

# 1 PROJECT SUMMARY

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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.

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**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

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

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 walrus.

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 walrus 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.

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**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

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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

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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

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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

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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): <ul style="list-style-type: none"><li>Carbon dioxide (CO<sub>2</sub>)</li><li>Methane (CH<sub>4</sub>)</li><li>Nitrous oxide (N<sub>2</sub>O)</li></ul>	Increase in GHG emissions	<ul style="list-style-type: none"><li>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.</li></ul>	<p>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.</p> <p>Overall, the residual effect of the Project on climate change is predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction (the Project will result in GHG emissions);</li><li>Low in magnitude (not expected to contribute notably to Canadian or global GHG totals or global climate change);</li><li>Geographically widespread (GHGs cause a global effect);</li><li>Continuous in frequency; and</li><li>Irreversible (following cessation of Project GHG releasing activities the GHGs will remain in the atmosphere for 20 years or more).</li></ul> <p>There is a high probability of the residual effect occurring.</p>	Not significant	Not significant	Not significant
Air Quality	Criteria air contaminants (CACs): <ul style="list-style-type: none"><li>Total suspended particulate (TSP)</li><li>Sulphur dioxide (SO<sub>2</sub>)</li><li>Nitrogen dioxide (NO<sub>2</sub>)</li><li>Carbon monoxide (CO)</li><li>Sulphur and nitrogen deposition and potential acid input (PAI)</li><li>Particulate matter &lt;2.5 µm (PM<sub>2.5</sub>)</li><li>Particulate matter &lt;10 µm (PM<sub>10</sub>)</li><li>Fugitive dust and metal concentrations and deposition</li></ul>	Increase in CACs	<ul style="list-style-type: none"><li>Review, update and implement the following plans, targeting dust suppression along the Northern Transportation Corridor:<ul style="list-style-type: none"><li>Environmental Protection Plan;</li><li>Air Quality and Noise Abatement Management Plan;</li><li>Dust Management Protocol in the Roads Management Plan; and</li><li>the dust fall monitoring program outlined in the Terrestrial Environment Mitigation and Monitoring Plan.</li></ul></li></ul>	<p>Concentrations of SO<sub>2</sub>, NO<sub>2</sub>, 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.</p> <p>Overall, the residual effect of the Project on air quality are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction, though positive along the transportation corridor once rail is operational;</li><li>Of a magnitude that exceeds thresholds for certain worst-case modeled scenarios, but with additional mitigation exceedances are not anticipated at sensitive receptors;</li><li>Geographically confined to the LSA;</li><li>Infrequent; and</li><li>Reversible with the cessation of Project activities.</li></ul> <p>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.</p>	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	<ul style="list-style-type: none"><li>• Increase in noise levels</li><li>• 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.</li></ul>	<ul style="list-style-type: none"><li>• Review, update, and implement the Environmental Protection Plan and the Air Quality and Noise Abatement Management Plan.</li><li>• Implement key mitigation measures outlined under the AER Directive 038 (AEUB 2007), such as:<ul style="list-style-type: none"><li>○ Fitting internal combustion engines with appropriate muffler systems;</li><li>○ Using acoustical screening from existing on-site buildings, where appropriate, to shield dwellings from construction equipment noise;</li><li>○ Taking advantage of local topography to screen noise emissions, where possible; and</li><li>○ Enclosing Milne Port crushing/screening plant in a building.</li></ul></li></ul>	<p>Overall, the residual effect of the Project on noise and vibration is predicted to be:</p> <ul style="list-style-type: none"><li>• Adverse in direction;</li><li>• 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;</li><li>• Geographically confined to the LSA;</li><li>• Of a duration that extends throughout the life of the Project</li><li>• Infrequent; and</li><li>• Reversible with the cessation of Project activities.</li></ul> <p>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.</p>	Not significant	Not significant	No transboundary effects
Terrestrial Environment VECs							
Landforms, Soils, and Permafrost	<ul style="list-style-type: none"><li>• Landforms:<ul style="list-style-type: none"><li>○ Glaciofluvial deposits</li><li>○ Eskers</li><li>○ Drumlins</li><li>○ Bedrock outcrops (cliffs)</li></ul></li><li>• Geochemistry</li><li>• Paleontology</li></ul>	<ul style="list-style-type: none"><li>• Effects on unique or valuable landforms</li><li>• Increase in geohazard risks</li><li>• Increase in geochemical risks</li><li>• Effects on paleontological resources</li></ul>	<ul style="list-style-type: none"><li>• Review, update and implement the following plans:<ul style="list-style-type: none"><li>○ Environmental Protection Plan;</li><li>○ Borrow Pit and Quarry Management Plan;</li><li>○ Railway Management Plan;</li><li>○ Railway Emergency Plan; and</li><li>○ Spill Contingency and Emergency Response Plan.</li></ul></li><li>• Thermal insulation may be used for the proposed Milne Port buildings, and adfreeze piles may be used for deep foundations.</li></ul>	<p>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.</p> <p>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.</p> <p>Overall, the residual effects of the Project on landforms, soils, and permafrost are predicted to be:</p> <ul style="list-style-type: none"><li>• Adverse in direction;</li><li>• Low in magnitude;</li><li>• Geographically confined to the LSA;</li><li>• Permanent in duration;</li><li>• Infrequent; and</li><li>• Irreversible.</li></ul> <p>The probability of the residual effect occurring is high for:</p> <ul style="list-style-type: none"><li>• A residual change in the abundance and distribution of unique or valuable landforms; and</li><li>• A residual ground disturbance of paleontological resources.</li></ul> <p>The probability of the residual effect occurring is low for:</p> <ul style="list-style-type: none"><li>• 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</li><li>• 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.</li></ul> <p>In consideration of the information available and the results of ongoing monitoring related to landforms, soils, and permafrost, there is:</p> <ul style="list-style-type: none"><li>• 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</li></ul>	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
