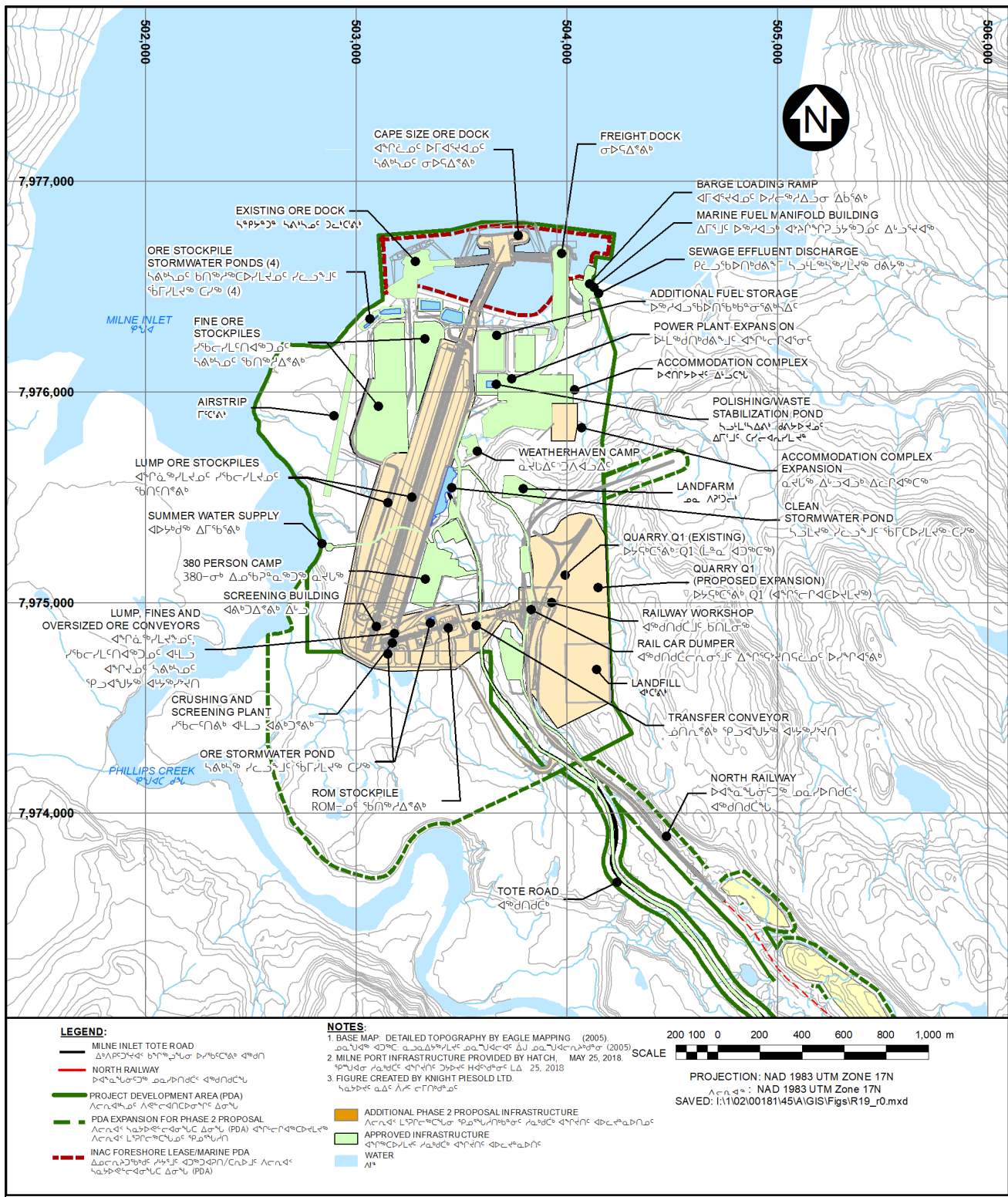


Figure 1.4 Milne Port – Phase 2 Proposal

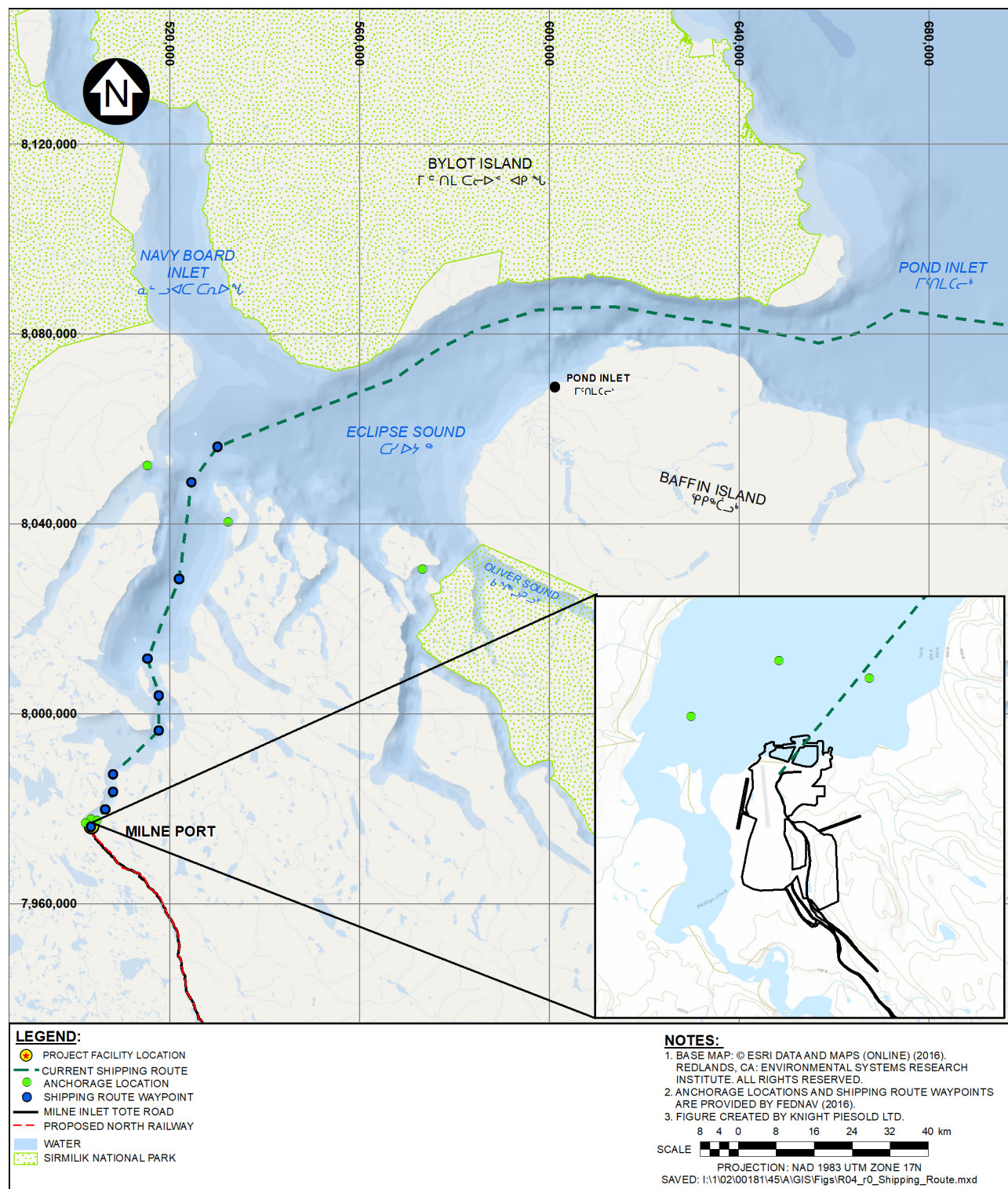


Figure 1.5 Northern Shipping Route

1.3 Document Organization

The Phase 2 Proposal is designed to address the requirements of the Nunavut Agreement, NuPPAA, and the Amended Guidelines as BIM seeks to amend the Nunavut Impact Review Board's Project Certificate 005. Further to this, BIM is also seeking to modify its existing Type A Water License and plans to pursue a coordinated review process with the Nunavut Water Board. In addition, the Phase 2 Proposal will meet requirements from several federal and territorial agencies to permit certain activities and will be subject to all relevant legislation and regulation. A full document map and detailed table of contents is provided in Appendix A.

The Phase 2 Proposal complies with the requirements of NIRB as outlined in the Guidelines for the Preparation of the EIS issued on November 16, 2009, and subsequently amended on November 3, 2010, and October 6, 2015 (the Guidelines, NIRB 2015). The Phase 2 Proposal submission consists of the main document (Sections 1-12), accompanied by administrative and technical appendices. The technical supporting documents (TSDs) present assessment information, supporting analysis, and modeling detail in greater detail than is presented within the main document. Taken together, and in consideration of what has been assessed in the FEIS and ERP Addendum to the FEIS as part of the Approved Project, these documents meet the Guideline requirements; a detailed concordance to these Guidelines is provided in Appendix B.

This submission is also intended to facilitate a joint NIRB and NWB review, as per the Coordinated Review Process. Information required for the NWB to review Baffinland's water license application is included in Appendix D of TSD 02 (Project Description).

The Addendum consists of 12 sections plus an executive summary, as follows:

- Executive Summary (the Popular Summary is included as Appendix C).
- Section 1: Introduction – provides a summary of the proposed Project, including background, and land tenure, as well as a description of the proponent including their environmental, social, health and safety performance, monitoring and environmental compliance, and reclamation security.
- Section 2: Need and Purpose – provides a summary of the need and purpose of the proposed Project.
- Section 3: Regulatory and Fiscal Regime – describes the regulatory process and requirements and provides a list of current and required approvals.
- Section 4: Project Description – includes a description of the proposed Project, including factors considered in project design, and potential future development.
- Section 5: Environmental Management System – presents Baffinland's environmental management system and related plans for environmental protection, monitoring and mitigation of the biophysical and socioeconomic environments, and describes the Project phases and schedule.
- Section 6: Project Alternatives – presents the alternatives considered for the Project.
- Section 7: Consultation and IQ Study Outcomes – describes Baffinland's approach to Inuit community and stakeholder engagement, including the results and outcomes of the consultation activities.
- Section 8: Existing Conditions – provides a description of the existing conditions for the Project, including the regional context and the biophysical and socioeconomic baseline conditions.
- Section 9: Environmental Effects Assessment Methods – identifies the assessment methods used to evaluate the environmental and social effects of the Project on valued components, including a descriptions of the Project activities and components, the valued components, and boundaries of the assessment.

- Section 10: Environmental Effects Assessment – identifies and discusses the potential effects of accidents and malfunctions, effects of the environment on the Project, as well as cumulative and transboundary effects.
- Section 11: Sustainability Assessment - contains an analysis of the ability of renewable resources affected by the Project to sustain current and future generations in Nunavut and Canada.
- Section 12: Conclusion – provides a brief summary of the Project and conclusion of the document.

Additional information is provided in technical supporting documents (TSDs):

- TSD 1 Alternatives Analysis
- TSD 2 Project Description
- TSD 3 Phase 2 Workshop Report
- TSD 4 Phase 2 Public Consultation Report
- TSD 5 Mary River Inuit Knowledge Study Mapbook
- TSD 6 Climate Change Assessment
- TSD 7 Atmospheric Assessments
- TSD 8 Landforms, Soils, and Permafrost Assessment
- TSD 9 Vegetation Baseline and Impact Assessment
- TSD 10 Terrestrial Wildlife Baseline and Impact Assessment
- TSD 11 Evaluation of Exposure Potential From Ore Dusting Events in Selected VECs
- TSD 12 Migratory Birds Baseline and Impact Assessment
- TSD 13 Surface Water Assessment
- TSD 14 Freshwater Biota and Habitat Assessment
- TSD 15 Freshwater Fish Habitat Offsetting Plan
- TSD 16 Ice Conditions Report
- TSD 17 Marine Environment Effects Assessment
- TSD 18 Ballast Water Dispersion Model
- TSD 19 Fuel Spill Modelling Report
- TSD 20 Hydrodynamic Modelling Report - Milne Port
- TSD 21 Invasive Species Risk Assessment
- TSD 22 Ship Wake and Propeller Wash Assessment
- TSD 23 Marine Fish Habitat Offsetting Plan
- TSD 24 Marine Mammal Effects Assessment
- TSD 25 Socio-Economic Assessment
- TSD 26 Labour Market Analysis
- TSD 27 Cumulative and Transboundary Effects

The list of contributors to the Phase 2 EIS are included in Appendix D, and the Initial Distribution List is provided in Appendix E.

1.4 The Proponent

Baffinland Iron Mines Corporation (Baffinland) is a Canadian iron ore mining company operating the Mary River operation, which includes a mine and port in the Qikiqtani region of North Baffin, Nunavut, Canada. Baffinland is a company focused on developing world-class deposits in one of the world's most captivating yet seldom-seen destinations. Currently mining from the Deposit No. 1, locally referred to as the Naulujuk deposit, Baffinland mines, crushes and screens one of the largest deposits and highest grades of iron ore on the planet and ship directly to global markets. The Mary River operation is the most northerly operating open pit mine in the world and the sixth most northerly mine of any type around the globe.

Baffinland is owned by Nunavut Iron Ore Incorporated and Arcelor Mittal. While Nunavut Iron Ore has a majority stake in the company, the two companies have joint operational rights. Baffinland's head office is located in Oakville, Ontario, Canada. In addition to its head office, Baffinland maintains a year-round presence at Milne Inlet, Mary River, and community liaison offices in Iqaluit, Igloolik, Pond Inlet, Hall Beach, Clyde River, and Arctic Bay. Baffinland's engineering and environmental teams have a wealth of Arctic development experience. Baffinland is also developing key partnerships with companies who have specific northern experience, for example, in shipping and ice-breaking.

Baffinland's head office is in Oakville, Ontario and its Northern Headquarters are located in Iqaluit, Nunavut (Table 1.2). The company operates community liaison offices in its five direct-hire North Baffin communities, staffed by Baffinland Community Liaison Officers (BCLOs).

Table 1.2 Baffinland Offices

Corporate Head Office	Northern Headquarters - Iqaluit	Arctic Bay
2275 Upper Middle Road East, Suite 300 Oakville, ON L6H 0C3 Tel: 416-364-8820 Fax: 416-364-0193 EIS Inquiries: Megan Lord-Hoyle, Sustainable Development General/Media Inquiries: Jason Leite Email: info@baffinland.com	1088 Mivvik Street, Block E, Noble House P.O. Box 849, Iqaluit, NU, X0A 0H0 Tel: (867) 975-2502 Contact: Joe Tigullaraq, Senior Manager, Northern Affairs	House 132, P.O. Box 87, Arctic Bay, NU, X0A 0A0 Tel: 867-439-8847 Contact: Meena Oyukuluk, BCLO
	Clyde River	Igloolik
	Lot 232, P.O. Box 35, Clyde River, NU X0A OEO Tel: 867-924-6444 Contact: George Iqalukjuak, BCLO	Co-op Store, Igloolik, NU, X0A 0LO Tel: 867-934-4160 Contact: Judah Sarpinak, BCLO
	Hall Beach	Pond Inlet
	Old Hamlet Office Beach Road P.O. Box 86, Hall Beach, NU, X0A 0K0 Tel: 867-928-8497 Contact: Joelie Kaerner, BCLO	Qaggivik Centre, Building 303, P.O. Box 599, Pond Inlet, NU, X0A 0S0 Tel: 867-899-8105 Contact: Joshua Arreak, IIBA Coordinator

1.5 Environmental, Social, Health and Safety Performance

While 2017 was Baffinland's third year of mine operations, the company has been operating at the Project site since 2004. The company's performance with respect to environmental, social, health and safety is recorded in its various annual reports, working group meetings, and ongoing communication with Inuit communities and stakeholders.

Record of Compliance and Corrective Action: In June 2016, Baffinland self-reported instances of high sediment discharges into local waterways. Consequently, Environment and Climate Change Canada (ECCC) issued a Directive to Baffinland under the *Fisheries Act*, and Indigenous and Northern Affairs Canada (CIRNA) issued a Letter of Non-Compliance under the company's Type A Water Licence. Baffinland's response to this issue was swift, and the company worked cooperatively and transparently with the relevant agencies to address the issue and the conditions of the Directive and Letter of Non-

Compliance (LNC) until a Completion Report and accompanying dust and sedimentation mitigation actions plans were issued in September 2016. Baffinland undertook preparations in 2017 to prepare against such an event occurring in the future. Baffinland has also undertaken several steps to address issues related to a September 2017 Directive received as a result of seepage from the waste rock facility. With the exception of these incidents, Baffinland has had no other major compliance incidents since exploration began in 2004 and mine operations began in late 2014.

Operational Safety: In 2015 a worker was fatality injured at the Mary River site and since this time Baffinland has implemented further Occupational Health and Safety measures to prevent future incidents from occurring. In 2017, Baffinland had a Total Recordable Injury Frequency Rate (TRIFR) of 1.33 for Baffinland employees and 1.79 for contractors, with zero fatalities. Baffinland is proud of its safety performance to date and pleased to report the TRIFR target for 2017 was reached. Baffinland will continue to use such data to build and improve its workplace safety culture.

Table 1.3 Total Recordable Injury Frequency Rate

Safety Performance	Employees	Contractors
Medical Treatment Incidents (MTI)	7	6
Restricted Work Case (RWC)	1	1
Lost Time Incident (LCI)	2	2
Fatalities	0	0
Total Recordable Injury Frequency Rate (LTIFR)	1.33	1.79
Occupational disease rate	0.26	0.39

Major Accidents, Spills and Emergencies, and Corresponding Responses: Baffinland has not had any major accidents including major spills. Since 2012, the company has undertaken annual spill response exercises whose participants include Petronav (fuel vessel), Baffinland, and representatives of the community of Pond Inlet as active participants.

Record honoring commitments on environmental and socio-economic matters in the event of closure or ownership changes: Baffinland is bound to environmental and socio-economic commitments through the various requirements of its Project Certificate, including management plans, annual reporting, and ongoing participation in consultation, and working group activities. The Securities requirements provide additional financial assurance that requirements closure commitments will be appropriately managed in case of unforeseen changes in operation or ownership.

Relations with Inuit Peoples - Baffinland is actively implementing its Inuit Impact and Benefit Agreement (IIBA) with the Qikiqtani Inuit Association (QIA). Additional information related to consultation and engagement activities is provided in Section 7, and TSD 04.

Operations in Arctic and Subarctic Regions: Mary River is Baffinland's sole operation; the company has been active in the region since 2004, and has been mining for more than three years.

Record of Incorporating Environmental and Socio-economic Considerations into Construction, Operations, Temporary Closure, Final Closure, and Post-closure: Baffinland has presented two previous development proposals to its stakeholders including the NIRB, and the Company is in its fourth year of mining. The Company has designed and constructed the ERP operation in accordance with plans laid out in the FEIS Addendum (Baffinland 2013) and Type A Water Licence Application. Baffinland's activities and the results of its monitoring programs are reported annually, and the company engages three working groups and its communities on a regular basis.

1.6 Monitoring and Environmental Compliance

Baffinland has various monitoring programs in place to monitor any potential effects to wildlife, the biophysical environment and the socio-economic environment, and document compliance with the environmental requirements, as outlined in the Project Certificate. The NIRB Annual Report (Baffinland 2017) details the monitoring activities undertaken and discusses the effects predictions made in the FEIS in context of current Project activities. Section 11 of this document provide general information on how monitoring has confirmed the FEIS predictions, or in some cases have demonstrated the needs for adaptive management, through the modification of mitigation identified to reduce unanticipated environmental effects.

1.7 Reclamation Security

Closure and reclamation costs for the Mary River Project are determined under the Annual Security Review process conducted in accordance with Schedule C of the Type “A” Water Licence Amendment No. 1 2AM-MRY1325 (NWB 2014) and Commercial Lease No. Q13C301 (QIA 2013). Under the Annual Security Review process, Baffinland, the respective landowners (the QIA & the Crown), NWB, and other interested parties confer to determine the estimated closure and reclamation costs for an upcoming year on an annual basis. This approach allows Baffinland to post financial security in incremental adjustments prior to the commencement of work. Baffinland has posted reclamation security for the current Project with the QIA as the primary landowner and CIRNA on behalf of the Crown.

Security is also held by the department of Fisheries and Oceans Canada (DFO) for the ore dock at Milne Port. Wildlife compensation provisions are found within the IIBA, and under the Nunavut Agreement a separate Water Compensation Agreement has been negotiated with the QIA.

Upon Ministerial Approval of Phase 2, Baffinland will proceed with the development of a detailed work plan for 2019, update the ICRP and in accordance with the mechanisms prescribed by the Water License, will partake in the Security Review Process.

1.8 Land Tenure

1.8.1 Mineral Leases

Baffinland is the sole owner of the three mining leases at Mary River covering a total area of 1,593 ha (Figure 1.6):

- Lease 2484 covers the iron ore deposit referred to as Deposit No. 1;
- Lease 2485 covers Deposits No. 2 and 3; and
- Lease 2483 covers Deposit No. 4.

The leases were renewed in 2013 for an additional 21-year period to 2034. Each of these are grandfathered federal mineral leases, though Leases 2484 and 2485 are located on Inuit Owned Land (IOL), and are administered by CIRNA under the Canadian Mining Regulations of the *Territorial Lands Act*.

In addition to the three original mining leases described above, Baffinland holds the following agreements and claims as part of the company’s regional mineral exploration efforts:

- Nunavut Tunngavik Inc. (NTI) Exploration Agreement - Signed on May 1, 2008, identifies an NTI Exploration Area that includes an initial area of 16,695 ha in the vicinity of Deposit No. 1 and the original Lease 2484, and an additional area of 1,425 ha covering a portion of Deposit No. 5. The NTI Exploration Agreement will become a Joint Venture between Baffinland and NTI, only if and when a feasibility study is completed on the NTI Exploration Area;

- McOuat Lake Claim Block - 18 federal claims registered with Aboriginal Affairs and Northern Development Canada(CIRNA) covering lands covering and surrounding both Deposits No. 4 and 5;
- Glacier Lakes Claim Block - 20 federal claims surrounding Deposit No. 6;
- Turner River Claim Block - 9 federal claims covering Deposit No. 7;
- North Cockburn River Claim Block - 8 federal claims covering Deposit No. 8;
- North Rowley River Claim Block - 4 federal claims covering Deposit No. 9.; and
- Deposits No. 6 through 9 are all recent discoveries identified during Baffinland's 2010 regional exploration program.

1.8.2 Surface Land Rights

Baffinland has access to the surrounding surface lands is provided through land use permits and leases issued by QIA or CIRNA (Section 2.2). Briefly, this includes:

- A Commercial Lease with the QIA for access to IOL;
- A land use permit from CIRNA for use of a 4.7 km section of the Milne Inlet Tote Road that crosses Crown Land;
- A waterlot lease from CIRNA for the existing ore dock; and
- A land use permit from CIRNA for ore dock operations.

Each of these permits will need to be amended or additional approvals obtained for the North Railway and second ore dock. The additional land area required by the Project is shown on Figures B.1 to B.7 in TSD 02.

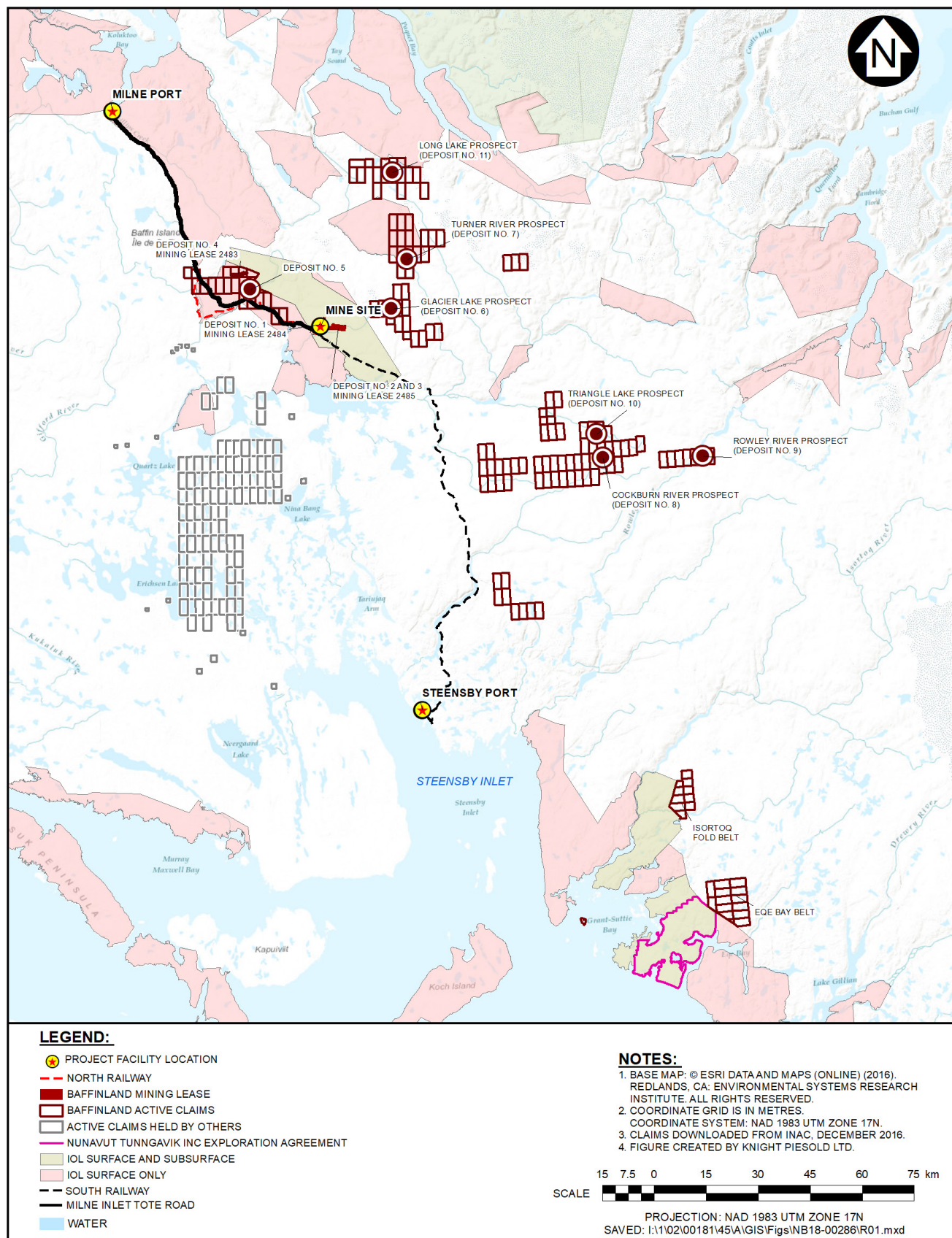


Figure 1.6 Active Mineral Claims

2 NEED AND PURPOSE

The purpose of the Project is to mine, crush and screen, and transport to market lump and fine iron ore products in an environmentally sustainable manner and at quantities that provide Baffinland and its shareholders a return on investment and provide socioeconomic benefits to local and regional Inuit communities and stakeholders. The Phase 2 Proposal will allow for expansion of current Project operations, which is necessary for Baffinland to meet the demand of its customers, and continue to provide these benefits.

The Government of Nunavut has focused on mine development as an economic driver and a non-economic catalyst for social changes. The Phase 2 Proposal will allow the Project to continue to address the need to support the Nunavut Planning Commission's Broad Planning Principles, Policies and Goals, which include encouraging sustainable economic development, building healthy communities, and protecting and sustaining the environment (NPC 2007). The Project has helped build healthy communities and strengthen partnerships between Baffinland and stakeholders and institutions. The Phase 2 Proposal will allow the Project to continue to contribute to the development of infrastructure, skills training, employment, and business opportunities in Nunavut, as outlined in Parnautit, the Government of Nunavut's Mineral Exploration and Mining Strategy (Government of Nunavut 2007), and Canada's northern strategy to strengthen Canada's sovereignty, protect the country's environmental heritage, promote economic and social development, and improve Northern governance. (Government of Canada 2009).

Canada's mining industry is a major driver of Canadian prosperity, contributing \$57.6 billion to Canada's GDP in 2016 (Mining Association of Canada 2016). In 2016, Canada's mineral sector provided direct and indirect employment of almost 600,000 workers and is the largest private sector employer of Indigenous peoples in Canada (Mining Association of Canada 2016). The industry paid approximately \$6.6 billion in taxes and royalties to federal, provincial and territorial governments in 2012 from extraction, smelting and processing; and an additional \$1.9 billion from fabricated metal product manufacturing (Mining Association of Canada 2016).

The mining industry in Nunavut is growing. From 2005 to 2015 the value of mineral production in the territory increased from \$3.8 million to \$567.2 million moving Nunavut's ranking from 13th to 9th out of the 13 provinces and territories in the value of Canadian mineral production (Mining Association of Canada 2016). A further \$215.1 Million dollars were spent on mineral exploration and deposit appraisal expenditures in Nunavut in 2015, roughly 12% of Canadian expenditures (Mining Association of Canada, 2016).

The ERP of the Project allowed Baffinland to successfully demonstrate the operational viability of the Project. During the ERP, customers have been able to test ore produced from the Mary River Project and determine its compatibility within their steel making circuits. As a result of operational success, positive testing, and the identification and development of markets, Baffinland is well positioned to meet an increasing demand for its ore supply.

Baffinland has taken a phased approach to the Project in order to safeguard the Project from vulnerability to market fluctuations, which will subsequently aid in preventing temporary or early closure of the Project. Transportation by truck to Milne Port along the Tote Road has and will continue to provide a short-term mechanism to sustain relationships with existing markets, thus capitalizing on the demand for ore and contributing to the long-term viability of the Project. Increases in production and transportation of ore to Milne Port via the North Railway will support Baffinland's ability to sell and deliver iron ore to its global consumers in quantities and values sufficient to equal the cost of developing and operating the Project.

The increase in production and transportation of ore to Milne Port will exceed the current shipping capacity of the port. Therefore, further expansion of the port is necessary, including the addition of a second ore dock. The secondary crushing and screening activities will be relocated to Milne Port from the Mine Site. Various upgrades and additional infrastructure will also be required at the Mine Site and the Northern Transportation Corridor to support the increase in production and construction of the rail lines.

As noted above, the Government of Nunavut has focused on mine development as an economic driver and a non-economic catalyst for social changes. The sustainability approach adopted by Baffinland takes into account environmental and social factors as well as economic consideration. Such a balance is important in the Project decision-making process.

3 REGULATORY AND FISCAL REGIME

The regulatory process in Nunavut is established primarily under the Nunavut Agreement. The regulatory regime is described in Volume 2 of the FEIS. An overview is provided below.

The *Nunavut Planning and Project Assessment Act* (NuPPAA) and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA) came into effect in 2013 and 2002, respectively. The NuPPAA and NWNSRTA fulfil obligations under Article 10 of the Nunavut Agreement to set out all substantive powers, functions, objectives, and duties of the Nunavut Planning Commission (Article 11 – Land Use Planning), the NIRB (Article 12 – Development Impact), the NWB (Article 13 – Water Management) and the Nunavut Surface Rights Tribunal (Article 21 – Entry and Access) in statute. The NuPPAA specifically covers Nunavut’s environmental assessment process and includes, but is not limited to, the following: clear processes for development and approval of land use plans, a single window entry into the regulatory review process, timelines for decision-making, and new enforcement tools for terms and conditions including monetary fines and possible jail times.

In addition to the Nunavut Agreement and NuPPAA, the Project is subject to various other Federal and Nunavut legislation, a Land Use Plan, and fiscal regime. These are provided below, along with current and required approvals (Appendix F).

3.1 Nunavut Agreement

- Article 5 – Wildlife;
- Article 11 – Land Use Planning;
- Article 12 – Development Impact (Environmental Assessment);
- Article 13 – Water Management (Water Licensing);
- Article 15 – Marine Areas;
- Article 20 – Inuit Water Rights;
- Article 26 – Inuit Impact and Benefit Agreements; and
- Article 33 – Archaeology.

3.2 Federal Legislation

The following federal legislation applies to the Project, including the Phase 2 Proposal:

- Nunavut Planning and Project Assessment Act (NUPPA);
- Nunavut Waters and Nunavut Surface Rights Tribunal Act (NWNSRTA);
- Indigenous and Northern Affairs Canada, Territorial Lands Act, Nunavut Mining Regulations, Territorial Land Use Regulations, and Territorial Quarrying Regulations: Mineral Lease and Royalties; Crown Land – Class A Land Use Permit(s); Crown Land – Land Lease and Waterlot Lease; Crown Land – Quarry Lease/Permit;
- Canadian Transport Agency, Canadian Transportation Act: Certificate of Fitness;
- Environment Canada, Species at Risk Act;
- Environment Canada, Migratory Birds Convention Act;
- Environment Canada, Metal Mining and Effluent Regulations;

- Fisheries and Oceans Canada, Fisheries Act: Fisheries Act Authorization, fisheries research permit;
- Natural Resources Canada, Explosives Act and Regulations: License for a Factory and Magazine;
- Transport Canada, Navigation Protection Act: Approval and/or Exemption;
- Transport Canada, Railway Safety Act;
- Transport Canada, Canada Shipping Act;
- Transport Canada, Arctic Waters Pollution Prevention Act;
- Transport Canada, Transportation of Dangerous Goods Act;
- Transport Canada, Marine Transportation Security Act;

3.3 Territorial Legislation

The following territorial legislation applies to the Project, including Phase 2:

- Department of Environment – Environmental Protection Act and Spill Contingency Planning and Reporting Regulations: Spill Contingency Plan Approval;
- Department of Environment – Wildlife Act: Wildlife Research Permit;
- Department of Economic Development and Transportation – Transportation of Dangerous Goods Act;
- Department of Health – Public Health Act: Camp Sanitation Regulations;
- Department of Culture and Heritage – Nunavut Archaeological and Palaeontological Sites regulations: Class 2 Archaeological Permit;
- Workers' Safety and Compensation Commission (WSCC) – Explosives Use Act and Mine Health and Safety Act and Regulations: Permit to Store Detonators; Explosive Use Permit; and
- Nunavut Research Institute – Scientist Act: research license.

3.4 Regional Inuit Association

The Qikiqtani Inuit Association (QIA) is the regional Inuit association, and the Phase 2 Proposal may require additional, or modify the following agreements:

- Commercial Lease;
- Quarry License;
- Inuit Impact and Benefits Agreement;
- Water Compensation Agreement; and
- Wildlife Compensation Agreement.

3.5 Fiscal Regime

The Phase 2 Proposal does not change the mineral rights and royalty payments which are part of the Approved Project. Baffinland pays the following taxes as part of its current operation:

- Corporate taxes (federal, Ontario and Nunavut);
- Nunavut Fuel Tax and Federal Fuel Excise Tax;
- Nunavut Payroll Tax; and
- Nunavut Property Tax.

3.6 Current and Required Approvals

Baffinland's active permits, licences, authorizations, and approvals governing current mining operations are listed in Table 3-1 below and in Appendix F. Most of the approvals required for the Phase 2 Proposal are already in place for the current operation, though amendments will be required.

Table 3.1 Current and Required Approvals

Approval	Project Activities	Expiry	Description of New Permit / Amendment
Nunavut Impact Review Board <i>Nunavut Agreement, and the Nunavut Planning and Project Assessment Act as of July 9, 2015</i>			
Project Certificate No. 005 <i>Nunavut Agreement</i> (Article 12)	Required to obtain the requisite permits and approvals to proceed with Project	No Expiry	An amendment will be required; several terms and conditions will require revision (particularly PC Conditions 179(a) and 179(b)).
Qikiqtani Inuit Association (QIA) <i>Agreements issued under Articles 6, 20 and 26 of the Nunavut Agreement</i>			
Inuit Impact and Benefits Agreement (IIBA) <i>Nunavut Agreement</i> , Article 26	Required under Article 26 of the <i>Nunavut Agreement</i> to proceed with Project – concluded September, 2013	No Expiry	An amendment to the IIBA will be required.
Wildlife Compensation Agreement <i>Nunavut Agreement</i> , Article 6	Wildlife Compensation regime set out in IIBA	No Expiry	An amendment is likely not required.
Water Compensation Agreement <i>Nunavut Agreement</i> , Article 20	Compensation should the Project substantially affect the quality, quantity, or flow of water on Inuit-owned land	June 10, 2025	An amendment is likely not required.
Commercial Lease Q13C301	Mine development activities on Inuit Owned Land	December 31, 2043	An amendment will be required to account for the additional surface lands require for the North Railway and at Milne Port.
Quarry Concession Agreement	Required to extract aggregate (quarried rock and borrow sand and gravel) on Inuit Owned Land	N/A	An amendment to the existing Quarry Concession Agreement or a new agreement will be required for 39 quarries along the North Railway.
Permitted quarries and borrow areas on Inuit Owned Land	Permitted quarries and borrow areas on Inuit Owned Land comprising Quarries Q1, QMR2, Q7, Q11, Q19, Borrows Km 104, Km 2, Km 97	N/A	Quarry Management Plans will need to be developed for all new quarries to be developed.

Table 3.1 Current and Required Approvals

Approval	Project Activities	Expiry	Description of New Permit / Amendment
Nunavut Water Board			
Water Licences issued under the <i>Nunavut Agreement</i> (Article 13), the <i>Nunavut Waters and Nunavut Surface Rights Tribunal Act</i>, and the <i>Northwest Territories Water Regulations</i>			
Type A Water Licence 2AM-MRY1325	Water use and waste disposal associated with the mine.	June 10, 2025	An amendment to the Type A Water Licence will be required for additional water usage and a new non-hazardous waste landfill at Milne Port.
Type B Water licence 2BE-MRY1421	Regional exploration activities, including exploration drilling	April 16, 2021	No amendment required.
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 <i>Territorial Lands Act</i> and associated <i>Canadian Mining Regulations</i> and <i>Territorial Land Use Regulations</i>			
Mineral Leases #2483, #2484 and #2485	Rights to extract minerals; Lease #2484 covers Deposit No. 1.	August 27, 2034	No amendment required.
Class A Land Use Permit N2014C0013	Exploration and geotechnical investigation work on Crown Land at Steensby Inlet and Milne Inlet	June 30, 2019	No amendment required.
Class A Land Use and Quarry Permit N2014Q0016	Extraction of sand and gravel from Borrow P1 at Km 63 along the Tote Road	June 30, 2019	Amendment likely required for additional borrow areas or quarries along the Tote Road on Crown Land.
Class A Land Use Permit N2014J0011	Summer narwhal monitoring camp at Bruce Head, in Milne Inlet	June 30, 2019	No amendment required.
Class A Land Use Permit N2014X0012	Port operation on Crown Land (ore dock operation)	June 30, 2019	Permit will be superseded by Foreshore Lease 47H/16-1-2 upon expiry.
Foreshore Lease 47H/16-1-2	Use of seabed by current ore dock at Milne Port	June 30, 2035	The current lease area covers the proposed second ore dock; however the lease must be amended to permit construction of this ore dock.
Class A Land Use Permit (New)	Camps and laydowns along Tote Road on Crown Land	Not issued	This activity will require a new authorization.
Class A Land Use Permit or Land Lease (New)	Infrastructure and operation associated with the north rail on Crown Land	Not issued	This activity will require a new authorization.
Department of Fisheries and Oceans			
Authorizations and Letters of Advice issued under the <i>Fisheries Act</i>			
Fisheries Authorization 14-HCAA-00525	Authorization to construct the ore dock in fish habitat	December 31, 2020	No amendment required.
Fisheries Authorization (New)	Authorization will be required to construct the second ore dock in fish habitat.	Not issued	This activity will require a new authorization.
Fisheries Authorization NU-06-0084	Authorization to construct water crossings in fish habitat along the Tote Road.	December 31, 2013; monitoring ongoing	A number of culvert crossings subject to this Authorization will need to be upsized to accommodate larger flows due to railway crossing diversions.
Letters of Advice (various)	DFO issued Baffinland various letters of advice in regard to culvert extensions and replacements along the Tote Road.	No Expiry	These letters of advice may apply to the Tote Road culvert replacements required to accommodate diverted flows. Further letters of advice may be required.
Fisheries Authorization (New)	Construction of freight dock at Milne Inlet in fish habitat.	Not issued	This activity will require a new authorization.
Fisheries Authorization (New)	Construction of new crossings, diversions and encroachments associated with the North Railway.	Not issued	This activity will require a new authorization.
Licence to Fish for Scientific Purposes and Animal use Protocol S-16/17-1016-NU, S-16/17-1019-NU, AUP 2016-027 FWI-ACC-2016-017	Issued to Baffinland's fisheries consultants Minnow Environmental Inc. and North/South Consulting to allow fishing for scientific purposes at the site.	No Expiry	No amendment required.

Table 3.1 Current and Required Approvals

Approval	Project Activities	Expiry	Description of New Permit / Amendment
Transport Canada			
Approvals of in-water works under the <i>Navigable Waters Protection Act</i> (NWPA; now the <i>Navigation Protection Act</i>); and Marine Facility Approval under the <i>Marine Transportation Security Act</i> and Regulations, and Railway Company authorization under the <i>Railway Safety Act</i>			
Navigation Protection Act Approvals: 8200-07-10273, 8200-07-10267, 8200-07-10269, 8200-07-10268, 8200-07-10274, 8200-07-10272 8200-07-10266, 8200-07-10271	Approvals to interfere with navigation within navigable waters along the tote road at crossings: CV040, BG50, CV128, CV223, CV072, BG17, CV217, and CV099	No Expiry	Approvals to interfere with navigation within navigable waters along the tote road at crossings: CV040, BG50, CV128, CV223, CV072, BG17, CV217, and CV099. New approvals will likely be required for water crossings at these and other locations associated with the North Railway.
Statement of Compliance of a Marine Facility # 001743	Issued under the <i>Marine Transportation Security</i> Regulations certifying that the Milne Inlet Marine Facility is operated in compliance with its approved security plan.	June 24, 2020	Approval for the Milne Inlet Marine Facility is operated in compliance with its approved security plan. An amendment or new approval will be required with updates to the security plan.
Railway Operating Certificate (New)	Operation of the north rail.	Certificate not issued	Authorizes a railway company to operate in Canada.
Navigation Protection Act Approval 2018-600026-001	Construction of freight dock at Milne Inlet.	No Expiry	Approval to interfere with navigation or confirmation that work is not likely to substantially interfere with navigation.
Navigation Protection Act Approval (New)	Construction of second ore dock at Milne Inlet.	Not issued	Approval to interfere with navigation or confirmation that work is not likely to substantially interfere with navigation.
National Resources of Canada			
Licensing of Explosives Manufacture and Storage Facilities under the <i>Explosives Act</i>			
Factory Licence #F76068	Issued to Baffinland's explosives contractor, Dyno Nobel Baffin Island, to manufacture explosives for the mine.	June 30, 2017	No amendment or new licence required as a result of the Phase 2 Proposal. A new factory licence will be required when the waste rock stripping ratio increases such that larger quantities of explosives will be required.
Canadian Transportation Agency			
Approval of rail line construction and operation under the <i>Canadian Transportation Act</i>, <i>Safe and Accountable Rail Act</i> and <i>Railway Safety Act</i>			
Rail Certificate of Fitness (New)	Construction and operation of the north rail.	Not issued	Demonstrates that the railway company is a federally-regulated railway that holds the prescribed liability insurance coverage.
Authorization to Construct a Railway Line (New)	Construction and operation of the north rail.	Not issued	Provides authorization to construct the north rail.
Workers' Safety & Compensation Commission			
Licensing of explosives magazines under the <i>NT/NU Explosives Use Act</i>			
Explosive magazine permits PQ-0468, PQ-0488, PQ-0469, PQ-0470, PQ-0479, PQ-0482, PQ-0475, PQ-0489, Detonator magazine permits PQ-470, PQ-482 Cap magazine permit A-0204	Issued for storage of explosives, detonators and blasting caps.	December 31, 2018	New magazine permits will be required for additional explosive, detonator or blasting cap magazines.
Government of Nunavut			
Licensing of archaeological studies under Department of Culture and Heritage			
Class 2 Permit (Archaeology)	Issued to Baffinland's archeology consultant, Claude Pinard, to perform archaeological studies at the site.	No Expiry	No amendment required.
Nunavut Research Institute			
Licensing of field research in Nunavut under the <i>Scientists Act</i>			
Scientific Research Licence 02 008 15R-M	Issued to Knight Piésold for Inuit Qaujimajatuqangit (IQ) and traditional harvest studies	No Expiry	Licence for social studies will also be required.

4 PROJECT DESCRIPTION

4.1 Phase 2 Proposal Description

The following section summarizes the Phase 2 Proposal project description. Additional details are provided in TSD 02.

4.1.1 Mine Site

For the Mine Site, the Potential Development Area (PDA) defined in 2012 remains unchanged. The Phase 2 Proposal layout for the Mine Site is shown on Figure 1.2. Some infrastructure within the PDA will be re-located in order to accommodate the construction of the North Railway and support the increase in mine production. All construction activities will be confined to the existing PDA for which the FEIS presented the initial effects assessment.

The Phase 2 Proposal will involve minor changes to the existing or planned diversions at the Mine Site. Diversions related to the collection of stormwater from the waste rock stockpile remain unchanged. The current ore stockpile will be relocated and marginally expanded as the transition to ore haulage by rail occurs, which may necessitate enlarging or modifying the associated stormwater catchment (ditches and ponds). Some of the permitted facilities may be relocated within the PDA due to poor geotechnical conditions where those facilities were originally sited. Effluent discharge locations as well as runoff discharge locations to the receiving environment (out of PDA) will remain unchanged from those locations already established in Baffinland's Aquatic Effects Monitoring Program (AEMP). The minor changes to surface drainage within the PDA will be captured in Baffinland's Surface Water and Aquatic Ecosystems Management Plan which is submitted to the NWB for approval on an annual basis.

The additional facilities and activities for construction and operation of the Phase 2 Proposal will consist of:

- **Increase of mining rate to 30 Mtpa:** Full production to accommodate shipments of 12 Mtpa through the Northern Transportation Corridor and 18 Mtpa through the Southern Transportation Corridor will total 30 Mtpa and this has been considered for assessment purposes. The mining equipment fleet, and associated fleet support facilities, will expand as mining production increases. Precipitation collected within the pit will require management; however, the estimated pit inflows and management of pit water inflows remain unchanged. Design criteria and specifications for water management structures will be identical to those approved under the current Type A Water License 2AM-MRY1325.
- **Changes to Crushing and Transport of Ore:** The existing mobile primary crushing of the ore will continue at the Mine Site, while secondary crushing will take place at Milne Port. This will reduce dust generation at the Mine Site. The existing crushing installation will be retained. Ore stockpiles will be enlarged and railway loading facilities will be installed for the South Railway (these facilities were described in FEIS and permitted under Project Certificate No.005).
- **Construction of the Mine Site North Railway Terminal:** Activities at the Mine Site will include the loading of ore, unloading of fuel and freight, and material back haul. The North Railway will extend through the Mine Site and eventually connect with the future South Railway located at the opposite end of the Mine Site. A railway loop, siding and rail car loading terminal will be constructed.
- **Expansion of the permanent fuel depot:** Current fuel storage at the Mine Site is small (2 ML), sufficient for 20-days of operation at current mining rate (4.2 Mtpa), with fuel delivered by truck on a regular basis. Fuel at the Mine Site is used mainly for power generation, to supply the mining fleet, and for aircraft. Current storage is insufficient to reliably sustain the operation at 4.2 Mtpa production rate. In order to sustain Phase 2 activities, and an eventual production rate of 30 Mtpa, fuel storage at the Mine Site needs to be increased to 47 ML. For the initial years of Phase 2, fuel delivered at Milne Port will be transported by tanker trucks to the Mine Site until the North Railway is

operational. Once Steensby Port and the South Railway are operational (2024), fuel will also be transported to the Mine Site by rail.

- **Expansion of the Power Plant:** Power is currently supplied to Mine Site facilities with six 1.35 MW diesel generators, with an installed capacity of 8.1 MW. The current peak power demand of 3.5 MW will gradually increase to 22 MW for the mining rate of 30 Mtpa.
- **Installation and operation of a Wind Turbine:** As a means of reducing operating costs and site fuel consumption, Baffinland is evaluating the use of wind turbines. The capacity of the wind turbines under consideration ranges from 3.5 MW to 4.2 MW per unit. Although preliminary studies have identified suitable areas for the installation of the wind turbines, the siting cannot be finalized until more detailed wind surveys are completed. For these reasons only broad study areas have been identified.
- **Expansion of the mine maintenance facilities and support administration buildings/facilities** (warehouses, shops, etc.): Most of the facilities are existing (maintenance facilities, warehouses, shops and administration building) and will be expanded as the production eventually increases to 30 Mtpa. Additional temporary shops and shelters may be required during the construction period.
 - The existing waste management facilities, transfer stations, and landfarm can accommodate the increase production rate. The landfill will be expanded. The Waste Management Plan will be updated as required and submitted to the NWB for approval should any changes be considered. Expansion of the landfill will be permitted with the NWB.
 - The current explosives plant will continue to be used until the quantities of explosives required by the Project will exceed the quantity that can be stored at the current magazines in accordance with Natural Resources Canada's (NRCan) quantity-distance tables (NRCan 2014). The quantity of explosives will increase as the mine production rate and the waste rock stripping ratio increases, and eventually new explosives plant and storage facilities will be constructed to the north of the open pit, at the location approved for the original 18 Mtpa South Railway operation in the FEIS (Baffinland 2012). This second location will meet the quantity-distance requirements for the quantity of explosives required for the Project.

4.1.2 Northern Transportation Corridor

4.1.2.1 Tote Road

The Tote Road alignment will remain unchanged. Some upgrades and minor realignments will be required to facilitate railway crossings. The road is currently a vital transportation link for the Project, and as such, upgrades to the road have been ongoing since 2013, with additional upgrades to continue during Phase 2. For approximately 3 years during development of the North Railway, haulage traffic volumes may increase for the transportation of up to 6 Mtpa of ore, fuel, construction material and mining supplies. Project traffic volumes during operation will be limited to personnel transport between the Mine Site and Milne Port, and deliveries such as water and fuel, as transportation of ore is diverted to the North Railway.

Culverts will be required to accommodate changes due to rail construction. Aggregate material required for the Tote Road maintenance and upgrades will be extracted from the quarry sites that have been identified along the Tote Road. Under the Type A Water Licence MRY 2AA-1325, Baffinland has a Borrow Pit and Quarry Management Plan.

4.1.2.2 North Railway

The North Railway will be 110 km in length from the loading station at the Mine Site to the unloading station at Milne Port. The alignment of the railway corridor is presented on Figure 1.3. For most of the length, the railway embankment will be constructed adjacent to the Tote Road. However, due to various constraints (e.g., topography), a 20 km section of the railway will deviate from the Tote Road alignment, between kp 57 and KP 84.5. As this stretch of land is on IOL, Baffinland's IOL Lease will need to be amended. The railway design is similar to that of the South Railway proposed in the FEIS.

The facilities and activities required for the construction and operation of the North Railway include:

- **Construction of the railway:**
 - **Construction of railway embankment:** The railway embankment will be comprised of fill, sub-ballast, and ballast materials, with timber ties and steel rails. As described in TSD 02, Section 3.2.8, the embankments have been designed for permafrost considerations and additional allowances have been made to account for climate change effects, including an assumed increased thickness of the active layer.
 - **Railway excavations:** One of the fundamental criteria for the railway alignment is to reduce cuts in ice-rich soils to avoid inducing thermal changes that may cause thaw settlement. The majority of the cuts will be into rock, most of which will be used as fill in the railway embankment. Approximately 25.5 km of the railway alignment may involve rock cuts.
 - **Disposal of ice-rich soils:** Ice-rich soils, when thawed, will be wet and prone to slumping, and considerable quantities of sediment-laden water may be released. To reduce the potential for sediment runoff into water bodies and to promote long-term stability of these materials, soil spoils will be disposed of in exhausted quarries and borrow areas as a preferred option if reuse in deep cuts is not feasible. Where quarries or borrow sources are not available nearby, local depressions will be selected as opposed to slopes where material can run-off.
 - **Track substructure, alignment, and gradient design:** Timber ties will be used, as their performance in cold climate heavy haul operations has been proven. To the extent possible, the railway alignment is located within 100 m of the Tote Road centerline. The railway design is based on a maximum grade of 1.5% for loaded ore trains, and 2.0% for empty ore trains. In some locations this is not possible due to permafrost, the topography and geotechnical considerations. Allowance has been made for exceptional grades of 3.0% for empty ore trains at three locations over the North Railway, totaling approximately 3 km in total length.
- **Construction of multiple water crossings:** The North Railway will cross several watercourses along the Northern Transportation Corridor. Bridges will be installed at four railway water crossings. Bridge spans are based on the existing normal flow riverbank. Culverts will be installed at other water crossings along the railway. Culverts will be designed in accordance with American Railway Engineering and Maintenance-of-Way Association (AREMA; 2010) guidelines. Culvert diameters will range from 0.6 m to 1.8 m and will be covered with a minimum of 1 m of fill.
- **Railway commissioning - Use of the laydown area at km 57 as an intermediate staging area for ore transportation:** For the commissioning of the North Railway, the construction laydown area developed for the construction of the railway at km 57 will be re-purposed as an ore staging area. Ore will be transported by trucks to this staging area, dumped on a small 12,000 t stockpile, and loaded onto railcars by front end loaders. This temporary ore transfer area will remain in operation until the railway terminal at the Mine Site is fully operational.
- **Construction and operation of four temporary camp pads and mobile camps:** To facilitate construction of the railway, temporary camps will be established near the work front. Temporary mobile construction camps will be in use at any time during the construction. The mobile camps will be relocated closer to the work areas as necessary. It is anticipated that up to four camp site locations will be established and that only two camps will be in services at any time. Water will be trucked to the temporary camp while sewage and waste will be returned by truck to either the Mine Site or Milne Port for treatment/disposal.
- **Construction of several level crossings for the Tote Road:** The railway will cross the existing Tote Road at 8 locations. Each crossing will be constructed in accordance with Transport Canada requirements for grade crossings.
- **Exploitation and closure of multiple quarries along the railway corridor:** Multiple new quarries have been identified along the North Railway, providing an estimated 12.7 Mm³ of rockfill to be used for railway construction. This

excludes material from cuts within the railway right-of-way that will also be used in construction. Not all quarries that have been identified will be used. A number of the quarries are covered with a thin veneer of overburden; this material will also be salvaged and used as general fill during construction.

- **Signaling, communications and other safety features:** Radio-distributed power is required to link the locomotives, with one at either end of the train. The operating system will be radio-order-system-based, with a backup of robust instruments and the current Tote Road radio repeater and microwave tower backbone. Train movements will be controlled by rail traffic controllers and an occupancy control system as outlined in the Canadian Rail Operating Rules (Transport Canada 2016). During the spring/summer thaw period there is a possibility that temporary speed restrictions might be imposed over sections of the line if the effects of the permafrost prove to be a concern. This will be determined by intensified track and substructure inspection and monitoring on a daily basis or even on a train-by-train basis where the maintenance engineer can decide to reduce the operating speed, or even to suspend operations for a determined period.
- **Ongoing inspection and maintenance of the railway embankment, railway, signaling and communication equipment, and wayside condition monitoring equipment:** A rigorous schedule of equipment inspections and maintenance will be implemented during the operating life of the North Railway. Locomotives will be subject to regular inspections during crew changes, plus 90-day, bi-annual and annual locomotive scheduled maintenance shop visits. Cars will be subject to routine detailed inspections, with major scheduled maintenance on brakes, wheels and couplers at other regular intervals based on the distance travelled. Inspection and maintenance activities will be performed at Milne Port at the maintenance centre, which consolidates most of the facilities required for railway operations into a single building. Rail-mounted cranes will be available to load and offload materials for repair and maintenance. Regular track inspection will allow for spot replacement of defective components and renewal of infrastructure. Programmed maintenance over specific track segments will include rail grinding and the replacement of worn or defective components on a designated track section. Regular track maintenance will be planned on the basis of a series of specific types of inspection: general visual inspections, detailed safety inspections, ultrasonic scanning for rail flaws and measurements of the track geometry.
- **Transportation by railway to and from Milne Port:** There are two scenarios currently being contemplated for the operation of the North Railway, the first is a two-train system that uses up to 90 cars a piece, and the second is a three-train system that uses up to 60 cars a piece. In each of these scenarios a locomotive would be attached to each end of the trains giving an overall length between 600 m for the three-train system and 900 m for the two-train system. Depending on the scenario, an average of 5 to 8 round trips will be completed each day. A rotary car dumper will be used to unload ore from the rail cars at Milne Port. This is the same system planned for use at Steensby Port.

Construction of the North Railway is expected to take three years with the railway being operational by 2021. Railways in Canada are highly regulated and operate in accordance with a number of acts, regulations, standards and guidelines. Prior to operating either of the railways associated with the Project, a Certificate of Fitness from the Canadian Transportation Agency will be required following release from the NIRB environmental assessment process.

During operation, the total fleet required has been estimated at up to 5 locomotives, including 1 spare, and 200 cars. Most freight will be transported by rail, which may require the addition of more cars and locomotives. Bulk materials may be hauled in tank cars or containers. Flat cars may be used to transport containers and large equipment and machinery. Ballast and maintenance equipment will also be part of the car fleet. Car switchers may be used to facilitate loading and unloading of fuel, general freight and explosives without using locomotives. A spare ore train and the freight train locomotives will stand in the yard. Ore trains will not operate on the same section of track simultaneously (i.e., not within the same virtual signal block). The design speed for the North Railway will be maximum 75 km/h. The initial maximum operating speed is expected to be 60 km/h or less under all conditions.

The trains will be staffed with a 2-person crew, with the possibility of reducing to a single operator in the future. A single dispatcher will control main line and yard operations. It is proposed that personnel will not be transported by rail because of train schedule and use of buses on the Tote Road provides the necessary flexibility; however, the mode of personnel transport will be reviewed periodically. Once the North Railway is in operation, consideration will be given to transportation of the fuel by rail from Milne Port to the Mine Site. Should this occur, it would be subject to the same management practices as described in the FEIS for the potential transportation of rail on the South Railway.

4.1.3 Milne Port

In order to accommodate the shipment of 12 Mtpa and the North Railway operation, the Milne Port PDA must be expanded. Milne Port layout design is shown on Figure 1.4. Changes to Milne Port will be driven by the construction of a second ore dock capable of berthing capesize vessels, expansion of the current ore stockpiling capacity and associated conveyance facilities to accommodate the North Railway, the installation of secondary ore crushing facilities and the addition of laydown areas and services shops necessary to support the railway operation.

The additional facilities and activities required at Milne Port for the Phase 2 Proposal will consist of:

- **Expansion of the Milne Port PDA:** The expected PDA will increase to 415 ha. This expansion is necessary to accommodate additional laydown areas, and ancillary facilities required to support the larger operation. The current Crown Lease for foreshore occupation is for 36 ha. No increase is required to accommodate the footprint of the second ore dock. The IOL Lease will be amended for the additional foreshore occupation.
- **Construction and operation of a second ore dock capable of berthing capesize ore carriers:** A second ore dock capable of berthing capesize ore carriers will be required. Capesize vessels can carry up to 230,000 dead weight tonnage (DWT), with a length of approximately 316 m, and a draft of about 21 m. The orientation of the dock is optimized to allow a clear approach for vessels parallel to the berth face and clearing the existing dock. Positioning of the new dock relative to the existing dock also considered the spacing requirements for vessels when both docks are in use. Based on the optimum angle for mooring lines the position chosen allows for a minimum clear spacing of greater than 150 m. The dock construction methodology is described in TSD 02 (Section 4.2 and Appendix F).
- **Modifications/expansion of ore stockpiling, new ore crushing/screening facility and ore handling systems:**
 - **Haul truck unloading area:** Until rail infrastructure is commissioned, the iron ore haul trucks will continue to dump coarse ore on a stockpile adjacent to the crusher building. This ore will be reclaimed by front end loaders and fed to the crushing plant. Long-haul trucks currently dump ore (either lump or fines) into small stockpiles, and mobile radial stackers are used to transfer the ore into the appropriate (lump or fines) stockpile.
 - **Rail car unloading:** Ore arriving in rail cars will be unloaded using a rotary dumper without any requirement to uncouple the cars. The material will be stockpiled in a small run-of-mine (ROM) stockpile that feeds the crushing and screening plant. Ore is conveyed from the rail unloading area to the ROM stockpile followed by the crushing and screening plant.
 - **Ore crushing and stockpiling:** Secondary ore crushing and screening operations will be located at Milne Port. The crushing and screening plants will consist of cone crushers fed from large vibrating screens, which will produce the lump and fine ore products to the same specifications as the current crushing and screening operation at the Mine Site. The crushing and screening plants will be located indoors to reduce dust emissions and lower noise levels. Product stockpiles will increase in accordance with the increased quantity of ore being loaded onto ships.

- **Stockpiles runoff management:** New catchment areas or ponds will be built as required to contain runoff from the expanded stockpile; all runoff will be analysed and meet discharge criteria prior to release to the receiving environment as per current authorizations.
- **Construction and operation of railway maintenance facilities:** Rail access at Milne Port will include tracks to the freight unloading/laydown areas, the fuel tank farm, and the railway maintenance yard. The railway maintenance facility at Milne Port will include maintenance shops and management offices; repair areas for locomotives and cars; shop for the care of track maintenance equipment; general storage area for spare parts and consumables; wheel and axle repair area; and locomotives will be moved in and out of the maintenance shop by a railcar mover.
- **Expansion of the camps and associated sewage treatment plant:**
 - **Expansion of camp:** An additional 180 beds will be relocated from the Mine Site Complex and added to the existing Port Site Complex, bringing the facility total to 300 beds. For Milne Port this will bring the overall total of available beds for operations to 680. A temporary 300-bed camp will be installed to accommodate personnel during construction. Following construction and commissioning, the 300-bed camp will be removed.
 - **Milne Port potable water supply:** The existing water supply infrastructure and maximum daily water consumption approved under the Type A Water Licence will accommodate the increase in camp occupancy. Potable water will continue to be sourced from Philips Creek and the lake at kilometer 32. The potable water treatment plant will be expanded.
 - **Sewage treatment plant:** The sewage treatment plant will be expanded to accommodate the larger camp facilities. Treated sewage effluent will continue to discharge to Milne Inlet via the existing outfall.
- **Expansion of the existing power plant and installation of wind turbines:** The power plant at Milne Port is currently equipped with seven 1.35 MW diesel generators, providing installed capacity of 9.45 MW. The expanded port facility including ore crushing and screening operations and a second ship loader will require additional power. Peak power requirements are estimated to be 22 MW during the shipping season and average 8 MW throughout the remainder of the year
- **Expansion and re-purposing of laydown areas and ancillary facilities:** Some of the existing maintenance facilities will be expanded to support the additional trucking fleet for the early period of the Phase 2 Proposal. Once the North Railway is in operation (2021), it is expected that some of these supporting facilities will be re-purposed to support the rail operation. Buildings and structures that are redundant or no longer have a useful life will be demolished.
- **Construction and operation of a landfill site:** Baffinland will continue to manage all waste generated in accordance with its approved Waste Management Plan. This management plan will be updated as required and submitted to the NWB for approval should any significant changes in practices be necessary. A landfill at Milne Port will be constructed as part of the Phase 2 Proposal. The design and construction of the landfill will be consistent with that of the landfill being operated at the Mine Site. The landfill will be developed and operated in accordance with the NWB approved management plan for the Mine Site landfill.
- **Increase shipping activities at Milne Port:** Tugs and line boats will be used to shift the ore vessels from anchorages onto and off the dock. Market ore carriers transiting towards Milne Port will proceed directly to either an open loading dock, or to one of several anchorages available in the event dock space is full. Six to 10 tugs/line boats are expected to be required to operate the port. Three of these vessels will be ice management vessels for ice management duties at the beginning and end of the shipping period. These boats will be sailed to site at the beginning of each open water season and will sail south at the end of each season. Refuelling will be done by ship-to-ship transfer.

4.1.4 Marine Shipping

Shipping is undertaken in accordance with applicable legislation including the *Canada Shipping Act* and the *Arctic Waters Pollution Prevention Act*. Shipping routes are generally open water during the period of July 25 to October 15. However, ice class ships are still expected to be required during the early season and late season periods (i.e., July 1 to November 15).

The *Canadian Ballast Water Control and Management Regulations* require that ships have a ballast water management plan, and either exchange or treat their ballast prior to discharge in waters under Canadian jurisdiction.

The Northern Shipping Route to Milne Port and anchorage locations are shown on Figure 1.5. Instructions to shippers, prepared by Fednav Limited (2016), provide waypoints to navigate in and out of Milne Port, along with approved anchorage locations, vessel speed limits, and other important information for safe navigation to the port. The need for seasonal changes to this routing have not been identified to date, nor have navigational aids been required. The anchorage locations, originally established by the Canadian Hydrographic Service (ca.1985), were confirmed as acceptable to the community of Pond Inlet prior to initiating construction of the ERP, in accordance with PC Condition 125(a). The standing instructions require vessels to reduce speed to a maximum of 9 knots beginning at the entrance to Pond Inlet (at 76° longitude) through Eclipse Sound and Milne Inlet.

The Project currently involves sealift deliveries of equipment and materials to Milne Port, and the shipment of ore from Milne Port to Europe, during the open water season. Proposed changes to shipping from Milne Port include:

- The use of capesize vessels in addition to various-sized market vessels for ore shipment
- The operation of ice management vessels and tugs/line boats during the shipping season
- Shipping predominately in the open-water season with shipping during periods of ice-break up (after July 1) and ice formation (up to November 15) as required
- A range of 134-176 ore carrying vessels calling at Milne Port annually

The amount of vessel traffic calling on Milne Port will increase with the Phase 2 Proposal. Baffinland intends to ship mostly during the open water season, however, the actual shipping window will be adjusted to adapt to annual fluctuations in weather and ice conditions while accommodating some additional operational flexibility. The shipment of 12 Mtpa of ore during the shipping window will be possible through an extended shipping window of July 1 to November 15 and the use of larger ore carriers facilitated by the construction a second ore dock at Milne Port.

4.1.5 Air Traffic

There is currently only one operational airstrip at the Mine Site that services the Project. An airstrip will be constructed at Steensby Port once construction of the South Railway operation begins, as described in the FEIS. The construction of the airstrip approved for Milne Port will be deferred. During the first two stages of Phase 2 (construction and operation of the North Railway), the present arrangement will continue with increased flights. No modifications to the existing airstrip at the Mine Site will be necessary. During the South Railway construction period, the Steensby airstrip will be constructed (Baffinland 2012). In addition, temporary airstrips will be used along the South Railway during its construction, as described in the FEIS.

4.1.6 Mine Closure

Under the Phase 2 Proposal, the operation period will extend to the end of 2035, after which a 3-year closure phase will be executed (Table 1.1).

Baffinland currently has an Interim Closure and Reclamation Plan (ICRP) approved by the NWB under its Type A Water Licence and by the QIA under the company's Commercial Lease for mine development activities on Inuit Owned Land (QIA

2013). The ICRP is an evolving document, which will be updated as new knowledge is gained from operational monitoring, refinement of methods based on progressive rehabilitation, and to reflect any relevant changes in the Project.

A further update to the ICRP will be prepared to incorporate the elements of the Phase 2 Proposal during the water licence amendment stage that is expected to occur following the successful amendment of Project Certificate No. 005. All the elements of the Phase 2 Proposal are already captured in the approved ICRP; only quantities and the associated reclamation security estimate will change.

4.2 Phase 2 Proposal Design

A wide range of factors were considered in designing the Phase 2 Proposal, as described below. These same factors were considered in designing the Approved Project.

4.2.1 Environmental Factors

The design of the current operating mine is strongly driven by its remote location on northern Baffin Island at an approximate latitude of 72°, and the associated meteorological, hydrological and oceanographic conditions. An overview of the climatic conditions is presented in Section 8.2.1.1 and TSD 06.

The region experiences near 24-hour darkness from early November to late January, with less than two hours of twilight. The highest snowfall typically occurs between September and November as daily temperatures move below 0°C in mid-October. “Arctic white-out” often occurs; diffuse white clouds blend into the white snow-covered landscape, reducing visibility and increasing the likeliness of disorientation. This condition can also occur in April and May. During winter months (December to April), the treeless topography and fine powdery snow produce blowing snow conditions that can restrict visibility.

The cold temperatures, darkness and blowing snow conditions all have a bearing on how the mining operations are conducted. Worker safety is paramount, and additional protection measures are necessary to account for the cold, darkness and occasional reduced visibility. These conditions reduce worker productivity levels as well as the reliability and life expectancy of mobile equipment.

The site is located within the zone of continuous permafrost, with permafrost on the order of 500 m in depth within the region. A one to two-metre thick active layer thaws each summer. Ice-rich and thaw-sensitive soils are located within the Project’s development areas, which influences building foundations and the construction of civil structures such as roads, railways and dams.

Mean annual precipitation at Pond Inlet is less than 200 mm, with a little more than half falling as snowfall. Watercourses near the Project are generally dry or frozen from October through May. Streamflow typically occurs between June and September. In spring, the ground is still largely frozen limiting infiltration. This results in early runoff rapidly reporting to stream channels, where flow is often on top of ice within the channels. Baffinland has experience with freezing culverts and implements a culvert steaming program each spring. Despite these efforts, high freshet flows combined with freezing can result in culverts being damaged. This has occurred at various locations along Tote Road as recently as 2016.

4.2.2 Climate Change Considerations

Baffinland undertook an update of its assessment of potential climate change effects on the region and the Project in support of the Phase 2 Proposal (TSD 06 and TSD 08). This has included consulting the latest global climate change assessments and has incorporated appropriate climate change adaptation strategies into its project design.

- Designing the North Railway to account for warmer ambient air temperatures and warming permafrost

- Locating the second ore dock in a location where seabed sediments do not contain high ice content, and designing the dock to account for the predicted sea level rise
- Designing watercourse crossings and water management facilities to a higher return period to account for increased variability in the hydrological regime

Any climate-change related effects on sea ice are expected to favour the Project. The dock will be able to accommodate a further rise in sea level of what has been predicted. The North Railway is the most sensitive project component to changes in ambient air temperature, which in turn affects permafrost warming and consequently the thickness of the active layer and further melting of soils with high ice content. The Railway Management Plan describes monitoring that will detect settlement of the embankment so that excessive settlement can be mitigated.

The potential adverse effects of climate change on permafrost have been acknowledged and addressed in the design of the Project infrastructure (TSD 08) as well as the assessment methodology. To avoid adverse effects, extensive geotechnical drilling is required in order to avoid ice rich soils, ice lenses, and unstable landforms for siting facilities and infrastructure. For the environmental assessment, potential development areas (PDA) have been delineated for the Project components. While the final siting of the infrastructure will not be done until the geotechnical investigations are completed, the PDAs are sufficiently large to ensure that Project components are located on stable ground. For the purpose of the environmental assessment, Baffinland assumes that the entire area within the PDA is impacted for all the biophysical VECs. This approach ensures a robust assessment of residual effects while retaining some degree of flexibility for final siting of Project components.

4.2.3 Precautionary Approach

Baffinland has incorporated the precautionary principle throughout the Project, including in developing its current project design, and in its Environmental, Health and Safety (EHS) Management System, which includes extensive monitoring programs and management plans that prescribe mitigation measures and adaptive management processes. Ongoing monitoring, as a complement to robust baseline data, enables Baffinland to proactively detect potentially adverse effects and address through adaptive management. The monitoring plans are reviewed annually, updated as necessary and are submitted to the NWB for approval. Baffinland's annual reports to the NIRB and to the NWB/QIA summarize the performance of the operation for the previous year and outlines modifications that have been implemented to prevent or reduce adverse environmental effects. Mitigation measures have been implemented even when it is not certain that adverse effects will occur. These annual reports are posted on both the NIRB and NWB public registries.

Following the ERP and in advance of the 18 Mtpa South Railway operation, the Phase 2 Proposal is an important step in the development of the Project. The Phase 2 Proposal will introduce shipping during periods of ice formation and break-up, which will allow Baffinland to gain experience shipping in ice and mitigating resultant effects to Inuit land use prior to developing the (approved) year-round port at Steensby Inlet.

4.2.4 Public Consultation and IQ

As further discussed in Section 7 and TSD 04, Baffinland has engaged Inuit communities and its stakeholders regarding its Phase 2 Proposal on numerous occasions since announcing its plans in late 2014, and the company has modified its plans considering feedback from that engagement. Major project design changes which have changed as a result of public input include the following:

- Baffinland confirmed in its November 2016 Project Update to NIRB, Inuit communities, and stakeholders that the Phase 2 Proposal had been modified such that most shipping would occur during the open water season, with shipping to occur during the periods of ice break up and ice formation, as required. Baffinland will inform the Mittimatalik Hunters and Trappers Organization (MHTO) for shipping during periods of ice-break up (July 1 on) and ice formation (up to November 15) in order to avoid overlap with Inuit use of landfast ice.
- Baffinland's original Phase 2 Proposal (Baffinland 2014b), included a winter sea-lift and trans-shipping, which are no longer being requested.

IQ has been considered and incorporated in the TSDs.

4.2.5 Socio-economic Conditions

Socio-economic conditions that influenced the design of the Approved Project remain unchanged by the Phase 2 Proposal. Work rotations established for the Project of 2 weeks on and 2 weeks off have become the standard for fly-in/fly-out mining operations and are thought to be the most suitable for Inuit communities. The feedback received regarding the Approved Project reinforced this. Baffinland has established employment policies that aim to increase Inuit employment, requirements for high school graduation have been waived for positions that can accommodate it, and Baffinland has implemented training programs and a second-chance policy. Baffinland has developed an Inuit Human Resources Strategy jointly with the QIA to increase Inuit employment from current levels. Baffinland has committed resources (cash plus in-kind contributions) to support the QIA to successfully receive federal funds to deliver further training programs to Inuit. Baffinland has undertaken socio-economic monitoring for the Project since 2013. Details regarding the socio-economic monitoring plan is provided in Appendix B of TSD 25.

4.2.6 Archaeological Sites

Development of the Approved Project has prioritized the avoidance and protection of a number of archaeological sites along Tote Road (protected by snow fencing), and the establishment of an exclusion zone within a portion of the beach at Milne Port, where a more culturally important and widespread archaeological site exists from the Arctic Small Tool Tradition. The Phase 2 Proposal will retain the same archaeology exclusion zone at Milne Port. In addition, several quarries to be used to construct the North Railway have been relocated or the boundaries adjusted to avoid other archaeological sites.

4.2.7 Inuit Land Use, Harvesting and Soapstone Sites

Baffinland's original Phase 2 Proposal would have involved shipping between June and March; this would have included shipping in ice at a considerable frequency. Feedback Baffinland received from community meetings and IQ workshops specific to the Phase 2 Proposal in 2015 and 2016 recorded concern with shipping in ice past the community of Pond Inlet, particularly at the frequency proposed, and the potential resultant effects on Inuit use of the landfast ice and harvesting activities from the landfast ice. In late 2016, when Baffinland spoke to the community about a possible winter sealift during the 2017 winter, the Pond Inlet MHTO expressed concern with shipping during the months of March and April due to the potential effects on ringed seals during the pupping period. This community feedback contributed to Baffinland's decision to reduce its proposed shipping season associated with the Phase 2 Proposal.

One soapstone deposit well known to the community of Pond Inlet is located near the Mine Site. Protection of soapstone (or carving stone) deposits for use by Inuit is afforded by the Nunavut Agreement, and by Article 19 of the IIBA between the QIA and Baffinland.

4.2.8 Protection of Terrestrial Wildlife and Habitats

Previous baseline studies had mapped caribou crossings along Tote Road, which provides relevant information for assessing the likely caribou crossings of the North Railway, and the same mitigation measures (mainly caribou crossings) proposed for the South Railway in the Approved Project will be applied to the North Railway (TSD 10). Baffinland held an IQ workshop in Pond Inlet in 2015 that focused on caribou interactions with the Northern Transportation Corridor, and the findings of that work have been incorporated into the railway design (TSD 03).

Raptor nests (mainly occupied by peregrine falcon) were also identified in the general area of the North Railway, with seven nests being located within or adjacent to the original North Railway PDA. Modifications to the project footprint were made to the extent feasible to increase the setback between the North Railway PDA and known raptor nests. This included adjusting the extent of or moving proposed quarries.

4.2.9 Protection of Marine Wildlife and Habitats

Protection measures for marine wildlife and habitats are addressed in the Shipping and Marine Wildlife Management Plan, and this plan and the marine mammal monitoring programs are discussed twice annually with the Marine Environment Working Group (MEWG). The same protection measures will be applied to the Phase 2 Proposal.

Protection of the Aquatic Environment

Port and shipping operations, both current and proposed, have been designed to reduce impacts to the marine aquatic environment. This includes monitoring vessel adherence to the *Ballast Water Management Regulations*, implementation of an offsetting plan for lost fish habitat, and conducting a comprehensive marine environmental effects monitoring program.

Operations on land have been designed to reduce impacts to the freshwater aquatic environment. Monitoring and management plans, including the Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan, the Railway Management Plan, and the Roads Management Plan will be implemented for the Phase 2 Proposal.

4.3 Future Development

4.3.1 Known Iron Ore Deposits

The North Baffin Island region has an abundance of high grade iron ore deposits. As described in TSD 02, Baffinland has a number of mineral leases on which exploitable resources have been identified.

These deposits and prospects are defined as high grade iron oxides (>65% iron) and generally comprise a number of iron formations which have been enriched and altered to varying degrees. Original banded iron formations comprised of alternating layers of magnetite and hematite appear to have been preserved in several locations along strike of potential high-grade deposits. It is generally believed that regional metamorphism and folding associated with geological events in the past resulted in significant crustal thickening together with the creation of zones of weak to very efficient leaching of silica. Subsequent geological events appear to have led to the alteration of magnetite to hematite and specular hematite. Surface outcrops differ in iron, silica, and sulphur content and in the proportions of their main oxide minerals – hematite, magnetite, and specularite.

The existence of a large number of deposits and prospects containing high grade iron oxides speaks to the significant long-term upside of the Mary River Project. The Project has the potential to exist as a multigenerational mining development. To

adapt to emerging iron ore demand, changing environmental conditions, and evolving technologies, development of these resources will require the continued use of a phased approach to development.

4.3.2 Near-Term Development Plan

Development of a large-scale iron ore district is an iterative process, evolving over time based on the results of advanced exploration as well as the commercial factors described in Section 8.1 of the FEIS Addendum for the Phase 2 Proposal. The NIRB, Inuit communities, and Baffinland's other stakeholders have witnessed the ongoing evolution of this Project to date.

As of December 31, 2017, Deposit No. 1 contains an estimated 653 Mdm of Mineral Resources (inclusive of Mineral Reserves) with an estimated grade of 65.3%. The current mine plan proposes to exploit the 383.7 Mdm of established Mineral Reserves in Deposit No. 1. Depending on iron ore prices and further economic evaluation, a larger portion or all of the 653 Mdm Mineral Resource may be mined. This would extend the life of, and/or accommodate a further increase in production at Deposit No. 1.

Deposits No. 2 and No. 3 are located adjacent to Deposit No. 1 and have been investigated (drilled) more extensively than the other deposits. Given their proximity to the current Mine Site, it is expected that these deposits will be developed either prior to or following exhaustion of ore in Deposit No. 1, utilizing much of the same Project infrastructure. Additional drilling will be required to further define the orebodies, establish safe pit slope angles, and geochemically characterize the associated waste rock. Mine plans can then be developed, establishing open pit dimensions, ore extraction and handling operations, and waste rock disposal plans.

Deposits No. 4 and No. 5 have been drilled at a very broad spacing while none of the prospects have been drilled to date. Drill information is currently insufficient and lacks the necessary confidence level to define mineral resources in these deposits. Deposits No. 4 and No. 5 are located approximately 7 km and 2 km from the proposed North Railway along the Northern Transportation Corridor. If proven to be economic, ore from these deposits could be transported to a new load-out facility along the North Railway for shipment via Milne Port. As with Deposits No. 2 and No. 3, additional drilling is required to define the ore bodies, characterize the waste and to develop a mine plan. A trade off study would be conducted to determine the most optimal means of transporting the ore to the North Railway (i.e., by a spur rail line, by road or by overland conveyor).

Table 4.1 Baffinland's Regional Iron Ore Deposits and Prospects

Deposit/Prospect Name	Description
Deposit No. 1	632 Mt of mineral resources and reserves at approximately 65% iron, of which 365 Mt are mineral reserves that will be exploited by the current mine plan.
Deposit No. 2	26 Mt indicated mineral resources at 65% iron.
Deposit No. 3	336 Mt inferred mineral resources at 65.9% iron.
Deposit No. 4	Elongated zones of high grade iron oxide from 5 to 75 m in width over a 2,800 m strike length.
Deposit No. 5	Attenuated and well exposed zones of high grade iron oxide over an approximate 6 km strike length; with individual high grade zones up to 700 m in length and up to 70 m wide.
Glacier Lake Prospect	High grade iron oxide exposed for 1 km strike length and up to 100 m width; prospect located on a major fold structure that can be traced for up to 20 km.
Turner River Prospect	High grade iron oxide exposed over a 700 m strike length and up to a potential 100 m width; prospect located on a major fold structure that can be traced for up to 25 km.
Cockburn River Prospect	High grade iron oxide exposed for a combined 2.4 km strike length and approximately 20-140 m width; prospect located on a geological structure that can be traced for up to 10 km.

Table 4.1 Baffinland's Regional Iron Ore Deposits and Prospects

Deposit/Prospect Name	Description
Rowley River Prospect	High grade iron oxide exposed for combined 1.4 km strike length and up to 150 to 200 m outcrop width and potential 40+ m thickness.
Triangle Lake Prospect	High grade iron oxide along an approximate 1.1 km strike length and exposed 20 to 25 m width; additional discontinuous mineralization extends this zone to a potential 3.5 km.
Long Lake Prospect	Main high grade iron oxide zone exposed for a 200 m strike length and a 20 to 30 m width; additional discontinuous mineralization extends this prospective assemblage to a potential 3.5 km strike length. There is additional potential (gold) beyond the high grade iron oxides.
Isortoq Fold belt	Includes several high grade iron oxide prospects; very early stage of exploration.
Eqe Bay Fold belt	Includes the Cake Lake Prospect, which contains a zone of massive, hard high grade hematite iron formation set within an oxide facies iron formation sequence 10+ km in length; potential high grade hematite ore zone up to 800 m length by 100 m width. There are additional mineral prospects (gold) beyond the high grade iron oxides.

4.3.3 Long-Term Development

Baffinland's active mineral exploration claims are shown on Figure 10.1. Baffinland's regional exploration efforts in the past few years have helped to further demonstrate the long-term potential of the region as having sufficient resources to support a high tonnage iron ore mining operation over a long duration. While the named prospects have been confirmed as containing high grade iron oxide (>65% iron), substantial drilling is still required to delineate mineral resources at these locations. Therefore, no development plans have been established for these deposits and prospects. Baffinland acknowledges that pending further exploration work, it is possible that priorities may shift to the development of one or more of these deposits. For example, the Isortoq Fold Belt and Eqe Bay Fold Belt Prospects appear to each contain multiple high-grade prospects and are located very close to tidewater, and as such, would require less infrastructure to transport the ore to the coast.

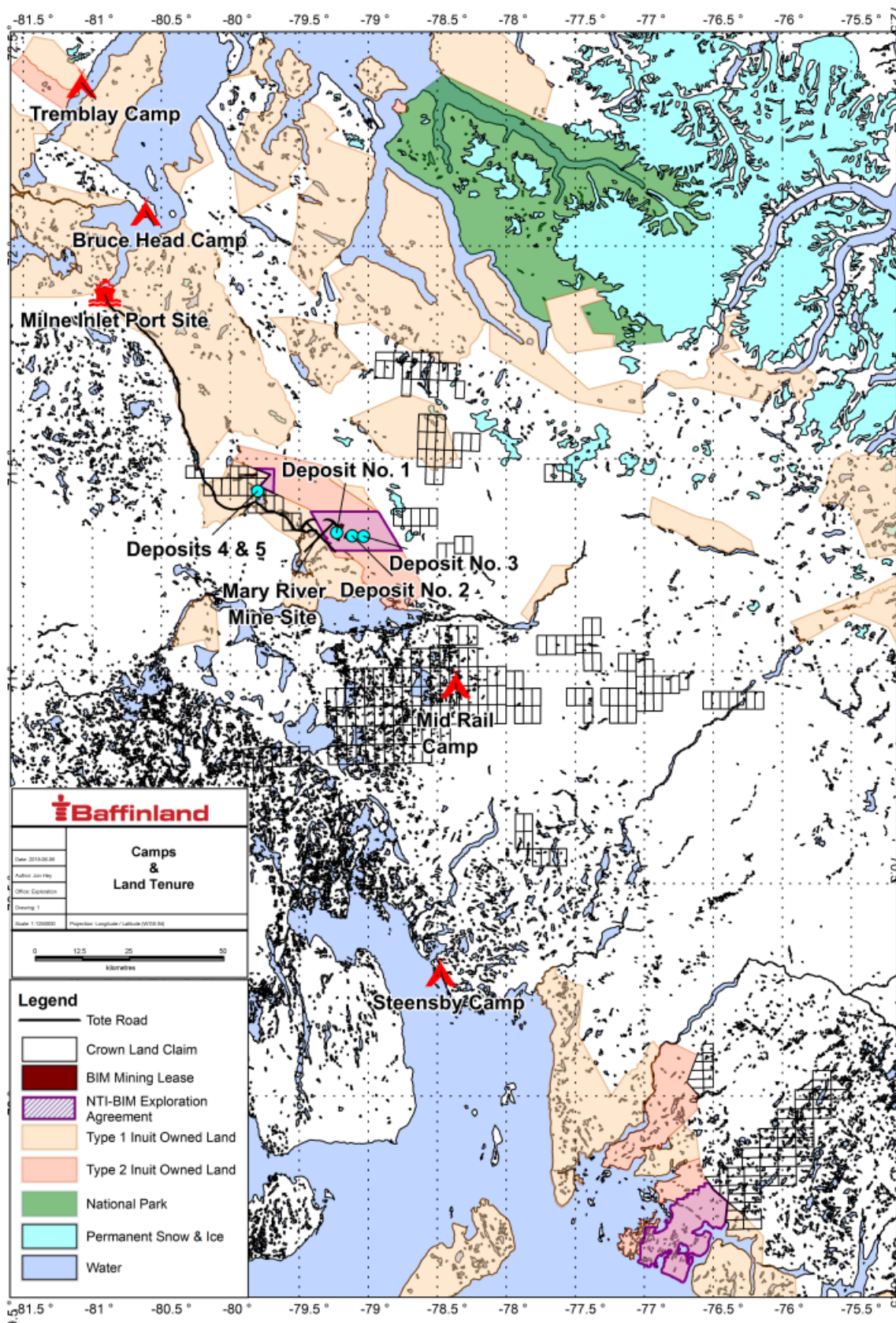


Figure 4.1: Active Mineral Claims

5 ENVIRONMENTAL MANAGEMENT SYSTEM

5.1 Environmental and Socio-economic Management, Monitoring and Mitigation Plans

Baffinland's Environmental Management System (EMS) is its Environmental, Health and Safety (EHS) Management System Framework Standard, were developed in 2010 (FEIS Appendix 10A-1; Baffinland 2010a) and presented in the FEIS. The EHS Standard is accompanied by the Hazard Identification and Risk Assessment Standard (FEIS Appendix 10A-2; Baffinland 2010b). The EMS regroups a number of environmental management plans (EMPs) that enables Baffinland to track its environmental performance along with the effectiveness of mitigation measures that prevent adverse effects on the VECs and VSECs. These EMPs are listed in Table 5.1 below. Additional discussion is provided in the following sections.

Table 5.1 Baffinland Environmental Management Plans

Document Number	Plan Name	Current Revision Date
BAF-PH1-300-P16-0002	Snow Management Plan	Sep-17
BAF-PH1-830-P16-0001	Surface Water Sampling Program - Quality Assurance and Quality Control Plan	Mar-17
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan	Mar-16
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan	Mar-14
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	Mar-16
BAF-PH1-830-P16-0008	Environmental Protection Plan	Aug-16
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan	Mar-18
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan	Mar-17
BAF-PH1-830-P16-0012	Interim Abandonment and Reclamation Plan	Mar-16
BAF-PH1-830-P16-0013	Oil Pollution Emergency Plan - Milne Inlet (OPEP)	Jun-17
BAF-PH1-830-P16-0017	Q1 Quarry Management Plan	Jul-17
BAF-PH1-830-P16-0023	Roads Management Plan	Mar-16
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan	Mar-16
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	Mar-16
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystems Management Plan	Mar-16
BAF-PH1-830-P16-0027	Terrestrial Environmental Management and Monitoring Plan	Mar-16
BAF-PH1-830-P16-0028	Waste Management Plan	Mar-18
BAF-PH1-830-P16-0029	Phase 1 Waste Rock Management Plan	Nov-17
BAF-PH1-830-P16-0030	Borrow Source Management Plan – Kilometre 2	Oct-14
BAF-PH1-830-P16-0031	Life of Mine Waste Rock Management Plan	Apr-14
BAF-PH1-830-P16-0032	Borrow Source Management Plan – Kilometre 97	Oct-14
BAF-PH1-830-P16-0035	Borrow Source Management Plan – Kilometre 104	Mar-14
BAF-PH1-830-P16-0036	Spill Contingency Plan	Mar-17
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan	Jun-14
BAF-PH1-830-P16-0038	Exploration Closure and Reclamation Plan	Jul-14
BAF-PH1-830-P16-0039	Aquatic Effects Monitoring Plan	Oct-15
BAF-PH1-830-P16-0040	QMR2 Quarry Management Plan	Jul-17

Table 5.1 Baffinland Environmental Management Plans

Document Number	Plan Name	Current Revision Date
BAF-PH1-830-P16-0041	Polar Bear Safety Plan	Mar-16
BAF-PH1-830-P16-0042	Spill at Sea Response Plan	Aug-15
BAF-PH1-830-P16-0046	Marine Environmental Effects Monitoring Plan	Mar-16
BAF-PH1-830-P16-0047	MMER Emergency Response Plan	Oct-17
BAF-PH1-840-P16-0002	Emergency Response Plan	Mar-18
11030-RP-OP-2000-001	Railway Management Plan (draft)	Jan - 12
SD-STD-002	Standard for Hazard Identification and Risk Assessment	-
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 has also established several socio-economic management plans (SEMPs) in accordance with the Guidelines (NIRB 2015). Table 5.2 lists Baffinland's socio-economic management plans.

Table 5.2 Baffinland Socio-economic Management Plans

Document Number	Plan Name	Current Revision Date
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	Mar-16
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	Mar-16
H337697-0000-01-126-0002	Health and Safety Management Plan	-
SD-SEMP-003	Human Resources Management Plan	-
-	Inuit Procurement and Contracting Strategy (see Note)	-
-	Inuit Human Resources Strategy (see Note)	-

NOTE:

Baffinland has jointly developed with the QIA two strategic documents that complement its existing socio-economic management plans: Inuit Procurement and Contracting Strategy and Inuit Human Resources Strategy

Section 9.3 of the Amended EIS Guidelines outlines the requirements for monitoring and mitigation within the biophysical environmental and socio-economic management plans prescribed in Sections 9.4 and 9.5 of the Amended EIS Guidelines (NIRB 2015). The various EMPs and SEMPs incorporate the required mitigation and monitoring.

Details on updates required for the Phase 2 proposal of the various monitoring and mitigation plans (or management plans) are provided in Section 10.4.

5.2 Environmental Protection Plan

Baffinland first developed its Environmental Protection Plan (EPP) in support of its bulk sample program initiated in 2007. The EPP is organized as follows:

- Section 1 - Purpose, Organization, Environmental Commitments, Environmental Approvals and Responsibilities.
- Section 2 - 33 Operational Environmental Standards covering archaeological protection, water use, fuel storage and handling, aircraft operation, wildlife protection and waste management.
- Section 3 - 14 Logs and forms, for recording various information including observations of human land use and wildlife, various environmental inspections and recording of environmental data.
- Section 4 - Form to request revision to an Operational Standard.

The EPP has undergone numerous revisions since 2007. The latest update of the EPP (BAF-PH1-830-P16-0008) was presented in Baffinland's 2016 Annual Report to the NIRB (Baffinland 2017).

5.3 Other Plans and Procedures

A number of procedures, manuals and guides have been developed, either as an outcome of previous NIRB reviews, or because Baffinland recognized the need:

- Tote Road Travel Procedure;
- Hunter and Visitor Site Access Procedure;
- Sump Water Disposal Procedure;
- Ice Auger Operation Procedure;
- Snowmobile Operation Procedure;
- Incinerator Ash Sampling Procedure;
- Mobile Oily Water Separator Manual;
- Waste Sorting Guideline; and
- Waste Sorting Guidelines Open Burning of Untreated Wood Cardboard and Paper Product.

These documents also form part of the operational EMS System.

5.4 Mine Closure and Reclamation Plan

An Interim Closure and Reclamation Plan (ICRP) has been developed by Baffinland and approved by the NWB under the Type A Water Licence, and conditionally approved by the QIA under the Commercial Lease. Financial assurance in the is currently held by the QIA and CIRNA, which reflects the proportioning of IP (IOL) and Crown Land, respectively. The Annual Security Review (ASR) process has been ongoing since 2013 in which the quantum of security is revisited considering the proposed work plan for the year following. The closure estimate will be updated after Ministerial approval of the Phase 2 Project, in accordance with Part J of the water license.

The Phase 2 Proposal involves additional infrastructure that will require an update to the ICRP. This includes additional infrastructure at the Mine Site (mainly a replacement of ore handling and stockpiling equipment for the ERP with the same equipment for the 12 Mt/a operation), the North Railway, and at Milne Port the additional ore dock and ore handling and stockpiling equipment. The current ICRP already describes the reclamation measures to be undertaken for a railway and ore dock, but will need to be updated to identify the additional infrastructure, and associated reclamation security.

5.5 Follow-up and Adaptive Management Plan

Section 9.7 of the Amended EIS Guidelines provides direction to Baffinland for the development of a Follow-up and Adaptive Management Plan. Follow-up and adaptive management have been incorporated into the individual biophysical EMPs and socio-economic management plans and associated monitoring plans identified above. Updates to existing documents which are required as a result of the Phase 2 Proposal are reflected in Section 10.4.

5.6 Project Phases and Schedule

Current and completed project phases include the following:

- **2004 to 2012 - Definition Phase:** Advanced exploration, bulk sampling, engineering studies and permitting;
- **2013 to 2014 - ERP Construction:** Construction of the ERP components of the Project; and
- **2015 onward - ERP Operation:** Operation of the 4.2 Mtpa ERP (the first development phase).

The Phase 2 Proposal involves mining the same resource as the Approved Project over a slightly longer timeframe (23 years instead of 21 years), but with incremental increases in the production rate to match transportation limitations. Given the various factors that affect the viability of mining in general and particularly in the north (e.g., ore prices; logistics; environmental sensitivity; community benefits), it is critical to retain adaptability in the project development schedule. Working within the bounds of the active Project Certificate, the Company will continue to consult with the public, communities, and regulators to determine the most appropriate mining and transportation plans.

The following development sequence applies to the Phase 2 Proposal:

- **2019 (end of Q4) to 2020:** Construction of the North Railway;
- **2020:** Commissioning of the North Railway;
- **2021:** Commence construction of Steensby Port and the South Railway;
- **2024:** Commissioning of the South Railway and Steensby Port; and
- **2025:** Full operation of Steensby Port and South Railway.

The construction period will overlap with the on-going operation of the Milne Port and North Railway operation. By the end of 2025, Baffinland will ship ore from both Milne Port (12 Mtpa) and Steensby Port (18 Mtpa).

The incremental approach of the Phase 2 Proposal an opportunity to gain more operational experience and learnings while gradually scaling up the Project. The Project's labour requirement will also grow incrementally, which allows for local communities to develop the capacity for a greater involvement in the Project's workforce over time.

Based on the existing development plan and the known mineral resource in Deposit No. 1, the mine will be exhausted by 2037. If additional mineable iron ore is not identified in Deposit No. 1 or in adjacent deposits, the mine will advance through a 3-year active closure phase (2038 to 2040), followed by a minimum 5-year post-closure monitoring phase (2041 to 2046).

6 PROJECT ALTERNATIVES

Core to the environmental assessment process is a detailed assessment of alternatives to a project and alternative means of carrying out a project, a summary of which is provided below. The full Alternatives Analysis is presented in TSD 01. The Project has considered numerous alternatives to carrying out the Project in a financially appropriate, timely, and responsible manner. Project alternatives have been organized according to two tiers:

- Tier 1 - Major alternatives shaping the overall approach to, and the viability of, the Project; and
- Tier 2 - Minor alternatives relating to the specific Project components.

Viable alternatives have been evaluated according to technical feasibility, cost effectiveness, environmental acceptability, and community acceptability.

It is necessary that a given alternative is technically feasible; alternatives that are not technically feasible are not considered further. Options that are technically feasible and do not affect the economic viability of the Project are evaluated further.

6.1 Alternatives to the Project

Several scenarios were considered as alternatives to the Project via different production levels, including keeping the status quo, ceasing operations, increasing production to satisfy Phase 2 transportation limits, and developing the Steensby portion of the Project.

- **Cease, Maintain or Increase Production** - Implementing the Phase 2 Proposal is Baffinland's preferred alternative. It allows the company to move to rail under a lower capital cost scenario and gain valuable operational experience with rail and at a higher production rate. The Phase 2 Proposal builds on Baffinland's experience with open water shipping and introduces limited ice breaking.

6.2 Tier 1 Alternatives to Carrying Out the Project

Five major (Tier 1) alternatives were assessed that potentially shape the overall approach to, and the viability of, the Project. These include:

- **Shipping Season Alternatives** - Four shipping season alternatives were assessed. The preferred shipping alternative is an extended season from July 1 to November 15, which allows for operational flexibility and reduces potential impacts on Inuit use of the landfast ice.
- **Northern Shipping Route Options** - ENFOTEC (2016) evaluated two ship routing options (Lancaster Sound/Navy Board Inlet and Pond Inlet) for the Phase 2 Proposal. Shipping from Milne Inlet via Lancaster Sound and Navy Board Inlet results in an additional 130 nautical miles (NM) of steaming when compared to shipping via Pond Inlet, and Navy Board Inlet tends to freeze-up earlier compared to Pond Inlet.
- **Trans-shipping** - Based on previous plans to ship extensively during the ice cover period, trans-shipping was planned to reduce the need for custom built ice breakers. With the current Phase 2 Proposal, Baffinland has been able to avoid shipping in ice thereby removing the need for trans-shipping.
- **Transportation of Ore to Milne Port** - Rail transportation is better suited for hauling large quantities of ore as proposed in the Phase 2 Proposal, has a better return on investment, and a reduced environmental footprint due to reduced sensory disturbance and dust generation. Further, due to reduced fuel consumption, greenhouse gas (GHG) emissions generated by the operation are also reduced.

- Selection of a Previously Rejected Alternative - A railway to Milne Port can be constructed at a substantially lower cost than had been previously assumed and Baffinland has established a customer base that can accommodate the delivery of ore within the brief open water shipping season.
- **Rail Alignment** - Two route options leading to Milne Port were considered. The preferred route runs generally parallel to the existing Tote Road and is located within an established transportation corridor. Geotechnical investigations and feasibility studies have verified that a railway along this alignment is technically feasible and economically viable.

6.3 Tier 2 Alternatives to Carrying Out the Project

Two minor (Tier 2) alternatives were assessed relating to specific project components. These include:

- **Alternative Locations for a Second Ore Dock at Milne Port** - Baffinland briefly considered three potential dock locations for the new ore dock. Option B, immediately east of the existing ore dock, is the preferred alternative. Option B also reduces the need for a largely expanded PDA improving environmental and social acceptability, and does not require underwater blasting or dredging for construction of the dock.
- **Renewable Energy Sources** - Alternative energy sources were evaluated previously in the FEIS. As stated in the FEIS, diesel remains the preferred alternative because it can meet the project's power generation requirements on a continuous basis year-round at an acceptable capital cost, with an acceptable timeframe for implementation. As part of its Climate Change Strategy (TSD 06), Baffinland is committed to exploring renewable energy opportunities. The use of wind turbines at Milne Port and the Mine Site is being considered as a means of reducing operating costs and site fuel consumption. The capacity of the wind turbines under consideration ranges from 3 MW to 4.2 MW per unit.

Baffinland has carefully considered the need to increase production and the alternatives to doing so. Additionally, within the Phase 2 Proposal as suggested within the Guidelines, Baffinland has considered a range of alternative means of carrying out the Phase 2 Proposal to achieve increased delivery of ore to market based on the Approved Project.

7 CONSULTATION AND IQ STUDY OUTCOMES

7.1 Approach to Engagement

Baffinland's approach to Inuit community and stakeholder engagement emphasizes the importance of informing Inuit community and stakeholders, establishing effective communication strategies, and collecting feedback from them on potential issues and concerns. This approach has informed the development and implementation of the Stakeholder Engagement Action Plan (SEAP) for the Project, which is intended to outline a systematic program for effective communication. It is a best practice standard and a cornerstone of corporate responsibility. The SEAP is a living document and is reviewed and updated as needed.

Since 2014, the engagement program has included considerable consultation related to the Phase 2 Proposal, including the identification and discussion of topics of interest and concern regarding the proposal and potential effects.

This section provides a high-level summary of consultation activities and outcomes related to the Phase 2 Proposal. For detailed consultation information, refer to the Public Consultation Report (TSD 04), prepared in support of the Approved Project for the Phase 2 Proposal.

7.2 Engagemet Activities for the Phase 2 Proposal

Baffinland is committed to meaningful engagement with Inuit communities and stakeholders potentially affected by the Project, including the five (5) North Baffin Inuit Communities (Arctic Bay, Clyde River, Hall Beach, Igloolik and Pond Inlet), the Qikiqtani Inuit Association (QIA), applicable regulatory agencies and the general public. Baffinland's approach to meaningful Inuit and stakeholder engagement is integrally related to its commitment to corporate responsibility and sustainable development. Inuit communities and stakeholders with whom Baffinland consults include, but are not limited to:

- **North Baffin Communities:** Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet;
- **HTOs:** Hunters and Trappers Organizations;
- **Local Groups:** Mary River Community Group;
- **Regional and Territorial Inuit Associations:** Qikiqtani Inuit Association (QIA) and Nunavut Tunngavik Inc. (NTI);
- **Various Governmental Agencies and Institutions of Public Government:** Nunavut Planning Commission (NPC), Nunavut Impact Review Board (NIRB), Government of Nunavut and Environment and Climate Change Canada (ECCC), Fisheries and Oceans Canada (DFO), Nunavut Water Board (NWB), Indigenous and Northern Affairs Canada (CIRNA), Workers' Safety & Compensation Commission of the NT and Nunavut (WSCC);
- **Education:** Nunavut Arctic College and local schools; and
- **Non-Governmental Organizations:** World Wildlife Fund – Canada (WWF) and Oceans North.

In support of achieving the engagement objectives defined for the Project, Baffinland implements a variety of engagement mechanisms that are intended to ensure that a broad and comprehensive approach to the identification of stakeholders and that the creation of enhanced opportunities for dialogue and input are executed. In addition to Phase 2 specific consultation, Baffinland has also conducted regular engagement with the North Baffin communities, the QIA and stakeholders related to the ERP and ongoing operations.

From 2014 to 2018, Baffinland has employed several methods to engage the Inuit communities, the public and stakeholders:

- **Public Meetings** - Nineteen (19) public meetings held across the five North Baffin communities;
- **Inuit Knowledge Workshops** - Five (5) workshops to gather information regarding Inuit land use, shipping through ice, open water shipping, caribou and the effects of the Phase 2 Proposal on the Arctic Bay community;
- **Meetings with Community Groups** - Thirty-eight (38) meetings with the North Baffin LSA Hamlets, HTOs, and various other community groups, including the Annual Project Review Forum (representatives from each of the 5 North Baffin Communities);
- **Regional and Territorial Inuit Associations** – Sixteen (16) meetings with the QIA and NTI;
- **Working Groups:** - Twenty-eight (28) meetings with the Terrestrial Environmental Working Group, Marine Environmental Working Group, Qikiqtaaluk Socio-Economic Monitoring Committee, and Mary River Socio-Economic Working Group;
- **Meetings with Government Organizations** - meetings with various government organizations;
- **Meetings with Non-Governmental Organizations (NGOs)** - Meetings with the WWF individually, and through the Marine and Terrestrial Environmental Working Groups;
- **Visit to Nain, Labrador** - Baffinland brought community representatives to Nain, Labrador, to witness ice breaking operations associated with the Voisey's Bay Mine and to discuss effects and mitigation measures with the Labrador Inuit;
- **Survey** - 205 community members in the five North Baffin LSA communities were surveyed to obtain feedback on perceptions of the proposed Project's impacts on the communities, general perceptions of Baffinland, and how community members wish to be engaged;
- **Baffinland Community Liaison Officers (BCLOs)** - Baffinland's BCLOs interact with the public and community members working at the Project, and document and report community feedback within the company; and
- **Annual Project Review Forum** - Annual forum is held as part of the Mary River Inuit Impact and Benefit Agreement with the QIA. The forum is held in a North Baffin Community.

In addition to the engagement methods above, Baffinland provides information, such as its commitment to sustainability, monitoring and reporting information, as well as Project updates and employment opportunities, through its website, social media and a Project-specific Document Portal.

7.3 Engagement Outcomes

The public and community group meetings organized over the course of the public engagement process have enabled the collection of crucial information regarding the topics of interest or concern to the North Baffin communities. Table 7.1 presents the number of comments and questions received during both public meetings and meetings with community groups.

Table 7.1 Number of Comments and Questions Received by Community and Event Type

Community	Community Group Meeting	Public Meeting	Total
Arctic Bay	46	162	208
Clyde River	48	65	113
Hall Beach	22	98	120
Igloolik	54	93	147
Pond Inlet	189	88	277
Totals	359	506	865

Baffinland has received nearly 1,000 comments from interested parties through Public Meetings and community group meetings. Figure 7.1 presents the main topics of interest and concern identified by the public and community groups across the five (5) North Baffin communities (Arctic Bay, Clyde River, Hall Beach, Igloolik and Pond Inlet), and the number of times each topic was raised.

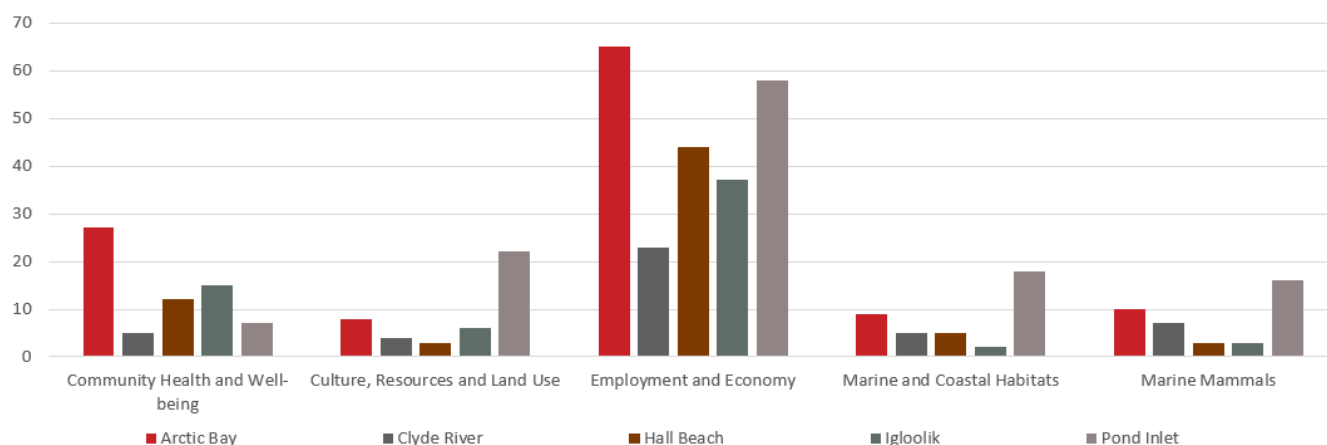


Figure 7.1 Topics of Interest and Concern Identified at Public and Community Group Meetings

Based on the number of comments raised at engagement activities, Baffinland has identified the main topics of interest and concern expressed by each individual North Baffin community in relation to the Phase 2 Proposal.

The top five topics of interest and concern most commonly raised across all five (5) North Baffin communities include:

- **Project Description:** Comments regarding the future of the Mary River Project and general concerns or questions regarding the Phase 2 Proposal.

- **Regulations and Agreements:** Comments and questions regarding the Inuit Impact Benefit Agreement (IIBA), the Environmental Assessment (EA) process, and Baffinland's Water Licences.
- **Culture, Resources and Land Use:** Comments and questions regarding disruptions to Inuit lifestyles, cultural practices and traditions, and disruption of land and marine travel for hunting or other purposes. References to Inuit Qaujimajatuqangit.
- **Consultation and Engagement:** Comments and questions related to the role of Inuit organizations in the consultation process, and details regarding Baffinland's public engagement events in North Baffin communities.
- **Benefits, Taxes and Royalties:** Community requests or suggestions for support, and comments on existing support programs.

7.4 Summary of Key Outcomes

Table 7.3 provides a summary of the key outcomes derived from Baffinland's engagement efforts relation to the Phase 2 Proposal. Results from consultation activities undertaken have been used throughout the Addendum to help focus the assessment of each VSEC/VEC to the topics of most interest and concern to communities.

Table 7.3 Summary of Key Comments/Responses from Baffinland's Phase 2 Proposal Engagement Activities

Topic of Interest or Concern	Comment and / or Question	Baffinland Response
Project Description	Confusion regarding Baffinland's reasons behind the change of plans from the original proposal, to the Approved Project, followed by the Phase 2 Proposal.	Baffinland acknowledges that its plans have changed over the years. This is the result of various studies and consultation with communities to determine the best approach to developing the Project at a scale that provides the company's shareholders with an acceptable return on investment that is also mindful of community concerns and aspirations.
	Clarification regarding the effects of the Phase 2 Proposal on the mine life; specifically, whether the Project will be multi-generational.	With the stepwise development proposed with the Phase 2 Proposal the mine life will now be 23years. Baffinland is continuing exploration and still believes the Project will be multi-generational.
Culture, Resources and Land Use	Request for information regarding the following, with respect to the Phase 2 Proposal: Impacts of winter shipping on marine wildlife and Inuit land-use activities Impacts of increased shipping frequency on marine wildlife and Inuit land use activities Potential impacts of the north railway on caribou migrations	Five (5) Inuit Knowledge workshops were held in Pond Inlet and Arctic Bay to discuss these concerns with community members and obtain feedback with regards to the proposal. Baffinland has modified its plans to limit shipping to open water and the periods of ice break-up (July 1 on) and ice formation (up to November 15), avoiding conflict with Inuit use of the landfast ice.
	Request for increased opportunities for Inuit workers to access counselling with Elders on site, including a desire for Baffinland to increase Elder participation in the planning and operations processes.	An Elder on site is available to all employees who wish to access counselling. Baffinland will review the program and identify opportunities for improvement.

Table 7.3 Summary of Key Comments/Responses from Baffinland's Phase 2 Proposal Engagement Activities

Topic of Interest or Concern	Comment and / or Question	Baffinland Response
	Concern about lack of transparency with respect to employment conditions – i.e. that new workers are not aware of the drastic change in lifestyles when they arrive at the mine site for work. Additionally, there was a comment that it was not clear that knowledge of English was a mandatory requirement for employment at the Mary River site.	Baffinland and the QIA support the use of Inuktitut in the workplace and have agreed that lack of English will not be a barrier for employment at the Project, except where the employee's exclusive use of Inuktitut poses a safety hazard. A revised Work Ready Program will be delivered in 2018 to help Inuit workers adapt to life at a remote fly-in/fly-out site.
	Request to understand the Project, its use of Inuit Qaujimajatuqangit, research, monitoring, regulatory processes, operation and mitigation.	Project information, including the regulatory process and operations, can be accessed through BCLOs, Baffinland's website, including the document portal, and during consultation events. Inuit Qaujimajatuqangit collected as part of the Project is used to guide project planning so as to reduce potential effects on land use activities and/or sensitive areas.
Livelihood and Employment	The impacts of switching from road-haulage to rail-haulage on Inuit training and employment.	Current employment levels will be sustained with the Phase 2 Proposal. There will be an upward shift in skill categories with some positions. To offset this, Baffinland will continue offering training opportunities, including those relevant to Project roles and needs.
Environmental Management	Spill prevention and control measures; dust prevention and control measures.	Baffinland has developed a comprehensive environmental management system (see Volume 10).
Consultation and Engagement	Request for Inuit presence on monitoring committees, and in case of shipping, request for Inuit presence aboard shipping vessels to physically monitor for any adverse effects to marine life.	The Ship-Based Observer monitoring program has been re-initiated in 2018. Two Inuit marine mammal observers will participate in this program. Baffinland is also working on developing training programs and identifying employment opportunities to secure more Inuit participation in the shipping component of the Project.
	Desire for more regular Baffinland representatives in the communities (i.e. in case the BCLOs go on medical leave).	BCLOs keep regular office hours within their communities. In the event a BCLO requires extended leave, Baffinland will make appropriate arrangements to confirm that communication between Baffinland and the community is maintained.
	Request for more transparency with respect to the feedback obtained from other communities in North Baffin, and more communication between communities, so that they are all on the same page.	Meeting minutes from public and community group meetings are distributed to all 5 North Baffin communities.
Benefits, Taxes and Royalties	Requests for Baffinland to support the communities through increasing food security (providing lunches at schools, universities), offering scholarships, and providing more transparent information regarding the resources available.	The IIBA has established funds, such as the Ilagiiktunut Nunalinnullu Pivalliajutisait Kiinaujat (INPK) Fund, which community members can assess. Funding is distributed by the QIA. Baffinland acknowledges that it has heard concerns of communities regarding direct benefits and will work with the QIA to better communicate the funds currently available to impacted communities.
	The potential to bring freight for communities by return shipping, and/or share shipping costs with local communities, thereby reducing the expenditures of local communities.	There will be limited opportunity to support community re-supplies due to the distance of the port sites from communities.

Table 7.3 Summary of Key Comments/Responses from Baffinland's Phase 2 Proposal Engagement Activities

Topic of Interest or Concern	Comment and / or Question	Baffinland Response
IIBA	Concerns regarding decreasing number of Inuit employed at the Project, as well as concerns about harassment against Inuit workers on site.	Worker retention has been a challenge for Baffinland, and the Proponent is actively trying to resolve this issue. Baffinland has developed an Inuit Human Resources Strategy and has been working closely with the QIA on training programs focused on Inuit employment and advancement. With regards to harassment against Inuit employees, discrimination will not be tolerated. Baffinland has an anti-discrimination policy. Instances of discrimination should be reported to human resources staff. There are also elders on-site who are able to listen to help record complaints of harassment.

Baffinland will continue to undertake an active and on-going approach to engagement on the Phase 2 Project with the communities and stakeholders. Baffinland has specifically committed to return to the five (5) North Baffin communities in early 2018 to provide further and more detailed information in relation to the Phase 2 Proposal and associated regulatory processes. Relevant documentation will be provided in advance of any community, hamlet, and HTO meeting to confirm that Inuit communities and stakeholders have an opportunity to identify and discuss topics of interest and concern. Baffinland will continue to safeguard that its engagement activities comply with the terms and conditions of all relevant standards, regulations, Project authorizations and the IIBA.

8 EXISTING CONDITIONS

8.1 Regional Context

The Project is located in northern Baffin Island, in the Eastern Canadian Arctic (Figure 1.1). Administratively, the Project is situated entirely within the Qikiqtani Region of Nunavut, and most Project components are located within the North Baffin Planning Region as defined by the NBRLUP (NPC 2000).

The Project is the only operating mine and industrial operation in the Qikiqtani Region and is one of three operating mines in Nunavut, the other two being the Meadowbank Mine in the Kivalliq Region and the Doris North/Hope Bay Mine in the Kitikmeot Region. Since the Definition phase in 2012, the Project has been making a major contribution to the Nunavut economy through the provision of employment and contracting opportunities, training programs, and revenues to the regional Inuit association (the Qikiqtani Inuit Association) and the Government of Nunavut.

8.1.1 Regional Biophysical Environment Overview

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

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

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

8.1.2 Regional Socio-economic Environment Overview

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. Recent changes, particularly residential schools, have affected family integrity and by implication, social cohesion. Elders are becoming more engaged in community life and in the education of youth in traditional skills. At the same time, a shift toward Western middle-class expectations appears to be taking place among Inuit youth.

The land-based economy is a major part of the livelihoods of many residents of the North Baffin. Harvesting from the land and sea is estimated to produce food worth between \$12 million and \$20 million per year in this region. In addition, residents of the region earn money through sales of arts and crafts, through employment, and from various government social programs such as income support. The personal income reported by residents of the five North Baffin communities amounted to \$83 million per year. As such, though there is still considerable active involvement in the traditional economy, local demand for wage employment is high, while job opportunities are limited.

Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-time work would pay, and a small number earning full-time, year-round incomes. Nunavut relies on federal transfer payments for at least 90% of its revenue. Government employment is a mainstay of the wage economy, with many of Nunavut's small businesses and retail outlets established to support government needs or those of public servants. The public sector accounts for a large portion of Nunavut's economic activity. Government jobs in administration, education and health account for about half of all employment earnings in the territory.

North Baffin communities have a subsistence economy and have experienced dramatic population growth over the last 20 years. Over 70% of the population is under 25. Underemployment and lack of opportunities is causing social stress. Community Elders recognize that the communities must position themselves to enter the wage economy. For many North Baffin households, harvest of country food provides an important contribution to overall well-being. In all five communities, caribou, ringed seal, and Arctic char are of major importance. In addition, walrus is a major species of importance in Hall Beach and Igloolik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet and, to a lesser degree, Clyde River.

8.1.3 Other Developments in the Region

The Project is set within an area with limited previous and current industrial development. The former Nanisivik Mine is currently being re-developed as a naval refuelling base. Additionally, there is limited proposed or reasonably foreseeable commercial and industrial activities in the area. A discussion of past, present and reasonably foreseeable projects in the area is provided in regard to cumulative effects (Section 10.6).

8.1.4 Current and Future Land Use Plans

The NBRLUP (NPC 2000) was established in accordance with Part 5, Article 11 of the Nunavut Agreement. For several years, the NPC has been undertaking additional land use planning for the development of a Nunavut-wide land use plan. An Updated Draft Nunavut Land Use Plan was distributed in 2016 (NPC 2016). The 2016 updated draft plan provides for protection of caribou calving and post-calving grounds and critical bird habitat; identifies traditional on ice travel routes with special management tools to protect them, areas of mineral potential, as well as areas with potential for tourism activities. The draft plan also provides Nunavummiut a voice in determining the future of development in the NSA at the land use planning level. The draft plan identifies existing and previously approved transportation corridors. In early 2017, Baffinland provided written comments on the draft plan. Public Hearings were held in May 2017. Once approved, the Nunavut-wide land use plan will replace the NBRLUP.

8.2 Baseline Conditions

The following is a summary of baseline conditions for the Phase 2 Project. More detailed information is available in relevant TSDs and past Project reports. The following focusses on Phase 2 components, though the Approved Project also includes the southern rail line and Steensby Port.

8.2.1 Atmospheric Environment

8.2.1.1 Climate

The Project is situated in the Northern Arctic Ecozone. The climate is semi-arid with relatively little precipitation. Monthly mean temperatures at long-term ECCC climate stations range from approximately -34°C in February at Pond Port to about 7°C in July at Igloolik. Mean monthly precipitation at long-term ECCC climate stations range from 4 mm in February at Pond Port, Hall Beach and Nanisivik, to about 64 mm in August at Dewar Lakes. Variability in precipitation at the long-term ECCC stations ranges from about 5 mm in January to about 30 mm in August.

Generally, snow melt occurs in late June and frost-free conditions last until late August. In 2017, the onset of snow melt began around mid to late June where temperatures were consistently above zero. Following the onset of snow melt, air temperatures rise and the amount of daylight increases, triggering plant growth and green-up.

Visual observations at the Mary River Site indicate that snow drifts across the open terrain and accumulates in valleys and against obstacles, while most of the flat terrain is swept free. Some of the mountain regions have mini-glaciers, snow-covered year-round, and some of the valleys might have snow most of the year. During winter 60 % of the total land area has snow cover. From June to September, snow covers less than 5 % of the area around Mary River, exposing dirt.

8.2.1.2 Air quality

The PDA is in a remote location, with the Approved Project activities as the only existing local source of air pollutants, introducing air contaminants such as particulate matter (TSP, PM₁₀, and PM_{2.5}), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), and carbon monoxide (CO) to the area. Baseline air quality conditions prior to Project development based on short-term ambient monitoring within the PDA in July 2007 (FEIS, Volume 5) indicated that measured baseline concentrations of air contaminants and metal deposition rates are extremely low compared to values in southern Canada. Air quality monitoring conducted since project operation in 2014 has included ambient air quality monitoring of gaseous emissions at the Mine Site and Milne Port, and dust fall monitoring along the Tote Road, at Mine Site and Milne Port. Ambient air quality results to date have indicated that NO₂ and SO₂ continue to meet ambient air quality standards (TSD 07). Dust fall at the Mine Site has generally been within predicted levels; however, at Milne Port dust fall has exceeded predictions near the ore stock piles and near the camp where dust is generated by both traffic and the nearby ore piles. Along the Tote Road, within 30 m and one kilometre on either side of the road, dust fall has shown an increase over predictions. However, outside the one kilometre range the dust fall deposition rates decreased to just at or below laboratory detection limits, which is within predicted levels.

8.2.1.3 Noise and vibration

Prior to the development and operation of the Approved Project, baseline noise monitoring indicated noise levels within the PDA would be described as faint, with background noise levels typical of remote areas, ranging from about 25 to 35 dBA (Baffinland 2012b). Noise observed consisted mainly of wind, insect, and small animal and bird noise. Flowing water and breaking waves contribute to the baseline noise levels at the port sites. Differences observed between daytime and nighttime sound levels are generally small. For the Approved Project, during operation, the maximum sound levels at 1.5 km from the Mine Site PDA was predicted to be 45 dBA (1-hour Leq) and the indoor sound level at the Worker Accommodation Building was predicted to be Balanced Noise Criterion (NCB) 29, below the recommended level of NBC 33 (Baffinland 2012b). During operation the maximum sound levels at 1.5 km from the Milne Port PDA was predicted to be 40 dBA (1-hour Leq) and the indoor sound level at the Worker Accommodation Building was predicted to be NCB 42 (Baffinland 2013).

Maximum predicted vibration levels at the Mine Site during operation were predicted as 2.5 mm/s peak particle velocity (ppv) at 1.5 km from the PDA and at the Worker Accommodation Building. No major sources of vibration were associated with Milne Port or Steensby Port operations.

Monitoring during operation has been limited to the interior monitoring of the Worker Accommodation Buildings at the Mine Site and Milne Port. Measured indoor noise at worker accommodations at the Mine Site in 2016 and summer of 2017 were below 40 dBA, however, this level was exceeded slightly at Milne Port (50.3 dBA in 2016; 42.6 dBA in 2017; average noise level), but remained within the acceptable range. Vibration at worker accommodations have generally been not measurable by the equipment.

8.2.2 Terrestrial Environment

8.2.2.1 Terrestrial Wildlife and Habitat

Baseline wildlife studies have been completed for the Mary River Project from 2006–2017, including those targeting caribou, large and small carnivores, and rodents. During caribou inventories prior to Project development, there were infrequent observations, suggesting very low abundance in the Regional Study Area (RSA). Most caribou were observed south and east of the Mary River camp. Height-of-Land (HOL) caribou surveys initiated in 2013 have detected relatively few caribou. While 8 caribou were recorded in 2013, no caribou were observed during HOL surveys from 2014–2016. The lack of observations during HOL surveys coincide with very few incidental caribou sightings between the Mine Site and Milne Port.

North Baffin Island caribou have a 60–70 year population cycle of abundance believed to be related to availability of forage. Caribou abundance has declined by 90% since their last peak ended in the mid-1990s. Caribou are currently at a “low” in the population cycle. Their numbers are expected to gradually increase in the Mary River region, but might not recover to historical high abundance until the 2050s. As of 2016, barren-ground caribou (including the north Baffin Island herd) are listed as threatened by COSEWIC (COSEWIC 2016a) but not yet included on schedule 1 of the *Species at Risk Act*.

Caribou occur and have historically been found throughout the RSA. Caribou in the RSA are currently non-migratory with no large-scale seasonal movements and daily movements averaging below 4 km/day throughout the year. They used to concentrate around Angajurjualuk Lake and probably up to Milne Inlet and around Steensby Inlet. This is consistent with high-density trails concentrated around Steensby Inlet and east and south of Angajurjualuk Lake. Current local residents indicate caribou are now found in mountains north of the Project and around Barnes Ice Cap. Caribou also calve throughout the RSA mostly located more northwards and in elevated areas for protection against predators and mosquitoes. There are no identifiable calving grounds where caribou are known to congregate.

Wolves and foxes are the dominant predators within the RSA, but they occur at very low densities. Though they are rarely observed, they occur within the RSA during the entire year and there are likely active den sites every year. None of the local carnivores are designated as being of conservation concern. Interviews with local people suggest that few carnivores are harvested each year. Wolf abundance and density are mostly dependent on caribou abundance.

Arctic hare is considered ubiquitous in the Project area, and its main predators are foxes and wolves. Lemming live trapping completed from 2006–2008 suggested that brown and collared lemming populations were at the peak of their cycle in 2008.

8.2.2.2 Vegetation

The Project area falls within three ecoregions: Borden Peninsula Plateau, Baffin Island Uplands, and Melville Peninsula Plateau; the Project area is mainly within the Melville Peninsula Plateau. The climate is cold and dry with little precipitation, high winds, shallow soils, and sparse vegetation cover. The landscape is characterized by non-mountainous terrain including dry, rugged uplands, rolling plains, and lowland features with continuous permafrost and sparse vegetation cover. There are 11 out of 13 Northern Land Cover (NCL) classes in the Project area; the most common is the sparsely vegetated bedrock cover type which contains 2–10% vegetation cover and generally consists of graminoids and prostrate dwarf shrubs and the second most common is the prostrate dwarf shrub cover type which typically contains >25% vegetation cover and is made up of prostrate dwarf shrubs, graminoids, and may contain <10% lichen and moss.

Baseline vegetation surveys were conducted in the Project area starting in 2005; monitoring work has been ongoing since 2012. Vegetation surveys completed in the Project area as part of baseline and project monitoring include inventory of: vegetation species, communities, abundance, composition and rare plants; vegetation and soil trace metals; revegetation by native plant species; Inuit Qaujimagatuqangit based traditional plant use studies; and exotic invasive vegetation.

Vegetation of the study areas was generally consistent with flora of Arctic regions and was characterized by short plant heights growing on rocky, sandy or silt soils of low nutrient content. Percentage of cover was dependant on slope aspects substrate and moisture regimes. A total of 126 vascular plant species were observed in the northern portion of the Project area during 2014 and 2016 vegetation abundance monitoring. Combined, all baseline vegetation surveys (2005-2016) recorded 184 vegetation species (and associated subspecies), including vascular and non-vascular plants. During field surveys, incidental observations of the horned dandelion (*Taraxacum ceratophorum*), a territorial “May Be At Risk” species for Nunavut, were made in 2014 and 2016. Horned dandelion is a native dandelion species in Nunavut not previously reported in northern Baffin Island. Horned dandelion was found near the Mine Site and along the Tote Road from km 84.6 to 85.2.

Metals analysis of soil and vegetation was conducted from 2012 to 2016; all results have been within the expected range and below thresholds, following the resampling of two stations in 2017 that were confirmed to be outliers.

Vegetation and exotic plant surveys to date have not recorded exotic or invasive species near the PDA.

8.2.2.3 Birds and Bird Habitat

The terrestrial and aquatic bird species found on north Baffin Island are generally reflective of those expected in the eastern Canadian Arctic. Most bird groups such as raptors, seabirds, shorebirds, songbirds, waterbirds, and waterfowl are represented by at least a few species found throughout the area. Field surveys and incidental observations documented 64 bird species within the Terrestrial Regional Study Area (TRSA) and Marine Regional Study Area (MRSA), of which 45 species were observed or reported breeding. This includes seven Species at Risk listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2016b) or the Species at Risk Act (SARA 2002) consisting of Peregrine Falcon, Harlequin Duck, Red-necked Phalarope, Red Knot, Short-eared Owl, Ivory Gull, and Ross’s Gull.

Migratory birds are present in the Project area from late May to early September in the TRSA and into October in the MRSA; however, a few species are known to overwinter in open water areas such as leads and polynyas in the region. Staging and breeding habitats for numerous bird species are found in the Project area including but not limited to Red-throated Loon, Canada and Cackling Goose, Common and King Eider, Peregrine Falcon, Rough-legged Hawk, Rock Ptarmigan, Baird’s Sandpiper, Glaucous Gull, Thick-billed Murre, Lapland Longspur, and Snow Bunting. The TRSA also includes part of an important moulting area for Snow Geese prior to fall migration, south of the Mine Site. Other than a small Glaucous Gull colony found in Milne Inlet, no seabird nesting colonies were recorded during Project surveys within the TRSA.

Relatively low densities of songbirds and shorebirds have been recorded throughout the TRSA compared to other studies on mainland Nunavut and NWT. Very few of these species were found foraging or nesting in or around the Mine Site during baseline surveys. Exceptions were Snow Buntings and American Pipits observed in low densities. Higher densities and diversity levels of songbirds and shorebirds were found in low-lying tundra and wetlands found along the Tote Road.

More details on bird communities and their habitats obtained from pre-construction and monitoring studies can be found in TSD 12 (Migratory Bird Baseline and Impact Assessment).

8.2.3 Freshwater Environment

8.2.3.1 Hydrology and Hydrogeology

Hydrologic information within the Project area was obtained from site-specific stream gauges and regional data. Field specific data was obtained for locations along the PDA including areas around the Mine Site, Tote Road and Milne Port. In combination, field and regional hydrologic information was used as the basis for in assessing aspects of engineering design and environmental assessment of Project activities.

Stream flow usually begins in early to mid-June as temperatures climb above 0°C, and ends in late September to late October. Within the Project area runoff increases very rapidly as a relatively low proportion of precipitation is lost to infiltration, evaporation or transpiration as it makes its way into the channels. Shallow permafrost, cool temperatures and lack of vegetative cover increase this effect. In catchments with significant lakes, these events were attenuated, producing lower peaks and longer duration flow events.

There are numerous factors that can be attributed to the variation of flow described in the Project area. The proportion of lakes within a watershed has a profound effect on water flows. Lakes attenuate rapid runoff events as well diurnal fluctuations in runoff, resulting in much lower intensity and longer lasting storm event runoff and overall more steady flows. Lakes also act to evaporate larger volumes of water than does the surrounding land, therefore lowering the mean annual runoff in catchments with large lake components. Furthermore, because the lakes are still free of ice when precipitation begins to fall as snow and permafrost melt ends, rivers fed by lakes freeze up approximately a month later than systems that do not include lakes.

8.2.3.2 Groundwater/Surface Water

Streams sampled for water quality within the Project area typically had naturally elevated concentrations or values for dissolved oxygen, turbidity, aluminum and iron. Some average values for pH exceeded the Canadian Council of Ministers of the Environment (CCME 2002) guidelines as did average values for cadmium and mercury at most sites. Selenium routinely was reported at the CCME guideline. When all areas for stream sampling were compared based on Water Quality Index values, the sampling locations within the area between Camp Lake and Milne Port indicated the highest value of 99.5, or “excellent” water quality.

Lake profiling indicated that dissolved oxygen and temperature in Mary Lake, Sheardown Lake and Camp Lake all showed vertical thermal stratification in late July and early August. In late August and early September the lakes were isothermic and uniformly mixed throughout the water column. Average values for pH exceeded the CCME range of 6.5 to 8.5 for lakes within the Mine Site area (Mary Lake, Camp Lake and Sheardown Lake). Cadmium and Mercury were at or above CCME guidelines in Mary Lake. Parameters that were at or above the CCME guidelines in Camp Lake and the northwest and southeast basins of Sheardown Lake included cadmium, mercury and selenium.

In areas where sediment samples were collected, the streambeds were typically cobbles and boulders with the samples being collected from the riffle pools behind the larger boulders. Sediment quality at stream and lake sites across the project area were generally good with naturally higher levels of chromium, copper and, to a lesser extent, arsenic, cadmium, mercury, lead and zinc.

8.2.4 Landforms, Soils and Permafrost

The Mary River iron deposits are located within the Mary River Group, an assemblage of Late-Archean metasedimentary to metavolcanic rocks that have been folded and preserved in greenstone belts. The Mary River Group greenstone belts are present as fragmented remnants stretching from Bylot Island south to Ege Bay, with a maximum thickness of 4,000 m.

Iron formations occur in varying thicknesses discontinuously within the Mary River Group meta sedimentary units but are typically not present in economically extractable thicknesses or configurations except in the Mary River area. The high-grade iron ore at Deposits No. 1, 2, 3 and 4 were discovered in 1962, and these initial hematite-magnetite mineralized zones were mapped out within extensive belts of banded iron formation in the area over the next three years. As typified at Deposit No. 1, the high-grade iron formations are inter layered with thin bands of chlorite-actinolite schist, staurolite-garnet-mica schist and banded iron formation across their strike width, with the entire assemblage up to 400 m-thick.

The Mine Site area is located in a major glaciofluvial outwash deposit in what appears to be a classic “U” shaped valley. In addition to the glaciofluvial deposits, there appears to be some direct glacial deposition consisting of kames, moraines, and

eskers in and around the southeastern portion of Sheardown Lake. The outwash valley is essentially a relatively flat plane with very little local relief, the major exceptions being along bodies of water, esker deposits and adjacent to the edges of the valleys. The walls of the valley are generally steep and abrupt and when looked at from a distance, distinct terrace levels are easily distinguished.

The Tote Road alignment generally follows a glacial valley oriented northwest-southeast to the Mary River Camp/Mine area. The surficial deposits along this alignment include till veneer or blankets on the higher elevations with some drumlins and moraines (in places). Glaciofluvial outwash sediments (gravel and sand) forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand) are typically found in the valley floors. Limited bedrock exposure is present along the Tote Road.

The dominant landforms and deposition features in the Milne Inlet area are typically of glacial activity, marine and mechanical forms in various degrees. Glacial activity is not overly apparent on the immediate site but is more pronounced in the higher elevations south of the site. Marine and mechanical features are most predominant with terraces and strand (beach) lines formed by marine action which have been cut by mechanical features, some of which may be attributed to permafrost. Wind appears to have been responsible for some drifting on the finer grained soils on the lower part of the site. Recently deposited colluvium is present on many of the slopes and side hills in the area. The action of surface water has produced numerous sharp gullies along water-ways. Marine clays were also noted at some locations at the site.

Project-area soils were classified based on the Canadian System of Soil Classification (Soil Classification Working Group 1998), and included primarily Cryosols (permanently frozen soils or soils with permafrost within 100-200 cm of soil surface) and Brunisols (soils with weak B horizon development). In general, Project area soils have weakly developed horizons, with a general lack of organic material accumulation. Fine to medium-textured soil materials were generally cryoturbated, and patterned ground phenomena related to permafrost and freeze-thaw cycling were also commonly observed.

Permafrost is defined as soil or rock that remains below 0 °C for at least two years. The Project is located in a zone of continuous permafrost. The active layer through the Project area typically ranges from approximately 1 to 2 m but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds and less in areas with significant layer of wet organics at surface. Unfrozen zones termed “taliks” can exist within areas of continuous permafrost below lakes, under major rivers or near the coast. Taliks may exist under lakes within the terrestrial RSA, particularly larger lakes such as Mary Lake, Angajurjualak Lake and Cockburn Lake.

8.2.5 Freshwater Biota and Habitat

The freshwater biota and habitat baseline studies provided a synthesis of information related to freshwater biota, including fish and lower trophic level communities, and aquatic habitat. Freshwater biota and aquatic habitat was characterized for the Milne Port, the Mine Site area, Tote Road and the railway and access road areas.

Site specific data was collected for aquatic habitat (streams and lakes), primary producers (e.g. phytoplankton and aquatic plants), secondary producers (e.g., zooplankton and invertebrates), fish populations and movements and baseline metals in Arctic char (*Salvelinus alpinus*). Only two fish species were present in the study areas - Arctic char and ninespine stickleback (*Pungitius pungitius*). Both species were generally abundant and widespread in distribution; however, ninespine stickleback were absent from the freshwater lakes and streams that were surveyed near the Milne Inlet coast.

All streams with the possible exception of large rivers freeze solid in winter. Lakes provide the only overwintering habitat for both species. Lakes also provide spawning habitat for Arctic char across the study areas. Many streams provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char. Most of the drainage basins that support Arctic char either contain barriers preventing anadromous migrations and/or are distant from the coast and most populations in the five study areas are land-locked. Nearshore zones of larger lakes also provide rearing and foraging

habitat and potential protection from predators for juvenile Arctic char, foraging and, in some cases, spawning habitat for adult Arctic char, and overwintering habitat for all life stages. Mercury concentrations in Arctic char muscle exceeded guidelines for human consumption in some fish captured, although concentrations were similar to those reported for other land-locked char populations.

In general, the lower trophic level communities were found to be similar to other areas of the Canadian Arctic. As is typical of Arctic ecosystems, the freshwater environment is relatively nutrient-poor and primary productivity is relatively low. In general, Arctic freshwater ecosystems are characterized by relatively low diversity of zooplankton communities due to low temperatures and nutrients. Results of the baseline studies for Mine area lakes are consistent with this generalization. The benthic invertebrate communities in the Mine area are generally moderately diverse, although higher diversity is found in some small tributaries, and are dominated by chironomids.

8.2.6 Marine Environment

8.2.6.1 Marine Water/Ice and Sediment Quality

The water quality of Milne Inlet was circumneutral, hard, and clear with moderate amounts of nutrients. Nutrient concentrations tended to be higher in deep waters than they were near the surface, and a distinct upper layer of water was observed. Nutrients are generally higher during the ice cover season than during the open-water season. Overall, nutrient concentrations are generally within range of those found in nearby Arctic waters.

The major elements in water samples collected from Milne Inlet reflect those typical of marine waters (e.g., chloride, sodium, sulphate, magnesium, etc.). Several metals (including cadmium and iron) are present in such low concentrations that they are generally below the analytical level of detection. Mercury concentration at Milne Inlet exceeded the CCME guideline for the protection of marine aquatic life in two samples collected from Milne Inlet.

Metal concentrations are higher in sediments with a higher proportion of fines and are similar to concentrations reported in literature. Petroleum compounds measured in Milne Inlet were low, also reflective of the literature. Concentrations of arsenic, cadmium, chromium, copper, lead, mercury and zinc are always below the respective Probable Effects Levels and Interim Sediment Quality Guidelines. Concentrations of arsenic, cadmium, chromium, copper, lead, mercury and zinc are always below the Probable Effects Levels and most were below the Interim Sediment Quality Guidelines.

8.2.6.2 Marine Wildlife and Marine Habitat

In total twenty-two marine mammal species are known or expected to occur in the identified RSA including the proposed shipping routes in Baffin Bay and Davis Strait. Only one mysticete or baleen whale species, the bowhead whale (*Balaena mysticetus*), occurs regularly in the RSA. Narwhal (*Monodon monoceros*) and beluga (*Delphinapterus leucas*) are abundant in the RSA; other Odontocetes that occur (albeit in low numbers) in the RSA include killer whales (*Orcinus orca*) and northern bottlenose whales (*Hyperoodon ampullatus*). Pinniped species which occur regularly in the RSA include ringed seal (*Pusa hispida*), bearded seal (*Erignathus barbatus*), and walrus (*Odobenus rosmarus*). Polar bears (*Ursus maritimus*) also occur throughout the RSA.

Observations made with underwater video imagery formed the basis of the nearshore seabed habitat mapping at Milne Inlet. Vegetation cover was the dominant biotic feature in nearly all observations, with bladed kelps and filamentous red algae being the dominant flora. Associated fauna at Milne Inlet is depth stratified, generally sparse, and was most often observed in places where algal cover was low. Brittle stars, sea urchins and bivalve siphons are all commonly observed in Milne Inlet.

Surveys revealed that the coastal habitats of Milne Inlet are typical of periglacial coastal environments where most of the shoreline is dominated by either rock or coarse sediment beaches comprised of poorly sorted boulder, cobble, pebble, and sand. Limited open-water seasons and the coarse nature of the shorelines results in complex, poorly organized shoreline

morphology. The presence of sea ice limits the development of intertidal biota, although rockweed was commonly observed along the shore.

Abundances in the nearshore algal community were estimated from analysis of the georeferenced underwater video imagery collected at Milne Inlet. The degree of cover varied with water depth and included benthic bladed kelp, foliose red and filamentous red algae.

Cyclopoid copepod *Oithona similis* dominates the Milne Inlet zooplankton community, followed by *Calanus finmarichus*/glacialis and Calanoid copepodites. *C. finmarichus*, *Pseudocalanus minutus*, *O. similis*, Harpacticoida, *Sagitta elegans*, and *Fritillaria borealis* were also present in samples. Zooplankton samples were collected from water depths that ranged to 150 m, and the dominant species were similar to those identified within that depth range in Lancaster Sound in 1979. Calanoida had the highest average density in 2008, followed by the chordate Larvacea, and Thoracica. In 2010, Thoracica had the highest average density followed by Calanoida and Larvacea. Species dominance and richness were similar between the two years. The species *P. minutus* and *Balanus* sp. (nauplius or cypris) were present in 100 % of samples in both years, while *F. borealis*, *C. finmarichus*, and unidentified polychaete larvae were occasionally absent. In 2010, Harpacticoida and unidentified Calanoid copepodites were also present in 100 % of samples.

A total of 146 benthic infauna species were identified from Milne Inlet. Polychaetes and ostracods were the most abundant taxa in Milne Inlet, although copepods, amphipods and several species of bivalves were also common. As reported in previous studies of the Canadian Arctic, the abundance and community composition of benthic infauna in Milne Inlet varies with depth.

Thirteen marine fish species were encountered during fish surveys from 2010 to 2016. Arctic char was the most common species in gill net catches in 2013, 2015 and 2016 constituting 75%, 75% and 96% of total number of fish, respectively. A particularly high number of Arctic char of 157 was caught in 2016. Sculpins constituted a great majority of non-char fish species caught with shorthorn sculpin (*Myoxocephalus Scorpius*) and fourhorn sculpin (*Myoxocephalus quadricornis*) being the most abundant; shorthorn sculpin represented 67% (50) of all fish caught in 2010 and fourhorn sculpin constituted 58% of all catches in 2014. Other fish species that were caught more than during one survey were four other sculpin species (Arctic sculpin (*Myoxocephalus scorpioides*), Arctic staghorn sculpin (*Gymnocanthus tricuspidis*), longhorn sculpin (*Myoxocephalus octodecemspinosus*), and Atlantic hookear sculpin (*Artediellus atlanticus*)), Greenland cod (*Gadus ogac*), fishdoctor (*Gymnelis viridis*) and fourline snakeblenny (*Eumesogrammus parecisus*). Species that were caught during only one survey included twohorn sculpin (*Icelus bicornis*), common lumpfish (*Cyclopterus lumpus*) and Arctic cod (*Boreogadus saida*) that was caught only in 2016, although it had previously been identified in fish stomachs.

Metals in incidental Arctic char mortality tissue samples were mostly below detection limits. Exceptions were concentrations of arsenic, chromium, copper, iron, mercury and zinc. Concentrations of these metals in fish tissue were, in general, consistent from 2010 to 2016. None of the samples exceeded Health Canada's guideline for mercury in fish tissue for human consumption of 0.5 mg/kg.

To date, no indication of presence of any invasive species in the Milne Inlet ecosystem has been detected.

8.2.7 Socio-Economic Environment

8.2.7.1 Education and Training

8.2.7.1.1 Early Childhood Education

Early childhood education (pre-school) opportunities are not widely available across the study area. Before school and after-school programs, which are important for parents working during the day, are absent in nearly all LSA communities, except for Clyde River, where an after-school program has been in place since 2008. The level of service in Iqaluit is better, with full-day and part-day preschool programs and after-school programs available.

8.2.7.1.2 Grade 12 Graduation

The number of high school graduates has been increasing in Iqaluit and across North Baffin over the past 20 years. Approximately 677 North Baffin LSA and 612 Iqaluit residents graduated from high school between 1999 and 2016 (Nunavut Bureau of Statistics 2017).

8.2.7.1.3 Post-Secondary Qualifications and Training

While education levels are low across the study area, many residents of the RSA have been engaged in training and upgrading through the local college system and through various specialized programs. Arctic College, which has Adult Learning Centres in every community, reports that between 1,200 and 1,350 Nunavummiut enroll in full-time programs at the college. This equates to roughly one quarter of the population between 20 and 29, or one-fifth of the 20-to-34 age group.

The focus of post-secondary training varies between Inuit males and females. Inuit men acquired post-secondary qualifications in areas such as construction trades and mechanical/repair technology, culinary services, corrections officer/services, peace officer/police, fire protection, heavy-truck driver, commercial driver, heavy-equipment operation, and commercial fishing. Inuit women have focused more on the fields of business, management, public administration, social and behavioural sciences, law, and education. Some men, particularly in Iqaluit, have also pursued programs focused on business, management, and public administration.

8.2.7.1.4 Literacy and Numeracy

Low baseline levels of literacy and numeracy present a major challenge to labour force development in the LSA and across Nunavut. In a report on adult learning in Nunavut, the largest group of adult learners in the territory are said to be at the lowest two levels of the four-level scale used in the International Adult Literacy and Skills Survey.

8.2.7.2 *Livelihood and Employment*

8.2.7.2.1 Importance of the Land-Based Economy to North Baffin Livelihoods

The harvest effort of residents of the five North Baffin LSA communities is estimated to yield approximately 830,000 kg of food. The cost to purchase an equivalent amount of imported food through local retailers is estimated at \$12 million; this is the in-kind value to households of harvest activity in the land-based economy. Since retail foods are subsidized through the food mail (and now through the Nutrition North) program, the “economic value” of the land-based harvest should take this into account, leading to a total economic value of the land-based harvest of approximately \$20 million.

8.2.7.2.2 Demand for Workers in the Formal Labour Market

The pre-Project amount of work opportunity generated by the wage economies of the study area amounts to the equivalent of 3,700 to 3,900 full-time, year-round jobs, of which 1,100 are located in North Baffin and 2,600 to 2,800 in Iqaluit. This equates to approximately 2 million hours of work in the North Baffin labour market each year, and 4.7 million hours of work in the Iqaluit labour market.

The number of jobs occupied by women has generally increased at a greater rate than those occupied by men. In North Baffin, the growth in demand for male labour has not kept pace with the growth of the Inuit male population. In Iqaluit, male-occupied job growth and Inuit male population growth rates appear to have increased at similar rates. The jobs occupied by women are more narrowly concentrated in public sector industries. While these sectors might be fairly stable in terms of boom and bust cycles, they are less likely to experience dramatic growth, suggesting that women coming into the labour market might need to find work in sectors not traditionally filled by women.

In terms of the skills required by the LSA labour market, approximately 18 % of occupations in North Baffin, and 21 % in the Iqaluit labour markets require a university education. One-quarter to one third of occupations in the study area require college or apprenticeship levels of training and skills. A similar number of occupations require high school education and/or

occupation-specific training. The remainder of jobs can be accessed by unskilled workers capable of undertaking on-the-job training.

8.2.7.2.3 Supply of Workers to the Formal Labour Market

Prior to the Approved Project, a total of 2,255 North Baffin residents worked to “fill” 1,100 North Baffin jobs, a rate of 2 workers per job. In Iqaluit, 3,665 individuals worked to fill the 2,600 to 2,800 jobs in that labour market, a rate of 1.3 to 1.4 workers per job. Wage-earners in North Baffin deliver 1.7 to 2 million hours fewer than they would if they were all working full-time, full-year. Wage earners in Iqaluit deliver 3 million hours fewer than they would if they all worked full-time, year-round.

Demand among residents for wage employment in the study area is very high, even when this work requires working in remote locations away from the community. Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-time work would pay, and a small number earning full-time, year-round income levels. The picture of Inuit employment in Iqaluit suggests a blend of work patterns with many individuals earning small wage income and many earning full-time wage levels. Most residents working in full-time jobs in Iqaluit work these jobs year-round. In North Baffin, many more full-time workers are engaged in these jobs for only short periods. The highest rate of short-term employment among full-time workers is among the younger male workforce. Women who work full-time jobs are more likely to work year-round than are men.

8.2.7.2.4 Experience from the Mary River Exploration and Bulk Sample Activities

A total of 1.3 million hours of fly-in/fly-out labour was delivered during the Mary River exploration and bulk sample activities by 776 workers from across Canada over a three-year period. Of this labour, 0.4 million hours were provided by 265 North Baffin residents, and 212 by residents of Iqaluit. Women accounted for 11 % of the total workforce. During peak activity in 2008, 0.8 million hours were worked at the Project, of which 0.2 million hours were provided by residents of the LSA.

Approximately 4-in-6 workers hired from North Baffin worked for at least three rotations of two weeks in, followed by two weeks back home. However, a substantial number, 1-in-5, did not complete one full 14 day rotation. Among workers hired from Iqaluit, 1-in-8 did not complete one full rotation. Both North Baffin and Iqaluit labour forces continued to supply new workers for the three-year period for which data were analyzed. Therefore, the Project definition phase did not “tap out” the study area labour force.

8.2.7.2.5 Experience from the Mary River Project – Early Revenue Phase

Approximately 2.38 million hours of Project labour were performed by Baffinland employees and contractors in Nunavut in 2017, which was equal to approximately 1,181 full-time equivalent positions (FTEs). Of this total, 313,068 hours were worked by residents of the LSA, representing approximately 155 FTEs. Baffinland continues to take positive steps to address the issue of Inuit employment and recently finalized its Inuit Human Resources Strategy (IHRS) and Inuit Procurement and Contracting Strategy (IPCS) with the QIA.

8.2.7.2.6 Sources of Income in LSA Households

In addition to the \$12 million in-kind income generated for North Baffin households through harvest activities in the land-based economy, residents gain monetary income through employment and various social transfers. In 2007, personal income reported by residents of the five North Baffin LSA communities amounted to \$83 million, and income reported by Iqaluit residents amounted to \$196 million. Among the resident Inuit population, earned income accounts for between 70 % (Clyde River) and 81 % (Pond Inlet) of total income. Most of the remaining income, ranging from 17 % (Pond Inlet) to 27 % (Clyde River) is derived from government transfers. Other income, such as that from investments, accounts for less than 3 % of total income. In Iqaluit, the role of government transfers is much lower than in North Baffin communities, accounting for only 8 % of the total income of the Inuit population of the city.

8.2.7.3 Economic Development and Self-Reliance

The public sector accounts for a large portion of Nunavut's economic activity; jobs in administration, education and health account for about half of all employment earnings in the territory. Public administration accounted for \$403 million, or 20 %, of the territory's total \$2.0 billion GDP in 2016. Education and health expenditures account for another \$277 million. Combined, these public expenditures account for more than 33 % of the territory's GDP.

The construction industry in Nunavut is driven by a combination of government-funded infrastructure projects and major private sector developments such as recent mining projects. Territorial government planned capital expenditures for the North Baffin LSA total \$32.3 million for the planning period 2010-11 to 2014-15, with another \$33 million that was planned for Iqaluit. Across the territory, \$381.6 million in capital expenditures was envisioned over this period.

The transportation sector provides a critical link between Nunavummiut in small communities to the specialized medical and educational services available only in larger centres. For the 2010/2011 fiscal year, for example, the territorial government has budgeted \$47.9 million for medical travel, an expenditure item that has increased at a rate of 6.9 % year-over-year, from a level of \$32.6 million in 2005-06. Goods imported into Nunavut by air and marine transport totalled \$900 million in 2008, and the Iqaluit airport was among the top 20 busiest airports in Canada, based on number of flights. In spite of the tremendous importance of air and marine transport, the sector is largely based outside the territory and transportation contributes less than \$21 million to the territorial GDP. The high cost of transportation means that many Nunavummiut face limited mobility options.

Nunavut has a small commercial fishery based on turbot and shrimp fished offshore primarily in Baffin Bay and Davis Strait. In addition to the offshore fishery, commercial Arctic char production is carried out at plants in Pangnirtung, Iqaluit, Rankin Inlet, and Cambridge Bay. Although the economic value is modest, the quality of this product is high and potential for value-added processing and marketing, including supplying the local Nunavut market where high retail food prices are the norm, continues to be realized. A modest commercial caribou and musk ox harvest is also carried out, the former predominantly from Coral Harbour and the latter from Cambridge Bay. As with the char fishery, these products represent high-value specialties that sell for premium prices. Given the importance, and precedence under the Nunavut Agreement, of the traditional noncommercial harvest of these species, the potential for expansion of commercial fish and wildlife operations is subject to inherent biological limitations.

Most visitors to Nunavut come to the territory for work. Business travelers account for approximately three-quarters of all Nunavut visitors. Between 3,000 and 6,000 visitors come each year for non-work purposes and this component spends \$6 to \$12 million annually. An amount of \$500,000 is estimated to be allocated each year across the North Baffin LSA to tourism activities outside business travel and sport-hunting. In addition to spending by tourists who come to visit friends and family living in the north, these expenditures also include those of cruise ship visitors (\$15,000 in one community), visitors to the national park, and adventure tourists.

8.2.7.3.1 Community Economic Development (CED)

The municipalities of the LSA regularly undertake broad planning processes that engage many groups in the community. These processes offer an opportunity to reflect on strengths and challenges faced by the community. This self-reflection typically addresses social issues, cultural change, and issues related to education, business, and economic development. Reflection on how well local organizations are working together to address common goals is an important outcome of this process, as this can improve institutional capacity at the local level. It can be expected that with recent establishment of the Regional Socio-Economic Monitoring Committees, which involve the hamlet mayors, the CED planning process could link in with monitoring progress in key areas.

Major economic projects are widely seen to present opportunities to support achievement of local development aspirations. The mechanisms that drive these opportunities typically include project effects on human resources

development through training and employment, expansion of local business opportunities by raising the level of disposable income available to purchase local goods and services, and by offering opportunities to supply goods and services to the Project, and in development of local and regional infrastructure through direct contributions as well as through increased government revenue.

Local wealth is a significant component for community development. In 2007 personal income reported by residents of the five North Baffin LSA communities and Iqaluit amounted to \$83 million and \$196 million, respectively.

8.2.7.4 *Benefits, Royalty and Taxation*

Approximately \$1.491 million in employee payroll tax (i.e. a 2% payroll tax levy) was paid by Baffinland to the Government of Nunavut in 2017; other payroll taxes are paid to the federal government (Appendix B of TSD 25). Increased tax amounts are anticipated to be paid once the Baffinland becomes profitable. Property taxes are not realized as lease payments are made to the QIA.

8.2.7.5 *Community Infrastructure and Public Services*

Compared to the rest of Canada, LSA communities typically experience several infrastructure and public service deficits. Infrastructure gaps are frequently suggested as important barriers to business, social, and cultural development in communities across the LSA. Hamlet Community Economic Development plans call for many types of infrastructure: space for small businesses, workshop space for carvers, visitor centres, fish plants, swimming pools, day cares, youth centres, healing centres.

While basic infrastructure and services are provided in all LSA communities (Iqaluit is an exception and has somewhat more developed infrastructure and services), the remote location and small populations of these communities have been limiting factors in their further expansion. The current operating Project has had varied effects on community infrastructure and public services across the LSA (Appendix B of TSD 25). Baffinland continues to use some LSA community infrastructure to support ongoing Project operations. This use is small in comparison to other ongoing community uses and adds only minimal incremental pressure on LSA facilities. Project-related aircraft movements at community airports in the LSA in 2016 represent only a small portion (5.7%) of the total aircraft movements. While there have been increasing trends in the number of total and per capita health centre visits in the North Baffin LSA and Iqaluit in the post-development period, these trends were also evident in the pre-development period. An increasing trend has also been noted throughout Nunavut in the post-development period, which implies a longer-term and/or territory-wide trend is likely occurring rather than a Project-induced one.

8.2.7.6 *Contracting and Business Opportunities*

The LSA business community is small, reflecting the small populations and low income levels of these communities. This is particularly the case in the North Baffin LSA communities, where two dozen businesses were registered with Nunavut Tunngavik Inc. (NTI) as Inuit firms, and/or with the Nunavummi Nangminiaqtunik Ikajuuti (NNI) program as Nunavut firms prior to the Project. This number has increased from 29 in 2013 to 44 in 2017, likely in part due to the Approved Project. The business sector in Iqaluit is substantially larger, with a total of 129 enterprises registered with NNI, NTI, or both. In addition to these are a number of businesses that have not registered with either NTI or NNI. These include incorporated and unincorporated enterprises such as local bed and breakfasts, taxi services, outfitters, and others. For example, while there are seven businesses from Arctic Bay registered with NNI and/or NTI, the Hamlet of Arctic Bay Economic Development Plan (2007) identified 26 local businesses. A total of 25 local businesses were identified in the Hamlet of Pond Inlet CED Plan (2010), compared with the 11 listed with NNI and/or NTI.

Self-employment is an important indicator of entrepreneurial capacity, as it can be a stepping-stone toward larger-scale business activities. The level of self-employment across the RSA is fairly low, as is the amount of income earned through self-employment activities. In 1996, a total of 270 Baffin residents reported income from self-employment business

activities. By 2004, this number had increased to 410 individuals. Most (6 out of 10) of these self-employed entrepreneurs live in Iqaluit, with the remaining 40 % distributed across the other Baffin communities. In the North Baffin LSA, approximately 70 individuals earned self-employment income in 2004.

Most North Baffin LSA residents reporting self-employment income earned less than \$5,000 through their business activities. In Iqaluit, self-employment earnings are a little higher, with half of self-employment income earners reporting more than \$5,000, and 1-in-5 reporting \$35,000 or more. Of the self-employment income earners in Iqaluit, 1-in-4 had family incomes with no other source of market income. Most people who report self-employment income however, live in families where a wage income is also earned. This other income can be substantial.

In Iqaluit in 2004, 100 of the 240 self-employment income earners, or 42 %, had family wage incomes of \$85,000 or more. In the rest of the Baffin region, a similar proportion of self-employment earners (24 %) have no other family wage income. In these communities, however, the level of other family wage income is lower, with only 41 % of families having wage incomes of \$35,000 or more, suggesting that employment income plays an important role as a spring-board to self-employment. While a few families rely on self-employment as their main source of income, it is more common that self-employment activities are nurtured by the wage employment earnings of either the self-employed person or a family member, or both. This pattern appears to be stronger in Iqaluit than it is in the other Baffin region communities.

During the Mary River Project definition phase, from 2006 through August 2010, \$49.7 million worth of goods and services were procured by Baffinland from vendors based in the North Baffin LSA and Iqaluit. Of this amount, \$10 million was purchased from businesses based in North Baffin, 3 % of total procurement, and \$39.9 million from vendors based in Iqaluit, or 11 % of total procurement. The value of Project-related procurement with Inuit-owned businesses and joint ventures between 2013 and 2017 has totaled \$819.1 million, with a high of \$387.2 million in 2017. A total of 18 contracts were awarded to Inuit-owned businesses and joint ventures in 2017, all awarded in the LSA. Total procurement (with Inuit and non-Inuit firms) in 2017 totaled \$1,068.0 million.

8.2.7.7 Population Demographics

8.2.7.7.1 Population Change

In 2016, the North Baffin LSA communities had a population of 6,608 (Nunavut Bureau of Statistics 2016). Approximately 94.5% of this population were Inuit and 5.5% were non-Inuit. Iqaluit had a population of 7,590. Approximately 55.4% of this population were Inuit and 44.6% were non-Inuit. Nunavut had a population of 37,082. Approximately 84.2% of this population were Inuit and 15.8% were non-Inuit.

Between 2012 and 2016, the North Baffin LSA communities grew from a population of 6,050 to 6,608 (or 9.2%). Iqaluit grew from a population of 7,013 to 7,590 (or 8.2%), while Nunavut grew from a population of 34,707 to 37,082 (or 6.8%). Average annual growth rates over this period for the North Baffin LSA communities (2.3%), Iqaluit (2.1%), and Nunavut (1.7%) were considerably higher than the Canadian average (1.1%) (Statistics Canada 2017a).

8.2.7.7.2 Inuit and Non-Inuit Components of the Population

The 2016 estimated population of the North Baffin region are mostly Inuit (94.5 %), with non-Inuit accounting for just 5.5 %, largely unchanged from 2008. The balance between Inuit and non-Inuit in Iqaluit is more even, with 55 % Inuit and 45 % non-Inuit. While the Inuit population has a very young age profile, nearly all non-Inuit residents in North Baffin are of working age. In Iqaluit, 58 % of the population - 66 % of the male population - age 40 to 64 are non-Inuit. Non-Inuit men also account for a majority of Iqaluit's male population age 25 to 39. The demographic data suggest non-Inuit residents move to local study area (LSA) communities primarily to work and that relatively few are raising families or living out their retirement years in these communities.

8.2.7.7.3 Net Migration into the Baffin Region

There are indications of an increasing net movement of Inuit from communities in the north to urban centres in the south. During the 10-year period between the 1996 and 2006 censuses, the Inuit population in regions outside traditional Inuit lands, or “Inuit Nunaat,” increased 62 % from 6,795 to 11,000 individuals. In 2006, Inuit living outside Inuit Nunaat accounted for 21.8 % of the 50,480 Inuit living in all regions of Canada.

As suggested by the analysis of the non-Inuit component of the LSA population, there has been tremendous movement between southern points-of-origin and Iqaluit and North Baffin, with nearly half the population changing-over within five years. The majority of this group comes to pursue employment opportunities and, as indicated by the age profile, does not settle permanently in the region.

Tax filer data indicate that during the period from 1997 through 2002—leading up to division of Nunavut from the Northwest Territories (NWT), and for several years into the establishment of the territorial government—the net flow of people between the Baffin region and other parts of Canada was mostly into the region. Since 2002, this has reversed, with more people leaving the Baffin region than moving in. This net migration is small, however, in the order of 150 individuals per year, or less than 1 % of the total population.

Since 2015, Baffinland data from Baffinland Community Liaison Officers from each North Baffin LSA community have identified only limited-negligible migration effects. A net of zero known non-Inuit employees/contractors have in-migrated to the North Baffin LSA, while a net of five known Inuit employees/contractors have out-migrated from the North Baffin LSA.

8.2.7.7.4 Language

The Inuktitut language is prevalent in North Baffin LSA communities. Nearly all Inuit residents of the North Baffin LSA learn this language as their mother tongue, and for 9-in-10 residents, Inuktitut is the language most commonly spoken at home. A portion of the population, ranging from 6 % in Hall Beach to 24 % in Igloolik, consists of unilingual Inuktitut speakers. In North Baffin, nearly 2-in-3 Inuit work in settings where Inuktitut is the prevalent language.

The linguistic picture in Iqaluit is dramatically different from that of North Baffin. In the capital, slightly more than one-fifth of the Inuit population did not learn Inuktitut as their mother tongue and fewer than half speak Inuktitut at home. Only 20 % of Inuit in Iqaluit speak Inuktitut in the workplace, and only 3 % are unilingual Inuktitut speakers.

8.2.7.8 Human Health and Well-being

8.2.7.8.1 Population Health Status

Life expectancy at birth in Nunavut was 70.2 years of age in 2011-2013. This was 11.5 years less than the Canadian average life expectancy of 81.7 years of age. Life expectancy for males in Nunavut (68.4 years of age) was also lower than for females in Nunavut (72.9 years of age) (Statistics Canada 2017b).

In Nunavut the birth rate is roughly twice that of Canada generally, while the incidence of pre-term delivery and low birth weight are both high relative to Canada overall. Nunavut’s infant mortality rate has been improving. It is, however, much higher than in other regions of Canada.

The major causes of death in Nunavut are cancer, suicide, heart disease, and accidents. The profile of causes of death in Nunavut differs from that of Canada overall. Age-standardized death rates for Canadian provinces and territories can be used to compare death rates in Nunavut’s young population with those of the aging Canadian population:

- The proportion of deaths by suicide in Nunavut is nearly four times that of Canada;
- Transportation-related deaths are more than twice as common in Nunavut as in Canada;

- Cancer accounts for a slightly higher share of deaths in Nunavut than in Canada;
- Heart and other cardiovascular disease account for a lower share of deaths in Nunavut; and
- Other causes of death account for a greater share of deaths in Canada than in Nunavut.

8.2.7.8.2 Community Perspectives on Social and Cultural Change

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. During the Arctic Bay working group conference, several participants spoke about the effect that recent changes, particularly the residential schools, have had on family integrity — and, by implication, social cohesion. Indication that Elders are becoming more engaged in community life and in the learning of the younger generation came out of community research. In addition, though, a shift toward Western middle-class values and expectations was observed to be taking place among Inuit youth.

Social change is clearly related to livelihood options. A shift from traditional to wage economy livelihoods was clearly identified by an Elder in Pond Inlet as being related to an understanding that the capacity of the environment has become inadequate to support today's population's food needs. Many other comments were made about the importance of employment both for gaining self-reliance as well as to support traditional harvesting activities. Finally, the importance of strong social networks in supporting people's ability to take on the challenges of fly-in/fly-out rotational work was raised.

8.2.7.8.3 Alcohol and Drugs in the LSA

Tobacco smoking rates in Nunavut are also high. Smoking during pregnancy has major adverse effects on fetal development, contributing to low-birth weight and pre-term delivery. The relationship between indoor smoking and respiratory problems has recently been highlighted in a study of Nunavut housing and respiratory disease.

Alcohol abuse is an issue that concerns many residents, health practitioners, social service providers and those involved in the justice system. On the health side, use of alcohol during pregnancy is known to cause brain damage in the fetus, leading to serious consequences for the individual born with fetal alcohol spectrum disorder (FASD). Community perceptions and concerns related to substance abuse, along with local alcohol policies and other related issues include the following:

- Perception that alcohol and drugs becoming more prevalent;
- Misuse of income on substances affects individuals, families, and the community;
- "If there is more money then there is potentially more availability of substances to abuse";
- "...but, even those without jobs are said to be able to purchase alcohol";
- Some are making an active effort to quit using drugs;
- Drug/alcohol-free workplace is desirable: "Access to a drug-free place will be good for people"; and
- FASD is a concern. Education to warn pregnant women not to drink is noticed by some.

In the Baffin Region, Iqaluit is the only "open" community, while Kimmirut, Pangnirtung, and Sanikiluaq are the only "dry" communities. The five communities of the North Baffin LSA each have policies in place to restrict access to alcohol. Bootleg alcohol, however, is considered to be widely available at a high cost.

8.2.7.8.4 Incidents of Reported Crime

The rate of violent crime in Nunavut is the highest across Canada, varying from between six and eight times the national rate during the period 1999 to 2007. Within the LSA, violent crime across North Baffin has been slightly over half the rate in Iqaluit.

In the North Baffin LSA in 2016, Pond Inlet had the highest number of violations per 100,000 persons (27,841), while Hall Beach had the fewest (8,787) (Nunavut Bureau of Statistics 2017c). Iqaluit had 63,939 violations per 100,000 persons in 2016, which was significantly higher than the North Baffin LSA community average (21,462) and for Nunavut (35,791). Compared to the previous year (2015), there was a decrease in the number of violations per 100,000 persons in the North Baffin LSA communities (by 1,385) and Iqaluit (by 2,933), but an increase in Nunavut (by 1,350). Compared to pre-development period averages, there have been decreasing trends in average crime rates in the North Baffin LSA (from 21,016 to 20,516), Iqaluit (from 77,983 to 65,750), and Nunavut (from 39,459 to 34,391) in the post-development period.

8.2.7.8.5 Accidents and Unintentional Injury

Potential years of life lost (PYLL) among the male population of Nunavut is 3,465 per 100,000 population per year. The corresponding rate for Nunavut women is 673 per 100,000. This is the equivalent of roughly 110 PYLL per year for men and women due to unintentional injury in the North Baffin LSA, and 140 PYLL in Iqaluit. Workplace injury frequency is measured in days of work lost or modified. In the Nunavut/NWT mining sector an average of 27 days of lost/modified work is experienced per 200,000 hours of labour supplied. Over a three-year period these territories experienced one workplace fatality, which could be equivalent to up to 60 PYLL.

8.2.7.8.6 Food Security

For many North Baffin households, the harvest of country food provides an important contribution to overall wellbeing. In all five communities, caribou, ringed seal, and Arctic char are of major importance. Walrus is a major species of importance in Hall Beach and Igloolik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet and, to a lesser degree, Clyde River. The rate of subsidy that is effectively applied to country food harvests is estimated to average approximately \$1.23/kg of edible food. This equates to between one tenth to one-fifth the subsidy rate applied to southern foods transported for sale in the North Baffin LSA.

The amount of nutritious, perishable food shipped per person in the LSA has increased steadily since 1999. During the decade total per capita shipments have increased by 52 %. This observed increase in per capita retail food consumption would be consistent with an increasing reliance on retail foods to meet household nutritional requirements. A positive relationship appears to exist between increasing income reported by women and the amount of nutritious, perishable foods purchased from retailers.

8.3 Update on Environmental Effects Monitoring

The following subsections provide general information on how monitoring has confirmed the FEIS predictions, or in some cases have demonstrated the needs for adaptive management, through the modification of mitigation identified to reduce unanticipated environmental effects.

8.3.1 Meteorology and Climate (Including Climate Change) (TSD 06)

Baffinland operates two meteorological stations, and this information is made publicly available on its website and through The Weather Network. Baffinland continues to track and monitor GHG emissions and report as per Environment and Climate Change Canada's GHG Emissions Reporting Program (ECCC 2016), which is included as part of the Air Quality and Noise Abatement Plan. Climate effects monitoring completed in 2017 included the calculation of GHG, SO₂ and NO₂ emissions from fuel combustion. The calculated gaseous emissions in 2017 are below the maximum annual GHG emissions predicted in the FEIS.

Site-specific meteorological data, coupled with emissions data from the operating mine provide further confidence in our effects predictions for both the Approved Project and the Phase 2 Addendum.

8.3.2 Atmospheric Environment (TSD 07)

8.3.2.1 Air Quality

As the Approved Project has now been operating for several years, there are relevant monitoring data available to assess the accuracy of previously predicted effects from the FEIS and FEIS Addendum, and validating the effects predicted, on Air Quality. Baffinland is monitoring SO₂ and NO₂ at Milne Port and the Mine Site; and dustfall levels are monitored at these sites as well as along the Tote Road. In 2017, continuous NO₂ and SO₂ monitoring was conducted at Milne Port from March to December, and at the Mine Site in November and December. SO₂ levels at both sites were low and did not exceed the 1-hour or 24-hour limits. NO₂ levels at both sites did not exceed the 1-hour or 24-hour limits.

Dustfall in 2017 was less than in 2016 at most year-round sampling locations (EDI 2018). At the Mine Site, annual dustfall levels were within predicted threshold levels. At Milne Port, annual dustfall exceeded predicted threshold levels at all but one site; elevated dustfall in November and December has been attributed to the ore stackers operating under high wind conditions. Along the Tote Road, dustfall concentrations within 30 m and occasionally 100 m on either side of the road centreline was higher than the predicted threshold levels, likely attributable to traffic being higher than any previous year. Dust fall deposition at the 1 km and 5 km distance are within background concentrations.

As a result of this monitoring, Baffinland continues to investigate how to better mitigate dust onsite. Baffinland has worked towards decreasing dust generated by wheel entrainment across the Project Sites, specifically reducing dust generation from ground surfaces by applying water and/or chemical suppressants such as calcium chloride to road surfaces and site layouts during summer conditions. The Company's effort with respect to the application of dust suppressants on the Tote Road are documented in the 2017 Terrestrial Environment Annual Monitoring Report (EDI 2018). Measures implemented to mitigate downwind dust of the Ore Pad were implemented in spring 2017 by removing dust impacted snow from areas of accumulation, including snow drifts near waterbodies and the beach west of the ship loader. The crushers at the Mine Site were installed with engineered dust shrouds on the main surge bins to reduce windblown dust as well as hoods at the out flow areas.

Overall, monitoring has supported the FEIS predictions for air quality, and have identified the factors which contribute to higher dust levels, and led to the development of adaptive management to address dustfall along Tote Road. The Phase 2 operation of the North rail line is expected to substantively reduce dust levels along Tote Road by diverting trucking.

8.3.2.2 Noise and Vibration

Monitoring of noise and vibration was conducted within the accommodation building at each Project site during the summer (June 2017). Average noise levels exceeded guidelines slightly at Milne Port, but were below guidelines at the Mine Site. In 2017, adaptive management was employed to reduce noise and vibration near accommodation complexes: quiet work hours were implemented; operation of equipment was limited in the vicinity of accommodation complexes, where practicable; and the Mine Site helicopter landing zone was relocated further away from the accommodations complexes during the morning and evening hours of the day.

The new Mine Site accommodations complex is also scheduled to be completed in 2018, which is anticipated to further reduce employee concerns related to noise and vibration. Baffinland is optimistic that by the end of 2018, they will be able to provide the data necessary to demonstrate that noise and vibrations at the accommodations complex is not adversely affecting employees and contractors.

Monitoring has supported most of the FEIS effects predictions, and resulted in modifications to reduce potential noise effects to workers within site camps.

8.3.3 Surface Water (TSD 13)

Monitoring has contributed to site-specific data to determine design criteria for engineering design, including bridges and culverts, and has also been used in the Phase 2 assessment of water quantity and quality. Water quality monitoring of the mine has demonstrated general compliance with required discharge limits, and have not identified project-related effects on water quality in potentially affected waterbodies. Baffinland has generally been in compliance with the discharge limits specified in its Type A Water Licence, with two exceptions, where immediate corrective action was undertaken. Aquatic Effects Monitoring Program monitoring to date has not identified a significant mine-related effect to the nearby aquatic environment. To date, monitoring under the Environmental Effects Monitoring (EEM) Program under Metal Mining Effluent Regulations (MMER) has demonstrated compliance with MMER requirements.

Overall, monitoring of freshwater quantity and quality has supported FEIS predictions of residual effects.

8.3.4 Landforms, Soils, and Permafrost (TSD 08)

FEIS predictions associated with Landforms, Soils, and Permafrost had high predictive certainty, and therefore monitoring has been limited to geotechnical evaluations at quarry sites where there was a concern over acid rock drainage (ARD) potential. There were no issues that arose from the monitoring.

8.3.5 Vegetation (TSD 09)

Baffinland's vegetation monitoring programs include vegetation abundance monitoring, vegetation and soil base metal sampling, exotic invasive plant species monitoring, monitoring of natural revegetation in disturbed areas, and dustfall monitoring. Results to date have supported FEIS effects assessment predictions. The vegetation abundance monitoring program to date has indicated no evidence of changes in vegetation abundance in the Project area from 2014 to 2017 as a result of the Project (EDI 2018). There is annual variation in the cover of some plant groups in the Project area; however, these differences were found across all plots; therefore, the variation is attributed to natural variation in plant group cover and there is no evidence to support a Project-related effect in the first three (3) years of monitoring. Metals analysis of soil and vegetation was conducted from 2012 to 2016; all results have been within the expected range and below Project-specific thresholds, following the resampling of two stations in 2017 that were confirmed to be outliers.

Dustfall monitoring is discussed above in section 11.2.1 (Air Quality).

Exotic invasive vegetation and natural regeneration monitoring was conducted once from August 1–3, 2014. No exotic invasive plant species were found within the Project footprint and adjacent areas. Terrestrial vegetation surveys conducted in 2017 did not identify the introduction of invasive species in the Project area as a result of Project activities to date.

Monitoring to date has therefore verified FEIS predictions with respect to vegetation.

8.3.6 Freshwater Biota and Habitat (TSD 14)

Project monitoring of freshwater fish and fish habitat has been undertaken in the Mine Site area and along the Milne Inlet Tote Road throughout the construction and operation phases of the Mary River Project. This monitoring can be compared to multiple years of baseline studies, and serves to verify the impact predictions and to address uncertainty in the original FEIS and FEIS Addendum, as well as provide further confidence in the impact assessment of Phase 2. While most monitoring has identified impacts within the FEIS predictions, where FEIS predictions are exceeded, adaptive management is being applied to mitigate observed effects. At the Mine Site, while lake sedimentation rates in Sheardown Lake NW in 2016 were greater than baseline, they remained within the range predicted in the FEIS, and monitoring of the biological communities (i.e., phytoplankton, benthic macroinvertebrates, and Arctic Char) conducted during the first two years of operation (2015 and 2016) indicated that there were no adverse mine-related influences on the biota of the Mine Site waterbodies and watercourses (Minnow Environmental Inc. 2016, 2017). Some issues regarding fish passage and condition

of stream crossings along the Tote Road have been noted in the annual surveys conducted since 2009; as a result, Baffinland has implemented various mitigation measures to correct issues identified, and will apply experience gained and lessons learned to the planning and design of the proposed North Railway watercourse crossings.

Overall, monitoring has supported the FEIS predictions for freshwater fish and fish habitat, and have led to the development of adaptive management to address effects on fish habitat along Tote Road.

8.3.7 Terrestrial Wildlife and Habitat (TSD 10)

The Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) includes mammal monitoring, in the form of height of land (HOL) caribou surveys, snow track surveys, and incidental sighting reports from on-site personnel. Results to date support the FEIS effects assessment predictions, which generally had a high level of confidence. In June 2013, a group of five caribou were observed in the PDA during HOL surveys; however, caribou have not been observed during surveys conducted between 2014 and 2017. Lack of caribou observations on site follow the trends of low numbers recorded in regional observations. Low numbers of incidental observations of caribou between the mine site and Milne Inlet between 2013 and 2017 also coincide with the lack of caribou observations during the HOL surveys. No caribou, wolf or other large mammal tracks were observed during snow tracking surveys conducted between 2014 and 2017; however, similar numbers of Arctic fox and Arctic hare tracks were observed throughout all survey years.

No incidences of Project personnel hunting or fishing within lands leased to Baffinland occurred in 2017, while 24 visitors were logged in the visitor's log. Over past years no Project personnel have participated in hunting or fishing on the Project Development Area unless approved by scientific permit and have not interfered with public rights to fish or hunt in or near the Project Development Area.

No wildlife mortality has been reported to date. Overall, monitoring of wildlife has supported FEIS predictions of residual effects.

8.3.8 Birds and Bird Habitat (TSD 12)

Monitoring programs up to 2016 have been used in the Phase 2 impact assessment for birds. Programs in 2017, limited to pre-clearing nest searches and cliff-nesting raptor occupancy and productivity surveys further support the impact evaluation results of the original FEIS and FEIS Addendum. Pre-clearing nest surveys in 2017 prior to development in expanded project footprint areas were conducted; no nests were identified within the new disturbance area. The addition of the 2017 results of the cliff-nesting raptor survey has indicated no evidence of a relationship between distance from the road/PDA and the number of birds observed. There has been no effect on cliff-nesting raptor nest occupancy rates since 2011, and distance to disturbance analysis suggests there is no negative effect on monitored raptor nesting productivity. Although annual variation in productivity for peregrine falcons and rough-legged hawks is apparent, it is most likely representative of natural variability associated with variation in prey availability and weather rather than due to any influence of disturbance.

To the extent that Project impacts on the terrestrial environment can be evaluated, the effects of the Approved Project appear to be within FEIS predictions, or the effects of concern have not occurred.

8.3.9 Marine Environment (TSD 17)

Project monitoring of marine water and sediment quality has been undertaken at Milne Inlet throughout the construction and operation phases of the Mary River Project, as outlined in the Marine Environmental Effects Monitoring Program (MEEMP). This monitoring can be compared to multiple years of baseline studies and serves to verify the impact predictions and to address uncertainty in the original FEIS and FEIS Addendum, as well as provide further confidence in the impact assessment of Phase 2. Monitoring efforts completed to date support the FEIS determination. From the most recent (2017) monitoring:

- All water quality samples collected in 2017 were below the applicable water quality guidelines for all tested parameters (Golder 2018).
- Localized increases in percent fines and iron concentrations were observed near Milne Port (Golder 2018). Sediment samples were below CCME Guidelines for most metals (arsenic was high at three locations but is likely naturally occurring and is not a component of project related activities). Sediment sampling will continue to evaluate if the trends observed between 2014 and 2017 will continue and to determine whether these are attributed to project-related activities or natural variability.

Reports of spills and unauthorized discharges are reported in annual reports to NIRB (Baffinland 2017); spills reported in 2017 did not result in environmental effects. No ship to shore fuel oil spills occurred in 2017.

In addition to environmental effects monitoring for marine water and sediment quality, the MEEMP also included effects monitoring for biological components of the marine environment. These also included an Aquatic Invasive Species (AIS) monitoring program, implemented as a part of the MEEMP. In general, monitoring studies have not shown any effect on the marine habitat and biota VEC from Project activities. From the most recent (2017) monitoring:

- Epifauna abundance largely remains unchanged relative to that of previous sampling years.
- Total fish catch largely remains unchanged relative to that of previous sampling years.
- Metals in Arctic char tissues remain unchanged and well below Health Canada's guidelines.
- No species recorded during aquatic invasive species sampling were identified as invasive to the Arctic region.

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

8.3.10 Marine Mammals (TSD 24)

The Approved Project was predicted to have a not-significant adverse effect on marine mammals, including disturbance caused by airborne and/or underwater sound from construction, shipping and aircraft, masking of environmental sounds, and mortality. The MEEMP includes a shore-based monitoring of narwhal and vessel traffic in Milne Inlet near Bruce Head. There was no significant change in overall narwhal abundance and distribution was observed in the area from 2014-2017. There have been no reported vessel strikes with narwhal; no collisions with marine mammals have been noted by shipboard observers or ship crew. Polar bear monitors look for polar bears entering camps and remote work areas. No polar bear incidents occurred in 2017.

To the extent that Project impacts on marine mammals can be evaluated, the effects of the Project are within FEIS predictions.

8.3.11 Socio-Economic (TSD 25)

As the Approved Project has now been operating for several years, there are relevant monitoring data as well as current statistics available to assess the accuracy of previously predicted effects from the FEIS and FEIS Addendum, and validating the effects predicted, on the valued socio-economic components.

Overall, to the extent that Project impacts on the socio-economic environment can be evaluated, the effects of the Approved Project are to be within FEIS predictions.

8.3.11.1 *Population Demographics*

Project monitoring of Population Demographics has confirmed in-migration of non-Inuit into North Baffin LSA communities is not occurring to any measurable extent as a result of the Project. Out-migration of Inuit workers also are to be occurring to the extent predicted for the Approved Project.

8.3.11.2 *Education and Training*

There are indicators that positive residual effects predicted on Education and Training through access to industrial work supported by pre-employment preparation and on-the-job training are being realized; however, it will likely take many years to fully realize the Project's Inuit employment potential.

8.3.11.3 *Livelihood and Employment*

The Approved Project was predicted to deliver significant positive effects on Livelihood and Employment with respect to two key indicators: wage employment and job progression and career advancement. These positive effects were anticipated to arise from new employment opportunities, local hiring commitments, and career progression opportunities provided by the Project. These positive effects are currently being monitored and are largely consistent with original predictions, although LSA employment is one area where Project activities have not fully met Approved Project predictions to-date.

8.3.11.4 *Economic Development and Self Reliance*

Positive overall effects were predicted for the Economic Development and Self Reliance VSEC from the Approved Project. While monitoring indicators specific to the VSEC were not developed, adequate monitoring is conducted through indicators developed for other VECs and VSECs; monitoring to-date largely supports Approved Project predictions presented for these VECs and VSECs.

8.3.11.5 *Human Health and Well-being*

The Approved Project was assessed to have both positive and non-significant adverse effects on Human Health and Well-being with regards to three key indicators: well-being of children, substance abuse and community social stability. These effects were anticipated to arise primarily from Project employment opportunities; more specifically, the new incomes it brings and challenges fly-in/fly-out employment can present. While effects are currently being monitored and are consistent with the original FEIS predictions, these monitoring activities are longer term and therefore conclusions will be drawn in future years. While a number of well-being statistics have revealed positive trends in the post-development period, many such positive trends were also evident in the five years preceding Project development.

8.3.11.6 *Community Infrastructure and Public Services*

With respect to Community Infrastructure and Public Services, the Approved Project was assessed to have both positive and non-significant adverse effects on hamlet staff recruitment and retention. Monitoring has indicated that many employees left jobs in their communities to pursue employment at the project, which is an effect within the FEIS predictions. However, since 2013, Inuit employees and contractors have received thousands of hours of training and labour experience; the ongoing training and experience, coupled with regular employee turnover, will continue to increase the pool of skilled workers in the local labour force, and negate short-term, adverse Project effects.

8.3.11.7 *Contracting and Business Opportunities*

The Approved Project was assessed to deliver positive effects with respect Contracting and Business Opportunities by creating an expanded market for business services to the and creating an expanded market for consumer goods and services. Positive effects are currently being realized by businesses and individuals throughout Nunavut as determined to date via the monitoring program, which tracks the value of procurement with Inuit-owned businesses and joint ventures, employee payroll amounts, and the number of registered Inuit firms in the LSA.

8.3.11.8 *Culture, Resources and Land Use*

While archaeological investigations conducted within the Approved Project PDA have established that the general area has seen substantial use throughout the human past, the knowledge gained from this work has been used to locate Project facilities away from important archaeological sites where possible; to assess any residual impacts; and to formulate preservation and mitigation plans for any important archaeological resources to be affected by Project development. Inuit knowledge and land use studies further describe culturally significant features and locations, and both historic and contemporary land use. The current operating Project has minimal effects on existing identified cultural resource sites. Residual effects for Resources and Land Use for the Approved Project include negative effects on Inuit travel and camping. Project monitoring related to culture, resources and land use include periodic monitoring of archaeological sites; completion of an annual archaeological status report; documenting the number of land user visits at Project sites; and outcomes of Wildlife Compensation Fund (WCF) claims submitted to the QIA. Results to date are consistent with FEIS predictions, suggesting, Inuit land use activities coexist with the Project, as local land users continue to access Project sites.

8.3.11.9 *Benefits, Royalty and Taxation*

The value of annual payroll and corporate tax payments by Baffinland to the territorial government helps demonstrate the Project's effect on revenues flowing to the territorial government. In 2017, Baffinland paid \$1,491,098.13 in employee payroll tax to the Government of Nunavut (i.e. a 2% payroll tax levy; other payroll taxes are paid to the federal government). As predicted in the FEIS, the positive effect of the Project on revenues flowing to the territorial government is confirmed. Baffinland expects increased tax amounts (i.e. corporate income tax) will be paid once the Company becomes profitable.

9 ENVIRONMENTAL EFFECTS ASSESSMENT METHODS

The impact assessment methods applied in this FEIS Addendum No. 2 are consistent with the impact assessment methods described in FEIS Volume 2, Section 3, but have been simplified for the purposes of this assessment and to make the discussion more accessible for readers.

The identification and assessment of environmental and social effects was based on the following steps.

- Identification of major Project activities during each phase of the Project;
- Identification of Valued Components and selection of appropriate key indicators and measurable parameters;
- Establishment of assessment boundaries;
- identification of project interactions;
- Mitigation measures and EMPs to avoid, reduce or minimize potential effects;
- Establishment of the framework for evaluating significance of residual impacts;
- Determination of the potential for a residual effect, and if anticipated, its significance;
- Identification of monitoring plans and adaptive management strategies for incorporation into EMPs; and
- The following subsections provide more information on the steps above.

9.1 Project Activities and Components

The activities considered in this assessment relate specifically to the Phase 2 Proposal. As reflected in the concordance documents (Appendix B), activities and components which were assessed as part of the Approved Project are not reassessed herein.

The Project activities under consideration in this Assessment are listed in Section 9.2; a description of the activities is provided in the project description summary (Section 4) and the Project Description (TSD 02).

9.2 Valued Components

The Guidelines prescribe the VECs and VSECs which must be considered with respect to project interactions. These are consistent with those considered for the FEIS. Table 9.1 presents a discussion of the scope for each of the VECs/VSECs, in consideration of Guideline requirements and public consultation results.

Table 9.1 Scope of this Assessment by VEC/VSEC

Guidelines VEC/VSEC Requirement	Discussion	Relevant TSD and Effects
Meteorology and Climate	Section 8.1.1.2 of the Guidelines requires consideration of climate conditions and meteorological events on the Phase 2 Proposal, including emissions of pollution into the atmospheric environment and the relationship between climate change and GHG emissions. For the Phase 2 Proposal, emissions from combustion from both stationary and mobile sources that use diesel fuel will directly emit GHGs including carbon dioxide (CO ₂), methane (CH ₄) and nitrous oxide (N ₂ O) to the atmosphere.	TSD 06: Climate Change Assessment Change in GHG Emissions
Air Quality	Section 8.1.2.2 of the Guidelines requires consideration of the effects of fossil fuel combustion from Project components and activities on air quality, dispersion of Project emissions, potential for acidic precipitation, and GHG contributions. Construction and operation of the Phase 2 Proposal will release air contaminants such as dust (i.e., total suspended particles (TSP), coarse and fine particulate matter (PM ₁₀ and PM _{2.5})), nitrogen dioxide (NO ₂), sulphur dioxide (SO ₂), and carbon monoxide (CO) and will result in the deposition of dust and potential acidifying substances (referred to as PAI – potential acid inputs).	TSD 07: Atmospheric Assessments (Air Quality) Change in Air Quality
Noise and Vibration	Section 8.1.3.2 of the Guidelines requires consideration of potential increase to noise levels from Project activities and the potential impacts of noise and vibration to people, terrestrial animals, marine mammals, and fish. Phase 2 Proposal activities will create noise and vibration as a result of construction activities, equipment and vehicle operation, blasting, and ore handling and processing, among other activities.	TSD 07: Atmospheric Assessments (Noise and Vibration) - Change in Noise - Change in Vibration
Geology and Geomorphology Hydrology and Hydrogeology Groundwater/Surface Water	Section 8.1.5.2 (Hydrology and Hydrogeology) and 8.1.6.2 (Groundwater/Surface Water) of the Guidelines requires consideration of impact of variable and extreme stream-flows, impacts to watershed, drainage patterns, and surface and ground water quality and quantity from the various Project activities. Activities associated with the Phase 2 Proposal may affect freshwater quantity and quality due to water extraction and consumption, stream diversion at the North Railway, ore dust deposition and transport, and water-rock interactions at quarries and rock cuts along the North Railway.	TSD 13: Surface Water (Freshwater Quantity) - Change in Water Quantity TSD 14: Freshwater biota and Habitat Assessment (Freshwater Quality) - Change in Water Quality
Landforms, Soils and Permafrost	Section 8.1.7.2 of the Guidelines requires consideration of the general impacts on landforms from Project activities, the abundance and distribution of unique or valuable landforms, stability of the terrain, terrain hazards, and potential for acid rock drainage and metal leaching. The Phase 2 Proposal has the potential to alter landforms, soils and permafrost due to alterations to ecologically sensitive land, and changes to the thermal regime of permafrost.	TSD 08: Landforms, Soil and Permafrost Assessment - Change in Landforms - Change in Geohazard Risk - Change in Geochemical Risk
Vegetation	Section 8.1.8.2 of the Guidelines requires consideration impacts to the abundance and diversity of vegetation and impacts to vegetation of cultural value from project activities. The Phase 2 Proposal may alter vegetation due to direct and indirect changes to habitat.	TSD 09: Vegetation - Change in Vegetation Abundance and Diversity - Change in Vegetation health - Change in Culturally Valued Vegetation

Table 9.1 Scope of this Assessment by VEC/VSEC

Guidelines VEC/VSEC Requirement	Discussion	Relevant TSD and Effects
Freshwater Aquatic Environment Including Biota and Habitat	Section 8.1.9.2 of the Guidelines requires consideration of the potential impacts to fish, invertebrates and freshwater habitat including alteration, disruption or destruction of fish habitat from Project activities. Activities associated with the Phase 2 Proposal may affect freshwater biota and habitat due to in-water construction activities; effluent discharges; changes in sedimentation rates; and changes in habitat availability and connectivity.	TSD 14: Freshwater Biota and Habitat Assessment Change in Freshwater Biota and Habitat
Terrestrial Wildlife and Habitat	Section 8.1.10.2 of the Guidelines requires consideration of the general impacts to terrestrial wildlife, including population size, abundance, distribution and behavior of wildlife from Project activities. The Phase 2 Proposal activities and components have potential to result in a change in risk of injury or mortality and a change in habitat quality or availability for terrestrial wildlife.	TSD 10: Terrestrial Wildlife and Wildlife Habitat - Change in Risk of Injury or Mortality - Change in Habitat Quality or Availability
Birds	Section 8.1.11.2 of the Guidelines requires consideration of the potential loss, alteration or alienation of habitat, impacts on migratory birds, and disruption of migratory routes. Phase 2 Proposal activities and components have potential to result in a change in risk of injury or mortality and a change in habitat quality or availability for bird species.	TSD 12: Birds and Bird Habitat - Change in Risk of Injury or Mortality - Change in Habitat Quality or Availability
Marine Environment, Marine Water/Ice and Sediment Quality	Section 8.1.12.2 of the Guidelines requires consideration of potential risks to the marine ecosystem, marine resources and habitat, and marine water quality, marine sediment quality and marine biota from Project activities.	TSD 17: Marine Environmental Effects Assessment (Marine Water and Sediment Quality) - Change in Marine Habitat - Change in water and sediment quality
Marine Wildlife and Marine Habitat	Section 8.1.13.2 of the Guidelines requires a comprehensive impact analysis of Project activities on marine wildlife. Activities associated with the Project may affect marine mammals due to the loss or alteration of habitat, acoustic disturbance, hearing impairment, auditory masking and mortality.	TSD 17: Marine Environmental Effects Assessment (Marine Habitat and Biota) TSD 24, Marine Mammals
Education and Training	Section 8.2.2.2 (Education and Training) of the Guidelines requires consideration of training and education needs, including training programs. Phase 2 Proposal activities have the potential to result in a change in education and training.	TSD 25: Socio-economic Assessment - Education and Training Change in Education and Training
Livelihood and Employment	Section 8.2.3.2 (Livelihood and Employment) of the Guidelines requires consideration of labour force development, job creation, and business and contracting opportunities. Phase 2 Proposal activities have the potential to result in a change in livelihood and employment.	TSD 25: Socio-economic Assessment - Livelihood and Employment Change in Livelihood and Employment

Table 9.1 Scope of this Assessment by VEC/VSEC

Guidelines VEC/VSEC Requirement	Discussion	Relevant TSD and Effects
Economic Development and Self-Reliance	Section 8.2.4.2 (Economic Development and Self-Reliance) of the Guidelines requires consideration of impacts to the local economy, including stimulation of local businesses and potential impacts on traditional economic activities. Phase 2 Proposal activities have the potential to result in a change in economic development and self-reliance.	TSD 25: Socio-economic Assessment - Economic Development and Self-Reliance Change in Economic Development and Self-Reliance
Benefits, Royalty and Taxation	Section 8.2.9 (Benefits, Royalty and Taxation) of the Guidelines requires consideration of royalty and taxation forecasts, and the IIBA. Phase 2 Proposal activities have the potential to result in a change in benefits, royalties and taxes.	TSD 25: Socio-economic Assessment - Change in Benefits, Royalty, and Taxation
Community Infrastructure and Public Services	Section 8.2.6.2 (Community Infrastructure and Public Services) of the Guidelines requires consideration of potential impacts to community and public services and infrastructure, including increased costs, demands on services and/or infrastructure, including healthcare. Phase 2 Proposal activities have the potential to result in a change in community infrastructure and public services.	TSD 25: Socio-economic Assessment - Community Infrastructure and Public Services Change in Community Infrastructure and Public Services
Contracting and Business Opportunities	Section 8.2.7.2 (Contracting and Business Opportunities) of the Guidelines requires consideration of potential impacts to contracting and business opportunities, including economic effects from Project contracts, competition for other businesses, and a discussion of barriers to local business capacity building. Phase 2 Proposal activities have the potential to result in a change in contracting and business opportunities.	Contracting and Business Opportunities Change in Contracting and Business Opportunities
Governance and Leadership	Section 8.2.10.2 (Governance and Leadership) of the Guidelines requires consideration of how the Project planning meets the needs of regional economy development, and how the Project will be managed in current governance and regulatory regime. Phase 2 Proposal activities have the potential to result in a change in governance and leadership.	Section 26: Community Services and Infrastructure Change in Governance and Leadership
Population Demographics	Section 8.2.1.2 (Population Demographics) of the Guidelines requires consideration of demographic changes. Potential effects to community health and well-being are anticipated to arise primarily from Project employment opportunities; more specifically, the new incomes it brings and challenges fly-in/fly-out employment can present.	TSD 25: Socio-economic Assessment - Population Demographics Change in Population Demographics
Human Health and Well-being	Section 8.2.5.2 (Human Health and Well-being) of the Guidelines requires consideration of community health from Project activities, including indirect effects such as substance abuse and family violence as well as health, safety and security of workers on site. Potential effects to community health and well-being are anticipated to arise primarily from Project employment opportunities; more specifically, the new incomes it brings and challenges fly-in/fly-out employment can present.	TSD 25: Socio-economic Assessment - Human Health and Well-being Change in Human Health and Well-being

Table 9.1 Scope of this Assessment by VEC/VSEC

Guidelines VEC/VSEC Requirement	Discussion	Relevant TSD and Effects
Culture, Resources and Land use	Section 8.2.8.2 of the Guidelines requires consideration of the potential impacts to archaeological resources, and land use activities such as hunting, fishing, marine harvesting, traveling, recreational and religious activities. Activities associated with the Phase 2 Proposal have the potential to interact with culture, resources and land use from the expansion of the terrestrial footprint associated with the North Railway, additional infrastructure and intensity of Project activity at Milne Port and increased frequency of shipping, with larger ships and expanded shipping season.	TSD 25: Socio-economic Assessment - Culture, Resources and Land use • Loss of Cultural Resources • Change in Access to or Availability of Harvesting Resources • Change in Access to Travel Corridors and Camps

9.3 Spatial and Temporal Boundaries

Spatial and temporal boundaries were determined to set limits within which the environmental assessment was conducted. Spatial boundaries for the effects assessment were determined on a VEC- and VSEC-specific basis for biophysical effects, and are consistent with the FEIS. Spatial boundaries were defined by the anticipated zone of influence of Project effects. A nested approach was adopted as follows.

- Potential Development Area (PDA) reflect the physical footprint of the Project activities.
- Local Study Area (LSA) - Is the area where there exists the reasonable potential for direct interaction due to Project activities, ongoing normal activities, or to possible abnormal operating conditions (i.e., accidents and malfunctions). The LSA includes all existing and Proposed Project Areas (PDAs), and the nominal shipping route within the Nunavut Settlement Area (NSA). Individual LSAs were defined for each biophysical environmental component, and for land use and other socio-economic components.
- Regional Study Area (RSA) - Is the area within which there exists the potential for direct, indirect, and/or cumulative biophysical and socio-economic effects. This area includes lands, waters and potentially affected communities within the NSA. Effects extending beyond the NSA have been addressed in a separate transboundary effects assessment. RSAs have been defined for each of the major environmental components (human, atmospheric, terrestrial, freshwater and marine) and are unchanged from the FEIS.

Spatial boundaries are consistent with those used for the FEIS, and encompass the areas anticipated to be affected by the Phase 2 Proposal. As well, spatial boundaries can serve to prescribe both the extent to which traditional Inuit land use could be affected, as well as the set of past, present, and reasonably foreseeable future projects and activities that could interact with the Project.

9.3.1 Project Development Area(s)

The Phase 2 Proposal is largely contained within the previous footprint of the Project. The Potential Development Area (PDA) for the Mine Site and Tote Road remain unchanged from the Approved Project. For the purposes of the assessment, the PDA of the relevant components is described in Table 8.2.

Table 9.2 Phase 2 Proposal Potential Development Areas

Project Component	PDA (ha)	Comment
Milne Port (land)	415	This includes approximately 224 ha that is part of the Approved Project; the change from the Approved Project is approximately 116 ha. This includes additional area for landfill and rail terminus.
Milne Port (water)	36	This includes approximately 20 ha that is part of the Approved Project. The change from the Approved Project is approximately 16 ha. This includes the second ore dock.
North Rail	1,384	This estimate is conservative for the purposes of assessment, and is based on 40 m either side of the centreline

9.3.2 Local Study Areas and Regional Study Areas

The LSA and RSA are VEC/VSEC-specific, where spatial areas have changed as compared to what was used for the FEIS, these differences are noted in the individual TSD documents.

9.3.3 Temporal Boundaries

Temporal boundaries define the period within which the Project is expected to result in environmental or socio-economic effects.

- Construction (Phase 2 component): two-year time frame beginning in 2019 and ending in 2021;
- Operation and Maintenance: 2018 to 2035;
- Closure: three-year period; and
- Post Closure: until closure objectives are satisfied.

9.4 Project-VEC/VSEC Interactions

The assessment of Project-related environmental effects follows a sequence where potential interactions between each VEC/VSEC and project components or activities are identified. For each VEC/VSEC, the interactions are ranked as 0, 1 or 2 and presented in tabular format, as shown in Section 10.1. A ranking of 0 indicates that there is no substantive interaction between the VEC/VSEC and the Project activity; these interactions are not carried forward for assessment. A ranking of 1 indicates that the interaction is not likely to be substantive, considering existing and planned mitigation and best management practices. These interactions are those that are less likely to be of notable environmental importance or consequence and result from interactions that are well understood, are common to projects of this nature, and/or can be addressed through application of standard, proven mitigation, or prevention approaches. While these interactions have been identified and analyzed to establish their level of significance as part of the effects assessment process, they are addressed with brevity in the EIS. A ranking of 2 indicates an interaction that may result in a more substantive effect and environmental consequence or an interaction that is of substantial public or regulatory interest. These potential interactions are subjected to a more detailed effects analysis in order to predict, mitigate, and evaluate potential effects. Potential effects are analyzed qualitatively, and, where possible, quantitatively, using existing knowledge, professional judgment, and other analytical tools, where appropriate and applicable.

9.5 Mitigation of Potential Effects

Where potential effects are likely or have been identified, mitigation measures are incorporated in the design of the facilities to avoid, reduce or minimized potential adverse effects. In many instances, potential effects can be avoided with the implementation of operation procedures and best management practices. Such operating practices are procedures are

captured in Baffinland's Environmental Monitoring and Management Plans. An overview of Baffinland's Environmental Management Systems has been presented in previous EIS and is discussed in Section 5.

9.6 Residual Effects and Significance Determination

Despite the implementation of mitigations by design or adoption, and implementation of best management practices, residual Project environmental effects will occur. The purpose of the EIS is the assessment and determination of the significance of the residual effects and their acceptability to Inuit communities and the Project stakeholders. As directed by the Guidelines for the Preparation of this EIS, determination of significance considers the following criteria (NIRB 2009).

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

These criteria were adopted for this assessment, as specified in the Guidelines. Additional attributes are considered, if and as applicable, in the assessment of the VECs/VSECs.

Effects are discussed, beginning with a description of the mechanism by which the effect may occur (i.e., which Project activity or activities may result in the effect). Mitigation is identified to reduce adverse interactions and enhance positive ones. Where applicable, mitigation committed to in previous assessments is referenced. Details are provided for mitigation not previously identified. The residual effect (i.e., after mitigation is applied) is described.

A summary of residual Project environmental and socio-economic effects is provided in Section 11.

9.7 Monitoring and Adaptive Management

A key component of the effects assessment is the level of confidence in the severity (magnitude, extent, duration, reversibility) of the predicted residual effects. Effective monitoring plans must be developed and implemented to enable early detection of adverse effects and implement adaptive mitigation measures to prevent adverse effects from occurring. Since the beginning of operation in 2014, Baffinland has successfully developed and implements several monitoring programs. Four years of intensive monitoring of project VECs and VSECs has validated the effects predictions made in the FEIS (see also section 11). On an annual basis, the Company reports on all its monitoring activities to the NIRB, the NWB and the QIA. These annual reports are available for public consultation on the NIRB and NWB registry.

As part of previous assessment of the Project conducted prior to this Phase 2 Project, various mitigation measures have been proposed and/or initiated, monitoring programs designed and implemented, and permitting requirements identified. The Phase 2 Proposal and the results of this effects assessment may result in the requirement for updates or changes to these. For each VEC/VSEC, previous commitments regarding mitigation, monitoring and permitting are referenced, and necessary changes or updates are described in the corresponding TSD.

10 ENVIRONMENTAL EFFECTS ASSESSMENT

10.1 Potential Interactions of the Project with VECs and VSECs

The interactions between the main activities associated with the components of the Phase 2 Proposal and the VECs and VSECs are identified and ranking in the tables in Appendix G.

10.2 Accidents and Malfunctions

Accidents and malfunctions refer to events or upset conditions that are not part of the normal operation of the Project. Even with the best planning and the implementation of preventative measures, the potential exists for accidents or malfunctions to occur during any Project phase, and if they occur, to potentially result in adverse environmental effects. Through good Project planning and design, and the implementation of effective mitigation measures, the adverse effects of accidents and malfunction on human health and the receiving environment can be reduced. In the event of an accident or malfunction, the implementation of emergency response measures can reduce adverse effects. By identifying and assessing the potential for these events to occur, Baffinland can put in place prevention and response procedures to reduce the potential for significant adverse environmental effects, should an accidental event occur.

Accidents and malfunctions were assessed as part of the Approved Project, and a risk register was developed to identify the potential risks, the likelihood of the accidental event occurring, level of consequence associated with each accidental event, and applicable emergency response plans. The risk register is an integral part of Baffinland's Environmental Management System (EMS) described in detail in the FEIS, Volume 10. The risk register is reviewed periodically and was updated for Phase 2.

The Approved Project included an assessment of accidents and malfunctions based on the Project, as initially conceived. Since that time, Baffinland has continued to assess risks as the Project has evolved, and the risk register for the Project was updated. This updated risk register, along with feedback received during consultation with Inuit communities and stakeholders on the Phase 2 Proposal, was used to update the assessment of accidents and malfunctions. The definitions for consequence and likelihood, and the matrix assessing overall risk are based upon Baffinland's Standard for Hazard Identification and Risk Assessment (Baffinland 2010b), which was included in the Approved Project.

The discussion below provides an overview of the Baffinland's existing emergency response plans, followed by an updated risk register and an assessment of potential accidents and malfunctions associated with the Phase 2 Proposal, where the infrastructure and activities proposed as part of Phase 2 Proposal may result in new or worse environmental effects than were addressed by the Approved Project. The assessment of accidents and malfunctions will include a discussion of potential environmental effects and the significance of those effects in consideration of the proposed mitigation and response procedures. Finally, a description of the necessary updates to the current emergency response plans is provided.

10.2.1 Emergency Response Plans

The operational emergency response plans are described in Table 10.1, along with an overview of updates required for the Phase 2 Proposal.

Table 10.1 Current Operational Emergency Response Plans

Plan	Current Revision (Date)	Description	Updates for Phase 2 Proposal
Emergency Response Plan	Rev. 3 (March 2018)	Primary plan that assesses the risk of various emergencies and outlines the generic steps to be taken in an emergency.	To be updated to incorporate the additional risks identified in Table 10.2.
Polar Bear Safety Plan	Rev. 1 (March 2016)	Describes the procedures to be undertaken to reduce the potential for worker encounters with polar bear, and procedures to manage polar bear encounters when they occur.	No update required.
Spill Contingency Plan (SCP)	Rev. 3 (March 2017)	Addresses spills on land or water, excluding spills during fuel transfer at Milne Port and spills at sea.	A minor update will be required to reflect site layout changes and the location of spill response equipment.
Oil Pollution Emergency Plan (OPEP) – Milne Inlet	Rev. 3 (June 2017)	Addresses ship to shore fuel transfer protocols at the Milne Port Oil Handling Facility, and response to spills if they occur during the fuel transfer process.	A minor update will be required to incorporate additional fuel storage in the Milne Port tank farm.
Oil Pollution Emergency Plan (OPEP) - Steensby Port	Rev. 2 (July 2016)	Addresses ship to shore fuel transfer protocols at the Steensby Port Oil Handling Facility, and response to spills if they occur during the fuel transfer process.	No update required at this time.
Spill at Sea Response Plan (SSRP)	Rev. 0 (August 2015)	Baffinland's procedures to respond to a spill from a project-related vessel, to be implemented in addition to the vessel's Transport Canada mandated Shipboard Oil Pollution Emergency Plan (SOPEP).	No updates required
Shipping and Marine Wildlife Management Plan (SMWMP)	Rev. 6 (March 2016)	Section 5.8 of the SMWMP describes response to emergencies such as accidental spills of fuel or chemicals; extreme weather conditions; malfunctions during shipping operations (with reporting procedures); and unforeseen events.	No update required.
Aerodrome Operations Manual (AOM)		An appendix of the AOM addresses overdue or missing aircraft; precautionary and forced landings; and an aircraft crash.	To be updated to incorporate the additional scope of shipping activities associated with the Phase 2 Proposal, including any additional mitigation measures or monitoring programs.
Roads Management Plan (RMP)	Rev. 5 (March 2016)	Identifies the hazards associated with use of the road, and corresponding safe work procedures.	To be updated to incorporate revised traffic patterns.
Railway Emergency Response Plan	January 2012	Conceptual-level plan	To be updated to incorporate activities of the North Railway

The Emergency Response Plan is the overarching emergency plan, which is currently supported by each of the other specific response plans outlined in Table 10.1. Each of the other plans focus on specific activities or risks.

In addition to emergency response plans, each vessel calling on Milne Port will have a Transport Canada approved Shipboard Oil Pollution Emergency Plan (SOPEP). SOPEPs are proprietary documents specific to each vessel. For Canadian flagged vessels, SOPEPs are reviewed and approved by Transport Canada.

A Railway Emergency Plan (Canarail, 2011a) and Railway Management Plan (Canarail, 2011b) were presented in the Approved Project. However, these are not currently operational plans. These plans will be updated to incorporate the North Railway. Future revisions to the Emergency Response Plan will include references to the Railway Emergency Plan as construction activities proceed in these areas.

Desk top exercises and field drill exercises are routinely carried out to validate the effectiveness of the emergency response plans. Timing of the training corresponds with ship-to-shore fuel transfer events at Milne Port. In 2017, training of Baffinland staff on its Oil Pollution Emergency Plan (OPEP) was conducted by spill response consultant Navenco Marine on August 03-08, 2017. The training encompassed classroom and hands-on spill response techniques including a mock exercise for potential port oil spills during ship-to-shore transfer. The training also included an audit inspection to confirm that Baffinland's spill response equipment and training requirements were in compliance with the OPEP and Transport Canada regulations for Baffinland's Class 1 Oil Handling Facility. General land-based spill response training is periodically reviewed with the Mine Rescue Team; however, this does not apply to the OPEP. Baffinland also maintains a contract with Oil Spill Response Ltd. (OSRL) for emergency response in the event of a marine spill.

10.2.2 Updated Risk Summary

Potential accidents and malfunctions associated with the Project (inclusive of the Phase 2 Proposal) are presented in Table 10.3. The rating definitions for consequence and likelihood and the risk matrix remain unchanged from the FEIS (Volume 9, Section 3.1; Baffinland 2012).

The ratings of consequence, likelihood and overall risk assume that suitable operational controls and other mitigation measures described in the environmental management and emergency response plans have been successfully implemented. Since these risks appeared in the Approved Project, there are existing response plans in place that are currently operational. The applicable response plans for each potential risk are identified in Table 10.2.

Table 10.2 Major Accidents and Malfunctions Risk Summary

Potential Risk	Consequence	Likelihood	Risk Rating	Applicable Response Plan(s) ¹
Mine Site				
Open pit and waste rock stockpile - slope failure causing production delay or human injury	Minor	Unlikely	Low	Emergency Response Plan
Explosive accidents (accidental detonation of explosives) causing human injury or fatality	Major to Critical	Rare	Low - Moderate	Emergency Response Plan
Hazardous material release resulting in contamination of environment	Minor	Unlikely	Low	Emergency Response Plan, SCP, AOM
Vehicle accidents resulting in human injuries or fatalities	Major to Critical	Unlikely	Moderate	Emergency Response Plan, RMP

Table 10.2 Major Accidents and Malfunctions Risk Summary

Potential Risk	Consequence	Likelihood	Risk Rating	Applicable Response Plan(s) ¹
Open Pit flooding resulting in a human injury	Major	Unlikely	Moderate	
Fire at the camp facilities and infrastructure resulting in human injuries or fatalities	Major to Critical	Unlikely	Moderate	Emergency Response Plan
Failure of power supply resulting in human injuries or fatalities	Major to Critical	Rare	Low - Moderate	Emergency Response Plan
Failure of WWTP resulting in environmental contamination	Minor	Unlikely	Low	Emergency Response Plan
Contamination or interruption of water supply resulting in effects on human health	Moderate	Rare	Low	Emergency Response Plan
Tote Road				
Road embankment failure/collapse of water crossing resulting in environmental degradation	Insignificant	Likely	Low	Emergency Response Plan
Hazardous material release resulting in environmental contamination	Minor	Rare	Very Low	Emergency Response Plan, SCP, RMP
Truck accident resulting in human injuries	Moderate	Likely	Moderate	Emergency Response Plan, RMP
Collision with other users resulting in human injuries or fatalities	Major - Critical	Unlikely	Moderate	Emergency Response Plan, RMP
Weather related strandings resulting in human injuries	Major	Possible	Moderate	Emergency Response Plan, RMP
Collision with wildlife resulting in injury to wildlife	Minor	Unlikely	Low	Emergency Response Plan, RMP
Railway				
Embankment failure/collapse of water crossing resulting in environmental degradation	Insignificant	Possible	Low	See Note 1
Derailment resulting in human injuries or fatality	Major - Critical	Rare	Low - Moderate	See Note 1
Tunnel collapse resulting in human injuries or fatality	Major - Critical	Rare	Low - Moderate	See Note 1
Weather related strandings resulting in human injuries or fatality	Major - Critical	Rare	Low - Moderate	See Note 1
Hazardous material release resulting in contamination of the environment	Minor	Rare	Very Low	See Note 1
Collision with vehicle at rail crossing	Major - Critical	Rare	Low – Moderate	See Note 1

Table 10.2 Major Accidents and Malfunctions Risk Summary

Potential Risk	Consequence	Likelihood	Risk Rating	Applicable Response Plan(s) ¹
Collision with human resulting in human injury	Major	Rare	Low	See Note 1
Collision with wildlife resulting in harm to wildlife	Minor	Unlikely	Low	See Note 1
Milne Port				
Fire at the camp facilities and infrastructure resulting in human injuries or fatalities	Major - Critical	Unlikely	Moderate	Emergency Response Plan
Diesel spill - ship to shore transfer resulting in contamination of the marine environment	Minor	Unlikely	Low	SCP, OPEP
Failure of power supply resulting in human injuries or fatalities	Major - Critical	Rare	Moderate	Emergency Response Plan
Failure of WWTP resulting in harm to human health or the environment	Minor	Unlikely	Low	Emergency Response Plan
Contamination or interruption of water supply resulting in an effect on human health	Minor	Possible	Low	Emergency Response Plan
Vehicle accidents resulting in human injuries or fatalities	Major to Critical	Unlikely	Moderate	Emergency Response Plan, RMP
Congestion at Port resulting in damage to vessels, possible spills including of ore into the marine environment, production delay	Minor	Unlikely	Low	OPEP, SSRP
Hazardous material release resulting in environmental contamination	Minor	Unlikely	Low	OPEP, SCP, Emergency Response Plan
Ice accumulation at Port resulting in damage to port infrastructure and vessels, production delay	Insignificant	Likely	Low	Emergency Response Plan
Introduction of invasive species (marine and terrestrial)	Minor	Likely	Low	SMWMP
Air Traffic				
Aircraft or helicopter crash resulting in human injuries or fatalities	Major - Critical	Rare	Low - Moderate	AOM, Emergency Response Plan
Shipping				
Collision with marine mammals resulting in harm to marine mammals	Minor	Rare	Very Low	SMWMP
Engine failure resulting in a delay in shipping	Insignificant	Possible	Moderate	SM WMP
Ship grounding resulting in damage to ship or possible harm to aquatic life	Minor	Unlikely	Low	SMWMP
Ice/ship interaction resulting in a delay or possible damage to vessel	Insignificant	Likely	Low	SMWMP

Table 10.2 Major Accidents and Malfunctions Risk Summary

Potential Risk	Consequence	Likelihood	Risk Rating	Applicable Response Plan(s) ¹
Collision with other vessels resulting in damage to ship, possible harm to aquatic life	Moderate	Rare	Low	SMWMP
Major diesel spill along the shipping route resulting in contamination of marine and coastal environment along shipping route	Critical	Unlikely	High	SMWMP

NOTES:

¹ A Railway Emergency Plan and Railway Management Plan were presented in the FEIS. These plans are not in use. These plans will be updated to incorporate the North Railway.

10.2.3 Discussion of Updated Assessment of Accidents and Malfunctions

The Phase 2 Proposal has not altered the risk register for the Project, except for one accident scenario related to shipping during periods of ice break-up and ice formation, increased total shipping via Milne Port, and use of some larger vessel classes. This could result in changes to the effects predictions for a major diesel spill along the shipping route. Although the overall consequence and likelihood ratings for this accident scenario have not changed from the Approved Project, shipping during ice formation and break-up and new vessel classes requires further assessment and consideration of the resulting effects on the environment if a spill were to occur. This potential accident scenario is discussed in more detail below.

10.2.3.1 Diesel Spill Along a Shipping Route

The Phase 2 Proposal will involve an extension of the ore shipping season into times of ice formation and break-up. As such, updated fuel spill modelling was conducted that considers the consequences of a fuel spill from an ore carrier during this period (Fuel Spill Modelling Report, TSD 19). Fuel tankers will continue to deliver fuel to Milne Port during the open water season only, and therefore this assessment focuses on the expanded ore shipping season. A worst-case spill from a fuel tanker during the summer season was considered in detail for the northern shipping route in the Approved Project. Although the Phase 2 Proposal includes the use of larger ore carriers and an increased number of trips, these changes are not considered directly in the fuel spill modelling as this considers the effects of a single worst-case spill, and how that scenario would affect the environment. The Phase 2 Proposal does not change this worse case assumption. As indicated in the updated risk register, the potential for an accidental spill remains unlikely. However, the consequence would be critical. Spill modelling was updated to understand how the Phase 2 Proposal may alter the environmental effects in the event of a spill.

Spill modelling is a tool used for planning emergency response should a large spill occur due to a shipping incident. It is important that the modelling effort be based on realistic and credible events. To this end, regular workshops have been held with representatives of Transport Canada, Canadian Coast Guard, and Environment and Climate Change Canada so that modelling efforts are focused, credible spill scenarios are considered, and adequate responses measures are incorporated in response plans.

The scenarios modelled as part of the fuel spill modelling assessment conducted to support the Phase 2 Proposal considered two spill-in-ice scenarios: near the times of break-up (mid-July) and freeze-up (mid-October). Both scenarios consider a hypothetical release of 1 ML of intermediate fuel oil (IFO) from an ore carrier. Spill probability distributions were developed to indicate geographical regions which might be affected as a result of a spill (e.g., Pond Inlet, Eclipse Sound, Navy Board Inlet and Milne Inlet), as well as how likely and how soon spilled oil might reach these shorelines (TSD 19). The spill modelling scenarios assumed no intervention, response or containment efforts, while in reality, should a spill occur, response measures would be implemented (TSD 19). Baffinland's SSRP provides detailed guidance on the actions and reporting requirements should a fuel spill from Project shipping operations occur.

The results of the modelling show that the presence of ice would generally slow the oil's path to shore as compared to an ice-free scenario. Effectively, oil becomes trapped by the ice. As the amount of ice present at the time of a spill increases, the likelihood that the oil will reach shore decreases. The presence of ice does not alter the shore areas that the oil may eventually reach.

10.2.3.2 Effects Assessment

The effects assessed in the Approved Project would be applicable should a major diesel spill along a shipping route occur. The Phase 2 Proposal includes shipping of ore during ice formation and break-up, and should a spill occur during either of these periods, the results of the spill modelling indicate that the oil would take longer to reach shorelines, but if unmitigated, the same shoreline areas would eventually be reached. Accordingly, the environmental effects of a spill in ice conditions would be no greater than, and often less than, those described in the Approved Project, and therefore the conclusions presented in the Approved Project remain unchanged for Phase 2 Proposal. As described for the Approved Project the environmental effects of a major diesel spill along a shipping route could include changes to or loss of habitat, changes to or loss of food sources, or direct health effects to marine biota, including seabirds, fish, and marine mammals.

The effect of ice for the mid-October fuel spill scenarios is to keep the fuel offshore and delay any drift to one of the shorelines and in practice, effectively trap the fuel in the ice as it freezes. The spill trajectories spend increasingly less time in ice of lesser concentrations as the freeze-up progresses. Unlike in mid-July, when trajectories eventually reach shore, for the freeze-up in October there can be numerous days where ice conditions prevent the spill from reaching shore; and with the onset of winter, the fuel is trapped in the ice. The number of trajectories reaching shore decreases steadily as the freeze-up progresses. At the beginning of the modelled freeze-up on 5 October all but one (in 2,003) of the simulations reaches shore. By 25 October the converse is true: just one of the simulations (in 2,011) reaches shore.

10.3 Effects of the Environment on the Project

10.3.1 Background

Potential effects of the environment on the Phase 2 Proposal may result from environmental factors such as geohazards, severe weather events, and global climate change. These factors are further assessed in TSD 06 – Climate Change, and TSD 08 – Landforms, Soils and Permafrost. A detailed assessment was presented in Volume 9, Section 2 of both the FEIS (Baffinland 2012) and the FEIS Addendum (Baffinland 2013). This previous assessment considered all facilities at the Mine Site, Milne Port, Steensby Port and the South Railway. With Phase 2, the construction and operation of the North Railway, the expansion of the Milne Port PDA and construction of the ore dock No. 2 are the only added components.

10.3.2 Potential Effects and Proposed Mitigation

Table 10.3 presents the interactions between the added Phase 2 Proposal components and environmental factors that may have an effect on these components. The added components are mainly the North Railway

Table 10.3 Environmental Factors Identified to Assess the Effects of the Environment on the Project

Category	Environmental Factors	Milne Port	Mine Site	Transportation Corridor	Marine Shipping
Geo-hazards	Ground Stability	✓	✓	✓	
	Slope Stability			✓	
	Seismic Events	✓		✓	
Extreme Weather Events	Extreme Temperatures				✓
	Extreme Precipitation and Flooding	✓	✓	✓	
	High Winds and Waves	✓			✓

Table 10.3 Environmental Factors Identified to Assess the Effects of the Environment on the Project

Category	Environmental Factors	Milne Port	Mine Site	Transportation Corridor	Marine Shipping
	Storm Surges	✓			✓
	Severe Fog or White-Outs	✓			✓
Global Climate Change	Increasing Temperatures			✓	
	Reduced Sea Ice				✓
	Sea Level Changes	✓			
	Increasing Precipitation	✓			
	Increasing Active Layer Thickness	✓		✓	

The effects of the environment on the added Phase 2 Proposal have largely been addressed in the assessment (e.g., geohazards and global climate change). Extreme weather events have been discussed in the FEIS, Volume 9, Section 2.

Geohazards, such as slope instability and ground instability related to permafrost thaw and erosion, and in the context of climate change, are assessed in TSD 08 and TSD 06. As described in TSD 08, adverse residual effects of geohazards on landforms, soil and permafrost are predicted to remain not significant for the Phase 2 Proposal. The Project is located in an area of moderate seismicity (FEIS Volume 9, Table 9-2.1; Baffinland 2012). However, concerns are mitigated through the adoption of appropriate engineering design criteria to address seismic risks. The effects of geohazards on the Project are therefore not significant.

The potential effects of extreme weather events and proposed mitigation measures remain unchanged from what was presented in the Approved Project. Baffinland now has operational experience as well as operational emergency response plans to respond to extreme weather events.

Other potential effects of the environment that may affect the Phase 2 Proposal are those related to climate change. The availability of updated global climate models prompted a review of the latest (2014) climate change models and literature to establish the potential effects of climate change on the environment in which the Project is set, and consequent effects on the Project. The predicted changes to meteorological parameters (i.e., temperature, precipitation and runoff); sea levels and sea ice cover, and permafrost; and how these changes may affect various environmental components, are described in TSD 06 and TSD 08. In consideration of planned mitigation, the effects of the Phase 2 Proposal on climate change are rated not significant.

10.4 Environmental Mitigation and Monitoring Required for Phase 2

Baffinland developed a number of Environmental Mitigation and Monitoring Plans (EMMPs) for the Approved Project to demonstrate that proposed mitigation is being implemented and monitored, and to provide confidence in the FEIS predictions, especially where predictive certainty was moderate or low for some VECs and VSECs. The EMMP annual reports document where environmental effects are occurring, and the magnitude of these effects, and compare to FEIS predictions, supporting Baffinland's assessment and data collection methods. Overall, the EMMPs developed for the Approved Project have generally supported conclusions of the FEIS. Some monitoring is long-term and is expected to require additional years of data to make trends or Project effects more apparent, especially in environments with high year to year and spatial variability (e.g., marine benthic environment), or where VSECs may be influenced by outside factors (e.g., Population Demographics). The results of monitoring since 2012 have been incorporated in the FEIS Addendum for Phase 2, providing greater certainty and confidence in our effects predictions.

As noted in Section 5, most of the EMMPs are in fact integrated into the various EMPs and SEMP. Section 9.3 of the Amended EIS Guidelines outlines the requirements for monitoring and mitigation within the biophysical environmental and socio-economic management plans prescribed in Sections 9.4 and 9.5 of the Amended EIS Guidelines (NIRB 2015). Current monitoring and mitigation plans (or management plans) listed in Section 5.1. These plans have been reviewed to determine updates that may be required for the Phase 2 Proposal, as well as any new plans that may be required.

10.4.1 Biophysical Environmental Management Plans

Baffinland established a number of biophysical EMPs as part of the original environmental review process (Baffinland 2012). A number of the biophysical EMPs were subsequently prescribed in the Type A Water Licence (NWB 2014). These plans are part of Baffinland's operational environmental management system.

Table 10.4 lists the NIRB-mandated biophysical management plans, identifies the applicable requirement of the Type A Water Licence (if any), identifies the corresponding current Baffinland plan, and identifies the required updates for the Phase 2 Proposal, if required.

Table 10.4 Biophysical Environmental Management Plans

Document No.	Plan	Updates Required for the Phase 2 Proposal
BAF-PH1-300-P16-0002	Snow Management Plan	No update required.
BAF-PH1-830-P16-0001	Surface Water Sampling Program - Quality Assurance and Quality Control Plan	No update required.
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan	Review management plan to determined whether changes to air quality monitoring stations is required.
BAF-PH1-830-P16-0004)	Borrow Pits and Quarry Management Plan	Update to reflect the new list of quarries and new figure.
BAF-PH1-830-P16-0008	Environmental Protection Plan	
BAF-PH1-830-P16-0010	Fresh Water, Sewage and Wastewater Management Plan	Update to reflect changes in water management associated with ore and product stockpiles.
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan	Update to reflect new quantities.
BAF-PH1-830-P16-0013	Milne Port Oil Pollution Emergency Plan (OPEP)	Update minor wording; no substantive updates required.
BAF-PH1-830-P16-0023	Roads Management Plan	Update required to address interactions between the road and the North Railway.
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan	Update required, in consultation with the MEWG.
BAF-PH1-830-P16-0026	Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan	Update to reflect changes in water management associated with ore and product stockpiles. New Offsetting Plans have been developed for the serious harm to fish in the freshwater environment (TSD 15) and the marine environment (TSD 23).
BAF-PH1-830-P16-0027	Terrestrial Environmental Management and Monitoring Plan	Update required, in consultation with the TEWG.
BAF-PH1-830-P16-0028	Waste Management Plan	Update to incorporate new landfill proposed at Milne Port.
BAF-PH1-830-P16-0029	Phase 1 Waste Rock Management Plan	Update the waste rock production schedule.

Table 10.4 Biophysical Environmental Management Plans

Document No.	Plan	Updates Required for the Phase 2 Proposal
BAF-PH1-830-P16-0031	Life of Mine Waste Rock Management Plan	No update required.
BAF-PH1-830-P16-0036	Spill Contingency Plan	Add the location and details of new fuel storage and new spill response equipment.
BAF-PH1-830-P16-0039	Aquatic Effects Monitoring Plan	No update required.
BAF-PH1-830-P16-0042	Spill at Sea Response Plan	Update to address larger ships and shipping in ice.
BAF-PH1-830-P16-0046	Marine Environmental Effects Monitoring Plan	
BAF-PH1-830-P16-0047	MMER Emergency Response Plan	
BAF-PH1-840-P16-0002	Emergency Response Plan	New risks to be considered in this overall ERP: collisions along road/rail, stranding due to rail accident.
SD-STD-002	Standard for Hazard Identification and Risk Assessment	No update required.
X	Explosives Management Plan	No update required.
11-030-RP-OP-2000-002	Railway Management Plan	Update required to incorporate North Railway.
11030-RP-OP-2000-001	Railway Emergency Plan	Update required to incorporate North Railway.
X	Blasting Management Plan (see Note)	Water Licence Part E, Item 24 states: <i>The Licensee shall submit... copies of separate Blasting Management Plans developed for the mining operation, tunnelling of the railway and blasting near water bodies...</i> A new contractor Blasting Management Plan will be developed if there will be blasting near water bodies.

Individual site-specific quarry management plans are listed in Table 5.1. Any new borrow sources required for the Phase 2 Proposal will require their own site-specific quarry management plan.

Most of the EMPs listed will require only modest updates, if any, in terms of incorporating the scope of the Phase 2 Proposal. Given that each of these are operational plans registered under Baffinland's Environmental Management System, updates will be prepared prior to implementation. Copies of the current versions of (most of) these plans are available on Baffinland's document portal at: <http://www.baffinland.com/news-reports/shareddocuments/?cat=9&subcat=7&archive=1&lang=en>.

Two new biophysical EMPs are required for the Phase 2 Proposal:

- **Offsetting Plan for the Serious Harm to Fish - Railway** - Construction of the North Railway will involve the installation of new watercourse crossings, and stream diversions that result from rock cuts along the alignment which will result in serious harm to fish and fish habitat.
- **Offsetting Plan for the Serious Harm to Fish - Second Ore Dock** - Construction of the second ore dock at Milne Port will require a conceptual offsetting plan to be submitted with this Addendum to the Approved Project.

The freshwater and marine offsetting plans are presented as TSD 15 and TSD 23, respectively.

10.4.2 Socio-economic Management Plans

Baffinland has established several socio-economic management plans in accordance with the Guidelines (NIRB 2015). Table 10.5 lists Baffinland's socio-economic management plans and identifies the required updates for the Phase 2 Proposal, if required.

Table 10.5 Socio-economic Management Plans

Document No.	Plan	Required Updates for the Phase 2 Proposal
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	Minor update required.
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	No update required. Update in September 2016 to direct the Company's consultation activities related to the Phase 2 Proposal.
BAF-PH1-830-P16-0041	Polar Bear Safety Plan	No update required. Plan developed in response to QIA Directive 2013-1-17-2.
H337697-0000-01-126-0002	Health and Safety Management Plan	No update required.
SD-SEMP-003	Human Resources Management Plan	No update required.
na	Inuit Procurement and Contracting Strategy (see Note)	Not a plan/strategy required by the EIS Guidelines. This Strategy has been developed jointly with the QIA for immediate implementation also considering the Phase 2 Proposal.
na	Inuit Human Resources Strategy (see Note)	Not a plan/strategy required by the EIS Guidelines. This Strategy has been developed jointly with the QIA for immediate implementation also considering the Phase 2 Proposal.

NOTE:

Baffinland has jointly developed with the QIA two strategic documents that complement its existing socio-economic management plans: Inuit Procurement and Contracting Strategy and Inuit Human Resources Strategy

Most of the plans listed will not require updates, in terms of incorporating the scope of the Phase 2 Proposal. Given that each of these are operational plans registered under Baffinland's Environmental Management System, any updates will be prepared prior to implementation.

10.5 Residual Environmental Effects

The detailed assessments of the Project residual effects are presented in the various TSDs. The findings of these assessments are summarized in Table 10.6 below. Section 90 of NuPPA lists factors to be considered in determining the significance of impacts. Certain factors, listed below, are the same for all VECs and are unchanged from the Approved Project, and the remaining factors are included in Table 10.6.

- The ecosystematic sensitivity of the area;
- The historical, cultural, and archaeological significance of the area; and
- The size of the human and the animal populations likely to be affected by the impacts.

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Atmospheric Environment VECs							
Meteorology and Climate (including Climate Change)	Greenhouse gases (GHGs): - Carbon dioxide (CO₂) - Methane (CH₄) - Nitrous oxide (N₂O)	Increase in GHG emissions	Review, update, and implement the Climate Change Strategy as necessary to incorporate GHG reduction, climate change adaptation, and monitoring and collaborative research initiatives specific to the Phase 2 Proposal.	- Releases of GHGs from the Project are small in comparison to Nunavut and Canadian totals and will partially mitigate current emissions by use of rail over road transport of ore. GHG releases will not have a measurable effect on global climate change. - Overall, the residual effect of the Project on climate change is predicted to be: - Adverse in direction (the Project will result in GHG emissions); - Low in magnitude (not expected to contribute notably to Canadian or global GHG totals or global climate change); - Geographically widespread (GHGs cause a global effect); - Continuous in frequency; and - Irreversible (following cessation of Project GHG releasing activities the GHGs will remain in the atmosphere for 20 years or more). - There is a high probability of the residual effect occurring.	Not significant	Not significant	Not significant
Air Quality	Criteria air contaminants (CACs): - Total suspended particulate (TSP) - Sulphur dioxide (SO₂) - Nitrogen dioxide (NO₂) - Carbon monoxide (CO) - Sulphur and nitrogen deposition and potential acid input (PAI) - Particulate matter <2.5 µm (PM_{2.5}) - Particulate matter <10 µm (PM₁₀) - Fugitive dust and metal concentrations and deposition	Increase in CACs	Review, update and implement the following plans, targeting dust suppression along the Northern Transportation Corridor: - Environmental Protection Plan; - Air Quality and Noise Abatement Management Plan; - Dust Management Protocol in the Roads Management Plan; and - the dust fall monitoring program outlined in the Terrestrial Environment Mitigation and Monitoring Plan.	Concentrations of SO ₂ , NO ₂ , and CO are not predicted to exceed thresholds outside of the PDAs. Exceedances of TSP are predicted under certain conditions. However, no exceedances are predicted at the HTO cabin near Milne Port, and at the HTO cabin on the west bank of Camp Lake. Once the new rail road is operational and ore is transported by rail instead of truck, dust emissions along the Northern Transportation Corridor will be reduced from current levels associated with ERP operations. Overall, the residual effect of the Project on air quality are predicted to be: - Adverse in direction, though positive along the transportation corridor once rail is operational; - Of a magnitude that exceeds thresholds for certain worst-case modeled scenarios, but with additional mitigation exceedances are not anticipated at sensitive receptors; - Geographically confined to the LSA; - Infrequent; and - Reversible with the cessation of Project activities. There is a high probability of the residual effect occurring. In consideration of the information available and the results of ongoing monitoring activities related to air quality, there is a moderate level of confidence in the residual effects predictions for air quality.	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Noise and Vibration	Noise and vibration levels	• Increase in noise levels • The potential effects of increased vibration levels were assessed for the Approved Project (Baffinland, 2012), and were determined to be not significant. Vibration from the Phase 2 Proposal is expected to be very similar to that of the Approved Project. Therefore, vibration was treated as a subject of note for the Phase 2 Proposal.	• Review, update, and implement the Environmental Protection Plan and the Air Quality and Noise Abatement Management Plan. • Implement key mitigation measures outlined under the AER Directive 038 (AEUB 2007), such as: ○ Fitting internal combustion engines with appropriate muffler systems; ○ Using acoustical screening from existing on-site buildings, where appropriate, to shield dwellings from construction equipment noise; ○ Taking advantage of local topography to screen noise emissions, where possible; and ○ Enclosing Milne Port crushing/screening plant in a building.	Overall, the residual effect of the Project on noise and vibration is predicted to be: • Adverse in direction; • Of a magnitude that exceeds thresholds for certain worst-case modelled scenarios outside of the Mine Site and Milne Port PDAs and at times at the HTO Cabin east of Milne Port; • Geographically confined to the LSA; • Of a duration that extends throughout the life of the Project • Infrequent; and • Reversible with the cessation of Project activities. There is a high probability of the residual effect occurring. In consideration of the information available and the results of ongoing monitoring activities related to noise, there is a high level of confidence in the residual effects predictions for noise and vibration.	Not significant	Not significant	No transboundary effects
Terrestrial Environment VECs							
Landforms, Soils, and Permafrost	• Landforms: ○ Glaciofluvial deposits ○ Eskers ○ Drumlins ○ Bedrock outcrops (cliffs) • Geochemistry • Paleontology	• Effects on unique or valuable landforms • Increase in geohazard risks • Increase in geochemical risks • Effects on paleontological resources	• Review, update and implement the following plans: ○ Environmental Protection Plan; ○ Borrow Pit and Quarry Management Plan; ○ Railway Management Plan; ○ Railway Emergency Plan; and ○ Spill Contingency and Emergency Response Plan. • Thermal insulation may be used for the proposed Milne Port buildings, and adfreeze piles may be used for deep foundations.	The railway embankment will cross glaciofluvial deposits and a large esker. However, these landforms are not ecologically unique given the abundance of other similar glaciofluvial deposits (including eskers) in the RSA. The rail construction will also remove existing bedrock outcrop. However, bedrock outcrops that will be affected are not currently used by cliff-nesting raptors. The potential for ML/ARD occurring from quarrying and rock cuts is considered unlikely as most of the affected rock is sedimentary. Granitic rocks present in the area are predicted to be low potential for ML/ARD. Overall, the residual effects of the Project on landforms, soils, and permafrost are predicted to be: • Adverse in direction; • Low in magnitude; • Geographically confined to the LSA; • Permanent in duration; • Infrequent; and • Irreversible. The probability of the residual effect occurring is high for: • A residual change in the abundance and distribution of unique or valuable landforms; and • A residual ground disturbance of paleontological resources. The probability of the residual effect occurring is low for: • Residual effects related to geohazard risks (i.e., thaw settlement at Milne Port second ore dock, Milne Port infrastructure on land, and along the proposed North Railway); and	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				- A residual increase in geochemical risks (i.e., exposure of potentially ML/ARD rock surfaces to the elements [along the North Railway]) have a low probability of occurring. In consideration of the information available and the results of ongoing monitoring related to landforms, soils, and permafrost, there is: - A moderate level of confidence in the residual effects predictions related to thaw settlement along the proposed North Railway and exposure of potentially ML/ARD rock surfaces to the elements; and - A high level of confidence in the residual effects predictions for all other residual effects on landforms, soils, and permafrost.			
Vegetation	- Vegetation abundance and diversity - Vegetation health - Culturally valued vegetation	- Change in vegetation abundance and diversity - Change in vegetation health - Any Project-related effects to culturally valued vegetation will be negligible since blueberry abundance within the RSA is very low and was previously assessed for the Approved Project as being not significant at the RSA scale with a high confidence. No effect assessment for culturally valued vegetation was completed for the Phase 2 Proposal.	- Review, update and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan. - Take measures to keep equipment brought to the site clean of soils that could contain plant seeds that do not currently occur within the RSA. - Allow natural regeneration of disturbed areas.	The Phase 2 Proposal has the potential to affect vegetation abundance and diversity in the PDA, as construction of the Northern Transportation Corridor and expansion at the Milne Inlet Port will remove approximately 14 km² of terrestrial habitat. Changes in vegetation health resulting from TSP deposition and atmospheric emissions outside the PDA were predicted to be negligible from natural variation. Vegetated habitat has the potential to be exposed to some level of dust deposition generated at Milne Inlet, Tote Road, the Mine Site, and along the North Railway. Although all vegetation classes considered sensitive to dust deposition and may be affected by annual TSP deposition, most of the habitats will remain intact within the RSA. Overall, the residual effects of the Project on vegetation are predicted to be: - Adverse in direction; - Of a magnitude that exceeds thresholds for certain dust deposition parameters within the PDA; - Geographically confined primarily to the PDA (as well as adjacent to the PDA for dust deposition); - Infrequent; - Of a duration that lasts for the life of the Project; and - Reversible with the cessation of Project activities and with reclamation. A residual change in vegetation abundance and diversity has a high probability of occurring. The probability of the residual effect occurring is low for a residual change in vegetation health due to TSP and a residual change in vegetation health due to atmospheric emissions. In consideration of the information available and the results of ongoing monitoring activities related to vegetation, there is: - A high level of confidence in the residual effects predictions related to a change in vegetation abundance and diversity; and	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				A moderate level of confidence in the residual effects predictions related to changes in vegetation health due to TSP and to atmospheric emissions.			
Birds and Bird Habitat	- Red-throated loon - Snow goose - Common eider - King eider - Thick-billed murre - Lapland longspur - Harlequin duck - Peregrine falcon - Red knot - Buff-breasted sandpiper - Red-necked phalarope - Ivory gull - Ross's gull - Short-eared owl	- Effects on habitat - Effects on risk of mortality - Effects on health	- Review, update, and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan. - Make raptor nest sites temporarily inaccessible to breeding birds during the nesting seasons potentially affected by construction.	Overall, the residual effect of the Project on birds and bird habitat are predicted to be: - Adverse in direction; - Low in magnitude; - Geographically confined to the PDA in general, but extending to the LSA for indirect effects on habitat quality or availability; - In a range from infrequent (for occurrences of bird injury and mortality), to frequent (for sensory disturbance), to continuous (for habitat loss); - Of a duration that last for the life of the Project; and - Reversible with the cessation of Project activities. The probability of the residual effects occurring is considered low for residual effects on bird health and moderate for all other residual effects on birds and bird habitat. In consideration of the information available and the results of ongoing monitoring activities related to birds and bird habitat, there is a high level of confidence in the residual effects predictions for birds and bird habitat.	Not significant	Not significant	Not significant
Terrestrial Wildlife and Wildlife Habitat	- Caribou - Wolf	- Effects on habitat - Effects on movement - Effects on risk of mortality - Effects on health	- Review, update and implement the following plans: - Environmental Protection Plan; - Terrestrial Environment Mitigation and Monitoring Plan; - Roads Management Plan; - Railway Management Plan; and - Railway Emergency Plan. - Implement the Caribou Protection Measures developed collaboratively with the QIA. - Continue engagement with stakeholders and the Terrestrial Environment Working Group.	Phase 2 Proposal components and activities at the Mine Site, the Tote Road and North Railway, and Milne Port have the potential to interact with terrestrial wildlife and habitat through collisions; increased harvesting; direct loss or alteration of terrestrial wildlife habitat; barriers to wildlife movement within or between habitats; and sensory disturbances. Overall, the residual effects of the Project on terrestrial wildlife and wildlife habitat are predicted to be: - Adverse in direction; - Generally low in magnitude given planned mitigation, but moderate in magnitude with respect to potentially reduced caribou habitat effectiveness during the winter season; - Generally geographically confined to the PDA, but extending outside of the PDA (within a 14 km ZOI) for potential residual effects on caribou habitat; - In a range from infrequent (for occurrences of wildlife injury and mortality), to frequent (for sensory disturbance), to continuous (for habitat loss and barriers to movement) for the life of the Project; - Of a duration that lasts for the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities, except in the case of the residual change in risk of caribou mortality associated with improved harvester access and/or knowledge of the area, which may persist indefinitely.	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				There is a high probability that the Project will result in residual changes in caribou movement and caribou mortality risk. The probability of the residual effects occurring is moderate for residual changes in caribou and wolf habitat and is low for residual changes in caribou health. In consideration of the information available and the results of ongoing monitoring related to terrestrial wildlife and wildlife habitat, there is: • A moderate level of confidence in the residual effects predictions related to caribou habitat, caribou movement, caribou health, and wolf habitat; and • A high level of confidence in the residual effects predictions related to caribou mortality risk.			
Freshwater Aquatic Environment VECs							
Freshwater Quantity and Quality	Freshwater quantity and quality	• Effects on water quantity • Effects on water quality	Review, update and implement the following plans: • Environmental Protection Plan; • Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan; • Fresh Water Supply, Sewage, and Wastewater Management Plan; and • Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including: ○ Aquatic Effects Monitoring Plan; ○ Surface Water Sampling Program – Quality Assurance and Quality Control Plan; ○ Blasting Management Plan; and ○ Quarry Management Plans.	As a result of the Phase 2 Proposal, freshwater quantity and quality may change due to changes in sedimentation rates, hydrology, metal concentrations; and water flows via withdrawals and diversions. • Overall, the residual effect of the Project on freshwater quantity and quality is predicted to be: • Adverse in direction, with the exception of a positive direction on water quality at the Mine Site due to changes associated with secondary ore processing; • Low in magnitude given planned mitigation and the small footprint affected relative to the watershed scale in the region; • Geographically confined to the LSA; • Infrequent effects are associated with the water withdrawals and continuous effects are associated with the stream diversions and water/sediment quantity and quality alterations; • Of a duration that will occur throughout the life of the Project; and • Reversible with additional mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to freshwater quantity and quality, there is a high level of confidence in the residual effects predictions for freshwater quantity and quality.	Not significant	Not significant	No transboundary effects
Freshwater Biota and Habitat	Arctic char	• Effects on health and condition of Arctic char • Effects on habitat of Arctic char	• Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013, 2016). • Obtain Project-specific <i>Fisheries Act</i> Authorization(s) from DFO, where required for water crossings and other in-water works, and comply with associated terms and conditions. • Develop an Offsetting Plan which will be submitted to DFO for review and approval as part of the	As a result of the Phase 2 Proposal, Arctic char habitat loss/alteration due to construction of North Railway is expected. In-water infrastructures (i.e., bridge footings, culverts, diversion activities) may negatively affect fish passage. Water withdrawals for dust suppression may reduce shoreline habitat, and cause stranding or impingement on the water intakes. The water and sediment quality and quantity at the Mine Site and along	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
		Effects on risk of mortality of Arctic char	application for <i>Fisheries Act</i> Authorization, to offset the serious harm to fish associated with construction of the North Rail and construction of the second ore dock at Milne Port.	the Northern Transportation Corridor may be negatively affected by sediment inputs from ore production, transport, and related activities. Overall, the residual effects of the Project on freshwater biota and habitat are predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation and the small footprint effected relative to available habitat in the region; - Geographically confined to the LSA; - Infrequent effects are associated with the water withdrawals and continuous effects are associated with the habitat and water/sediment quantity and quality alterations; - Of a duration that will occur throughout the life of the Project; and - Reversible with mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to freshwater biota and habitat, there is a high level of confidence in the residual effects predictions.			
Marine Environment VECs							
Marine Ice, Water, and Sediment Quality	- Marine ice - Marine water quality - Marine sediment quality	- Effects on marine ice - Effects on marine water quality - Effects on marine sediment quality	Review and update the following plans: - Environmental Protection Plan; - Marine Environmental Effects Monitoring Plan; - Shipping and Marine Wildlife Management Plan; - Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan; - Fresh Water Supply, Sewage, and Wastewater Management Plan; - Emergency Response Plan; - Spill Contingency Plan; - Oil Pollution Emergency Plan; - Spill at Sea Response Plan; and - Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including: - Aquatic Effects Monitoring Plan; and - Surface Water Sampling Program – Quality Assurance and Quality Control Plan. - Manage runoff, sewage, and wastewater discharges to comply with the effluent quality discharge limits specified in Type A Water Licence.	Phase 2 Proposal components and activities at Milne Port and the Northern shipping route have the potential to interact with marine ice, water, and sediment quality through the construction and removal of the ore dock and other marine facilities; vessel traffic; ballast water discharge; wastewater and site water discharge and; ore dust from the stockpiles and ship loading. Overall, the residual effects of the Project on marine ice, water, and sediment quality are predicted to be: - Adverse in direction; - Low in magnitude that is low given planned mitigation; - Geographically confined to the LSA but extending to the RSA for a residual increase in TSS and metals in water as well as a residual increase in metals and change in physical composition in sediments due to dispersion and deposition of dust; - Frequent; - Of a duration that lasts for the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				ice, water, and sediment quality, there is a high level of confidence in the residual effects predictions.			
Marine Habitat and Biota	- Marine fish habitat - Arctic char	- Effects on marine fish habitat - Effects on Arctic char health and condition	- Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC. - Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013, 2016). - Obtain Project-specific <i>Fisheries Act</i> Authorization(s) from DFO, where required for in-water works, and comply with associated terms and conditions. - Develop an Offsetting Plan, which will be submitted to DFO for review and approval as part of the application for <i>Fisheries Act</i> Authorization, to offset the serious harm to fish associated with construction of the second ore dock at Milne Port. TSD 23 outlines a conceptual Marine Offsetting Plan. - Continue to implement existing plan for Aquatic Invasive Species Monitoring of Milne Inlet Marine Ecosystem.	Phase 2 Proposal components and activities at Milne Port and Marine Shipping along the Northern shipping route have the potential to interact with marine biota and habitat through habitat loss/alteration, acoustic disturbances, and invasive species introduction. Overall, the residual effect of the Project on marine habitat and biota is predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation; - Of a duration that ranges from during construction (e.g., sediment resuspension) to extending beyond the life of the Project (e.g., introduction of aquatic invasive species); - Geographically confined to the LSA, apart from aquatic invasive species introduction; - Continuous, apart from sediment resuspension concerns during construction; and - Reversible with additional mitigation and the cessation of Project activities, apart from aquatic invasive species introduction. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine habitat and biota, there is a high level of confidence in the residual effects predictions.	Not significant	Not significant	Not significant
Marine Mammals	- Ringed seal - Walrus - Beluga whale - Narwhal - Bowhead whale - Polar bear	- Change in habitat - Acoustic disturbance effects - Hearing impairment effects - Auditory masking effects - Effects on risk of mortality	- Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC. - Review and update the following additional plans: - Shipping and Marine Wildlife Management Plan; - Polar Bear Safety Plan; and - Biophysical Environmental Effects Monitoring Framework, Appendix 4 (Candidate Environmental Effects Monitoring Studies Marine Mammal). - Implement a ramp-up procedure for pile driving activities during construction and install a bubble curtain around the wetted pile to dampen sound transmission through water during active pile driving. - Engage a qualified and experienced Marine Mammal Observer (MMO) to undertake marine mammal monitoring, and communicate all marine mammal sightings to the piling contractor, during all pile driving activities. - Reduce vessel speeds when transiting along the established shipping corridor and operating in Milne Port.	Phase 2 Proposal components and activities at Milne Port and the Northern shipping route have the potential to interact with marine mammal populations through ship strikes, acoustic disturbances, contaminant loading, and habitat loss. Overall, the residual effects of the Project on marine mammals are predicted to be: - Adverse in direction; - Low in magnitude given planned mitigation; - Geographically confined to the LSA; - Infrequent; - Of a duration that extends throughout the life of the Project; and - Reversible with additional mitigation and the cessation of Project activities. In consideration of the information available and the results of ongoing monitoring related to marine mammals, there is: - A moderate to high level of confidence in the residual effects predictions related to a change in habitat; and	Not significant	Not significant	Not significant

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				A moderate level of confidence in the residual effects predictions for all other residual effects on marine mammals. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to marine mammals, there is a high level of confidence in the residual effects predictions.			
Human Environment VSECs							
Population Demographics	Demographic stability	- Change in in-migration of non-Inuit Project employees into the North Baffin LSA - Change in out-migration of Inuit residents from the North Baffin LSA	Direct hire from within and outside the LSA.	While Inuit employment levels have the potential to increase over time, the overall magnitude of Inuit out-migration is not expected to change. Assessment outcomes for population demographics therefore remain the same as for the Approved Project. Potential residual effects arising from in-migration and out-migration are not expected to be sufficient to cause adverse effects on demographic stability of the affected communities. Overall, the residual effects of the Project on population demographics are predicted to be: - Adverse in direction; - Low to moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent in frequency; - Long-term in duration; and - Reversible. There is a high probability of the residual effects occurring. In consideration of the information available and the results of ongoing monitoring related to community population demographics, there is: - A moderate level of confidence in the residual effects predictions related to the out-migration of Inuit residents from the North Baffin LSA; and - A high level of confidence in the residual effects predictions related to the in-migration of non-Inuit Project employees into the North Baffin LSA.	Not significant	Not significant	No transboundary effects
Education and Training	- Life skills - Education and skills	- Improvement of life skills among LSA residents - Change in incentives related to school attendance and success - Change in opportunities to gain skills	- Review, update and implement Human Resources Plan. - Implement IIBA initiatives, and the Q-STEP training program	In general, the Phase 2 Proposal is expected to result in positive effects on education and training. These positive effects are anticipated to arise from access to industrial work supported by pre-employment preparation and on-the-job training. Overall, the residual effects of the Project on education and training are predicted to be: - Positive to mostly positive in direction; - Moderate to high in magnitude; - Occurring within point-of-hire communities; - Continuous in frequency; - Of a duration that extends throughout the life of the Project to long-term in duration; and	Significant (positive)	Positive cumulative effects	Positive transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				- Non-reversible or spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to education and training, there is: - A moderate level of confidence in the residual effects predictions related to improved life skills among LSA residents; and - A high level of confidence in the residual effects predictions related to incentives for school attendance and success and opportunities to gain skills.			
Livelihood and Employment	- Wage employment - Job progression and career advancement	- Creation of jobs in the LSA - Change in employment of LSA residents - New career paths	- Review, update and implement Human Resources Plan; - Implement IIBA initiatives, and the Q-STEP training program; and - Designate all LSA communities as points-of-hire.	In general, the Phase 2 Proposal is expected to result in positive effects on livelihood and employment. These positive effects are anticipated to arise from new employment opportunities, local hiring commitments, and career progression opportunities provided by the Project. Overall, the residual effects of the Project on livelihood and employment are predicted to be: - Positive in direction; - Moderate to high in magnitude; - Occurring within point-of-hire communities; - Continuous in frequency; - Medium-term to long-term in duration; and - Spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to livelihood and employment, there is: - A moderate level of confidence in the residual effects predictions related to employment of LSA residents and new career paths; and - A high level of confidence in the residual effects predictions related to creation of jobs in the LSA.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Economic Development and Self-reliance	- Land - People - Community economies - Territorial economy	Specific residual effects were not identified or assessed for this VSEC. Rather, overall assessments of the key indicators 'land', 'people', 'community economy', and 'territorial economy' were conducted and conclusions were drawn based on this integrated analysis.	- Review, update and implement Human Resources Plan. - Implement IIBA initiatives, and the Q-STEP training program. - Designate all LSA communities as points-of-hire.	No new residual effects will result from the Phase 2 Proposal, as no new impact pathways for economic development and self-reliance will be created. The Phase 2 Proposal will not introduce any new activities that change the previously assessed effects to economic development and self-reliance, although positive effects in some areas may be enhanced. Similar to previous assessments of the Approved Project, direct and indirect economic expansion associated with the Project will create new opportunities for employment and business across the RSA, and particularly within the LSA. The Project will also enhance labour force capacity and increase Inuit business capacity.	Significant (positive)	Positive cumulative effects	Positive transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
				Residual effects were not characterized for this VSEC because the assessment was integrative in nature, relying primarily on the conclusions of other VEC and VSEC residual effect assessments to understand the Phase 2 Proposal’s interactions on economic development and self-reliance. The overall direction of the Phase 2 Proposal’s effects on the economic development and self-reliance VSEC has been assessed, with a high level of confidence, to be positive.			
Human Health and Well-being	- Well-being of children - Substance abuse - Community social stability	- Changes in parenting - Change in household income and food security - Change in transport of substances through Project sites - Change in affordability of substances - Change in attitudes toward substances and addictions - Effects of absence from the community during work rotation	- Continue to implement a no drugs/no alcohol policy on site with baggage searches for all employees and contractors arriving at site, access to an EFAP for workers and their family members, and contributions to the INPK community wellness fund. - Implement IIBA initiatives.	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced. The Phase 2 Proposal is predicted to have a positive effect on parents gaining employment at the Project and an overall benefit by most children from the improved well-being their parents gain from having a good job, reduced financial stresses in the family, and improved food security. For a minority of children, challenges related to parental absence, the transition between parental comings and goings, changing parental expectations, and the response of parents to the stresses and concerns brought about by fly-in/fly-out employment are expected to lead to some adverse residual effects. The adverse residual effects of the Project on human health and well-being are predicted to be: - Low to moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent to continuous in frequency; - Medium-term to long-term in duration; and - Spontaneous. The probability of the adverse residual effects occurring is high for: - Residual changes in parenting; and - Residual effects of absence from the community during work rotations The probability of the adverse residual effect occurring is moderate for a residual change in the transport of substances through Project sites. In consideration of the information available and the results of ongoing monitoring related to human health and well-being, there is: - A moderate level of confidence in the adverse residual effects predictions related to changes in parenting; and - A high level of confidence in the adverse residual effects predictions related to the transport of substances through Project sites and absence from the community during work rotations.	Not significant	Not significant	Not significant

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
Community Infrastructure and Public Services	Hamlet staff recruitment and retention in the North Baffin LSA	- Effects on competition for skilled workers - Change in labour force capacity	Monitor employee-specific information (e.g., through surveys, and employment and training records), Project-related community infrastructure use, and government statistics (e.g., on health centre usage).	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced. The Phase 2 Proposal is predicted to have a positive effect on labour force capacity. However, an adverse residual effect on competition for skilled workers is also predicted from the creation of competition with local employers. This adverse residual effect of the Project on community infrastructure and public services is predicted to be: - Moderate in magnitude; - Occurring within point-of-hire communities; - Intermittent in frequency; - Short-term in duration; and - Reversible. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to community infrastructure and public services, there is a high level of confidence in the residual effects predictions.	Not significant (adverse); significant (positive)	Not significant	No transboundary effects
Contracting and Business Opportunities	Business opportunities	- Expansion of market for business services to the Project - Expansion of market for consumer goods and services	Monitor the value of procurement with Inuit-owned businesses and joint ventures, LSA employee payroll amounts, and the number of registered Inuit firms in the LSA.	The nature of the activities associated with the Phase 2 Proposal are such that positive effects associated with the Approved Project will continue to be realized, and possibly enhanced as Baffinland looks to expand its operations (e.g., through additional capital expenditure and contracting opportunities associated with the Phase 2 Proposal) and boost its local contracting efforts. Overall, the residual effects of the Project on contracting and business opportunities are predicted to be: - Positive in direction; - Moderate to high in magnitude; - Occurring within the LSA, RSA, and point-of-hire communities; - Continuous in frequency; - Medium-term in duration; and - Spontaneous. The probability of the residual effects occurring is high. In consideration of the information available and the results of ongoing monitoring related to contracting and business opportunities, there is a high level of confidence in the residual effects predictions.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Culture, Resources, and Land Use	- Cultural resources - Harvesting - Travel and camps	- Effects related to ground disturbance - Effects on caribou harvesting - Effects on marine mammal harvesting - Effects on safe travel within Pond Inlet, Eclipse Sound, Milne	Review, update, and implement Cultural Heritage Resource Protection Plan.	In general, the nature and magnitude of the effects to culture, resources and land use are consistent with the conclusions presented in the Approved Project. The Phase 2 Proposal will result in adverse effects associated with the culture, resource and land use VSEC related to the loss of cultural resources, change in access to or availability of harvesting resources, and change in access to travel corridors and camps. Overall, the residual effects of the Project on culture, resources, and land use are predicted to be:	Not significant	Not significant	No transboundary effects

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
		Inlet during open water • Sensory disturbance at camps • Effects on safe travel inland through Milne Port • Sensory disturbance and effects on safety along the Milne Inlet Tote Road • Effects on difficulty and safety relating to railway crossing		• Adverse in direction; • Low to moderate in magnitude; • Occurring generally within PDA and extending to areas that may experience additional noise and dust; • Infrequent, though in some cases continuous for effects related to access, throughout the life of the Project; and • Reversible in nature with the exception of potential ground disturbance effects on cultural resources. There is generally a high probability of the residual effects occurring, except for: • Residual effects on marine mammal harvesting, which have a moderate probability of occurring; and • Residual effects on caribou harvesting, which have a low probability of occurring. In consideration of the information available and the results of ongoing monitoring related to culture, resources, and land use, there is: • A high level of confidence in the residual effects predictions related to increased ground disturbance, sensory disturbance at camps, and difficulty and safety relating to railway crossing; and • A moderate level of confidence in the residual effects predictions for all other residual effects on culture, resources, and land use.			
Benefits, Royalty, and Taxation	• Benefits, royalties, and taxation	• Change in benefits, royalties, and taxation	• Implement IIBA initiatives.	The Approved Project provides significant positive effects with respect to the benefits generated in Nunavut. The Phase 2 Proposal will provide an incremental increase to these already significant effects.	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Governance and Leadership	• Governance and leadership	• Not applicable (assessed as subject of note)	• Implement IIBA initiatives.	In the FEIS, Governance and Leadership was addressed as a subject of note. The Phase 2 Proposal does not change the effects of the Project on Governance and Leadership. Since the FEIS, Baffinland and the QIA have negotiated an IIBA, a number of initiatives have been launched, and socio-economic monitoring has been ongoing. In line with the FEIS, the Project is considered to have a positive and significant effect on Governance and Leadership.	Significant (positive)	Positive cumulative effects	No transboundary effects
Assessment of Effects of the Environment on the Project and Accidents, Malfunctions, and Unplanned Events							
Effects of the Environment on the Project	• Geo-hazards • Extreme Weather Events • Global Climate Change	• Ground Stability • Slope Stability • Seismic Events • Extreme Temperatures • Extreme Precipitation and Flooding	• Appropriate engineering design	Potential concerns are mitigated through the adoption of appropriate engineering design.	Not significant	Not applicable	Not applicable

Table 10.6 Summary of Residual Effects

VEC/VSEC	Key Indicator	Potential Effect(s)	Mitigation, Monitoring, Environmental Management, and Follow-up	Characterization of Residual Effect(s)	Significance Rating	Cumulative Effects	Transboundary Effects
		• High Winds and Waves • Storm Surges • Severe Fog or White-Outs • Increasing Temperatures • Reduced Sea Ice • Sea Level Changes • Increasing Precipitation • Increasing Active Layer Thickness					
Accidents, Malfunctions, and Unplanned Events	Accidents and malfunctions were assessed as part of the Approved Project, and a risk register was developed to identify the potential risks, the likelihood of the accidental event occurring, level of consequence associated with each accidental event, and applicable emergency response plans. The Phase 2 Proposal has not altered the risk register for the Project, apart from one accident scenario related to shipping during periods of ice break-up and ice formation. Overall, consequence and likelihood ratings have not changed from the Approved Project and the environmental effects of a spill in ice conditions would be no greater than, and often less than, those described in the Approved Project, and therefore the conclusions presented in the Approved Project remain unchanged for Phase 2 Proposal.					Not applicable	Not applicable

10.6 Cumulative Environmental Effects

The assessment of cumulative environmental effects is presented in TSD 27, the findings of which are summarized in Table 10.6, above.

10.7 Transboundary Effects

The assessment of transboundary effects is presented in TSD 27, the findings of which are summarized in Table 10.6, above.

10.8 Navigable Waters

Navigation in Canada is regulated under the *Navigation Protection Act* (NPA), which is administered by the Navigation Protection Program (NPP) of Transport Canada. The current NPA came into force in April 2014 and replaced the former *Navigable Waters Protection Act* (NWWA). The NPA authorizes and regulates interferences with the public right of navigation (i.e., the right to free and unobstructed passage over navigable waters).

TSD 13 assesses the effects of the Phase 2 Proposal on navigation. The scope of the assessment includes watercourse crossings along the Tote Road; watercourse crossings, drainage crossings, and stream diversions along the North Railway; and construction and operation of the second ore dock at Milne Port.

In 2007, Baffinland obtained approvals under the former NWWA for navigable watercourse crossings associated with upgrades to the Tote Road that were then carried out in 2007 and 2008. Legislative amendments to the NWWA were subsequently introduced in 2012 and came into force in 2014 under the renamed NPA. Key changes to the Act included (Transport Canada 2015):

- Adding a schedule to the Act that identifies specific navigable waters (scheduled waters); and
- Offering owners of works in non-scheduled navigable waters the opportunity to opt in and render those works subject to the Act.

Similar to the NWWA, works meeting the assessment criteria of the *Minor Works Order* are classed as designated works under the NPA and may proceed in scheduled waters without a Notice to the Minister, as long as they comply with applicable legal requirements.

None of the freshwater streams, lakes, or rivers in the RSA are listed as scheduled waters under the NPA and there is no existing navigation use of freshwater streams, rivers, and lakes within the PDAs for the Mine Site, Northern Transportation Corridor, or Milne Port, other than to support aquatic studies undertaken by Baffinland on lakes. However, Milne Inlet is located within the portion of the Arctic Ocean that is listed as a scheduled water under the NPA (i.e., all waters from the outer limit of the territorial sea up to the higher high water mean tide water level and including all connecting waters up to an elevation intersecting with that level) and is subject to existing navigation use.

When the NPA came into force, all works previously approved under the NWWA were transitioned into the new regime (i.e., automatically opted in). The terms and conditions imposed in 2007 for the navigable water crossings associated with the Tote Road upgrades therefore remain in effect under the NPA, and the NPA applies to these legacy works as it would to similar works located in scheduled waters. For the current Project, minor realignments of the Tote Road are required to support construction of the North Railway, while new secondary roads are required to access new borrows. These roads sections will require 17 new or relocated culverts on small streams. No new adverse effects to navigation are expected to occur, and therefore no additional mitigation is proposed.

Construction of the North Railway will require 433 watercourse and drainage crossings along its route as well as 32 stream diversions that will necessitate upgrades to four culverts on the Tote Road to accommodate higher flows. Although none of the watercourses to be crossed by the North Railway are listed as scheduled navigable waters under the NPA, the North

Railway crosses seven of the eight waterways previously identified as navigable under the NWPA in relation to construction of the Tote Road under the ERP.

The NPA includes an opt-in provision that allows the proponent of a work in non-scheduled navigable waters to request review under the NPA and application of the Act as if the proposed work were located in a scheduled water, thus providing assurance that the work's interference with navigation is sanctioned under the NPA (Transport Canada 2016). Baffinland intends to submit an opt-in request for the seven aforementioned navigable watercourse crossings associated with the North Railway. If the request is accepted, the full NPA regime and all requirements will apply to the works, including the requirement to provide notice to the Minister before constructing, altering, repairing (other than a minor repair), rebuilding, removing, or decommissioning the work. An NPA approval may also be required and impose further terms and conditions.

NWPA approval was issued for the existing ore dock at Milne Port in 2014. The second ore dock that is proposed to be constructed at Milne Port will be located within the portion of the Arctic Ocean that is listed as a scheduled water under the NPA. Baffinland conducted a self-assessment and determined that the proposed ore dock does not meet the criteria of a designated work under the *Minor Works Order*. It will therefore require a Notice to the Minister under the NPA and may also require an NPA approval. In addition to complying with terms and conditions that may be imposed through the NPA process, potential effects on navigation will be mitigated through the adoption of best industry practices and undertaking appropriate consultation with user groups to communicate potential risks. Navigation aids are not expected to be required but might be specified by Transport Canada.

11 SUSTAINABILITY ANALYSIS

The Amended EIS Guidelines (NIRB 2015) require that the Phase 2 Proposal “contain an analysis of the ability of renewable resources affected by the Project to sustain current and future generations in Nunavut and Canada.” The guidelines define sustainable development as:

“Development that meets the needs of the present generation without compromising the ability of future generations to meet their needs.”

Progress towards sustainable development includes the following goals, where possible:

- Preservation of ecosystem integrity, including the capability of natural systems (local and regional) to maintain their structure and functions and to support biological diversity;
- Respect for intergenerational equity - the right of future generations to the sustainable use of renewable and non-renewable resources depends on our commitment to those resources today; and
- The attainment of durable social and economic benefits, particularly in Nunavut.

An analysis of the sustainability of the Phase 2 Proposal using the above sustainability goals, is presented in Table 11.1. The sustainability analysis is based on the outcomes of the VEC and VSEC assessments and the potential for Project-related activities to affect the capacity and integrity of resources to meet present and future needs. Based on the results of the assessment, the Phase 2 Proposal will continue to provide sustainable durable social and economic benefits to Nunavut and the rest of Canada, without substantially affecting ecosystem integrity and the right of future generations to realize the sustainable use of its renewable and non-renewable resources. Baffinland’s Sustainable Development Policy is included as Appendix H.

Table 11.1 Sustainability Analysis for the Phase 2 Proposal

Sustainability Goal	EIS Section	Relevant VECs or Key Indicators	Assessment Conclusion
Preservation of ecosystem integrity, including the capability of natural systems (local and regional) to maintain their structure and functions and to support biological diversity.	TSD 07	Air Quality: Reduction in air quality due to Project emissions, which in the extreme have the potential to adversely affect vegetation communities, wildlife species, and an ecosystem’s structure or processes.	The residual effects on air quality as a result of Phase 2 Proposal were predicted to be generally confined to the LSA, occur infrequently and reversible following cessation of Project activities. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity.
	TSD 09	Vegetation: Changes in vegetation abundance and diversity as a direct result of the PDA and from dust deposition and other pollutants were assessed.	The residual effects on vegetation abundance and diversity as a result of Phase 2 Proposal were expected to be limited to the PDA, occur infrequently and reversible following cessation of Project activities. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity.

Table 11.1 Sustainability Analysis for the Phase 2 Proposal

Sustainability Goal	EIS Section	Relevant VECs or Key Indicators	Assessment Conclusion
	TSD 10	Terrestrial Wildlife and Habitat: project effects on habitat, movement, mortality, health were assessed. Overall Project effects on the long-term productivity of the North Baffin caribou herd were quantified using an energetics model.	The residual effects on terrestrial wildlife and habitat as a result of Phase 2 Proposal were expected to be mostly limited to the PDA, although some indirect effects are predicted within the LSA. Effects on terrestrial wildlife (such as injury or sensory disturbance) are anticipated to occur in a range of frequencies depending on the activities being undertaken and phase of the Project. These effects are generally reversible with the cessation of the Project with the exception of caribou mortality associated with improved harvester access. Generally, the effects on wildlife habitat (i.e., loss of habitat as a result of construction) are expected to be continuous through the construction and operation. Remediation of the PDAs following cessation of the Project, during Closure and Post-closure are anticipated to lessen the effects of the Project on wildlife habitat, consequently effects on wildlife habitat as a result of the Project are predicted to be reversible. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity or the long-term persistence or viability of a wildlife species in the local or regional area.
	TSD 12	Birds and Bird Habitat: project effects on migratory bird population abundance and distribution considered habitat loss, mortality, and health.	The residual effects on migratory birds and habitat as a result of Phase 2 Proposal were expected to be limited to the PDA, occur infrequently and reversible following cessation of Project activities. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity, including implications to the regional populations of migratory bird species.
	TSD 14	Freshwater Aquatic Biota: Project effects on Arctic Char health and condition, habitat, and mortality were assessed.	The residual effects on Arctic Char as a result of Phase 2 Proposal were predicted to be confined to the LSAs, occur infrequently, and reversible following cessation of Project activities. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity or the long-term persistence or viability of Arctic char in the local or regional area.
	TSD 17 TSD 24	Marine Habitat and Biota: Project effects on nearshore marine habitat at Milne Port due to propwash and other dockside activities and noise disturbance on biota; benthic productivity from ballast water discharge, and direct mortality to Arctic char were assessed.	The residual effects on marine habitat and biota as a result of Phase 2 Proposal were expected to be limited to the PDA, occur infrequently and reversible following cessation of Project activities. Therefore, it is unlikely to result in an effect to the preservation of ecosystem integrity or the long-term persistence or viability of marine biota in the local or regional area.

Table 11.1 Sustainability Analysis for the Phase 2 Proposal

Sustainability Goal	EIS Section	Relevant VECs or Key Indicators	Assessment Conclusion
Respect for intergenerational equity - the right of future generations to the sustainable use of renewable and non-renewable resources depends on our commitment to those resources today.	25, 26, 27, and 28	Socio-economic Effects: as measured by 4 VSECs.	The current operations have delivered significant positive benefits to local communities, the LSA, Nunavut and Canada. The Phase 2 Proposal will result in modest changes to both beneficial and adverse effects being realized by the current Project. In general, these changes are unlikely to affect the right of future generations to the sustainable use of renewable and non-renewable resources depends on our commitment to those resources today.
The attainment of durable social and economic benefits, particularly in Nunavut.	25 and 26	Economic Benefits: Assessed based on VSECs that describing the economic contributions of the Project.	The Phase 2 Proposal will result in residual effects which were assessed to be positive and significant with respect to the delivery of employment, training, and economic benefits. In general, these changes are unlikely to affect the attainment of durable social and economic benefits for Nunavut.

12 CONCLUSION

This Addendum Document provides an assessment of the Phase 2 Proposal. The assessment of the environmental impacts of the Phase 2 Proposal concluded that it would not result in significant residual adverse environmental effects. Positive socio-economic impacts are predicted as a result of employment, skill development, and contracting opportunities. Cumulative effects and transboundary effects were also considered in this report for the Phase 2 Proposal, and the significance determinations are not changed from the Approved Project.

This report includes an environmental impact assessment of development plans for the Phase 2 Proposal and is based on studies of the biophysical and socio-economic environments and builds on the knowledge acquired during the Approved Project. Consultation specific to the Phase 2 Proposal has been undertaken, and has helped to shape this assessment.

The Phase 2 Proposal will be designed to meet relevant regulatory requirements and to avoid, limit, and, reduce negative effects where possible and to enhance socio-economic benefits; the Phase 2 Proposal will allow the Project to continue to provide positive economic returns to investors and benefits to the people, the Government of Nunavut, and Inuit organizations. A comprehensive management and monitoring system has been developed to safeguard the commitments of the Project. Baffinland is committed to ongoing consultation with Inuit communities and stakeholders and will address public concerns throughout the life of the Project.

Existing management practices will continue to be applied with the Phase 2 Proposal, and management plans will be updated if and as applicable to include the Phase 2 Proposal. Furthermore, additional dust suppression efforts will be put in place to reduce emissions, and Baffinland will continue to consult with the HTO regarding the changes the Phase 2 Proposal will have on the use of the HTO cabin.

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