				<ul style="list-style-type: none"><li>A high level of confidence in the residual effects predictions for all other residual effects on landforms, soils, and permafrost.</li></ul>			
Vegetation	<ul style="list-style-type: none"><li>Vegetation abundance and diversity</li><li>Vegetation health</li><li>Culturally valued vegetation</li></ul>	<ul style="list-style-type: none"><li>Change in vegetation abundance and diversity</li><li>Change in vegetation health</li><li>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.</li></ul>	<ul style="list-style-type: none"><li>Review, update and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan.</li><li>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.</li><li>Allow natural regeneration of disturbed areas.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on vegetation are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Of a magnitude that exceeds thresholds for certain dust deposition parameters within the PDA;</li><li>Geographically confined primarily to the PDA (as well as adjacent to the PDA for dust deposition);</li><li>Infrequent;</li><li>Of a duration that lasts for the life of the Project; and</li><li>Reversible with the cessation of Project activities and with reclamation.</li></ul> <p>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.</p> <p>In consideration of the information available and the results of ongoing monitoring activities related to vegetation, there is:</p> <ul style="list-style-type: none"><li>A high level of confidence in the residual effects predictions related to a change in vegetation abundance and diversity; and</li><li>A moderate level of confidence in the residual effects predictions related to changes in vegetation health due to TSP and to atmospheric emissions.</li></ul>	Not significant	Not significant	No transboundary effects
Birds and Bird Habitat	<ul style="list-style-type: none"><li>Red-throated loon</li><li>Snow goose</li><li>Common eider</li><li>King eider</li><li>Thick-billed murre</li><li>Lapland longspur</li><li>Harlequin duck</li><li>Peregrine falcon</li><li>Red knot</li><li>Buff-breasted sandpiper</li><li>Red-necked phalarope</li><li>Ivory gull</li><li>Ross’s gull</li><li>Short-eared owl</li></ul>	<ul style="list-style-type: none"><li>Effects on habitat</li><li>Effects on risk of mortality</li><li>Effects on health</li></ul>	<ul style="list-style-type: none"><li>Review, update, and implement the Environmental Protection Plan and the Terrestrial Environment Mitigation and Monitoring Plan.</li><li>Make raptor nest sites temporarily inaccessible to breeding birds during the nesting seasons potentially affected by construction.</li></ul>	<p>Overall, the residual effect of the Project on birds and bird habitat are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low in magnitude;</li><li>Geographically confined to the PDA in general, but extending to the LSA for indirect effects on habitat quality or availability;</li><li>In a range from infrequent (for occurrences of bird injury and mortality), to frequent (for sensory disturbance), to continuous (for habitat loss);</li><li>Of a duration that last for the life of the Project; and</li><li>Reversible with the cessation of Project activities.</li></ul> <p>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.</p> <p>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.</p>	Not significant	Not significant	Not significant
Terrestrial Wildlife and Wildlife Habitat	<ul style="list-style-type: none"><li>Caribou</li><li>Wolf</li></ul>	<ul style="list-style-type: none"><li>Effects on habitat</li><li>Effects on movement</li><li>Effects on risk of mortality</li><li>Effects on health</li></ul>	<ul style="list-style-type: none"><li>Review, update and implement the following plans:<ul style="list-style-type: none"><li>Environmental Protection Plan;</li><li>Terrestrial Environment Mitigation and Monitoring Plan;</li><li>Roads Management Plan;</li><li>Railway Management Plan; and</li><li>Railway Emergency Plan.</li></ul></li></ul>	<p>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.</p>	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
			<ul style="list-style-type: none"><li>Implement the Caribou Protection Measures developed collaboratively with the QIA.</li><li>Continue engagement with stakeholders and the Terrestrial Environment Working Group.</li></ul>	<p>Overall, the residual effects of the Project on terrestrial wildlife and wildlife habitat are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Generally low in magnitude given planned mitigation, but moderate in magnitude with respect to potentially reduced caribou habitat effectiveness during the winter season;</li><li>Generally geographically confined to the PDA, but extending outside of the PDA (within a 14 km ZOI) for potential residual effects on caribou habitat;</li><li>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;</li><li>Of a duration that lasts for the life of the Project; and</li><li>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.</li></ul> <p>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.</p> <p>In consideration of the information available and the results of ongoing monitoring related to terrestrial wildlife and wildlife habitat, there is:</p> <ul style="list-style-type: none"><li>A moderate level of confidence in the residual effects predictions related to caribou habitat, caribou movement, caribou health, and wolf habitat; and</li><li>A high level of confidence in the residual effects predictions related to caribou mortality risk.</li></ul>			
<b>Freshwater Aquatic Environment VECs</b>							
Freshwater Quantity and Quality	Freshwater quantity and quality	<ul style="list-style-type: none"><li>Effects on water quantity</li><li>Effects on water quality</li></ul>	<ul style="list-style-type: none"><li>Review, update and implement the following plans:<ul style="list-style-type: none"><li>Environmental Protection Plan;</li><li>Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan;</li><li>Fresh Water Supply, Sewage, and Wastewater Management Plan; and</li><li>Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including:<ul style="list-style-type: none"><li>Aquatic Effects Monitoring Plan;</li><li>Surface Water Sampling Program – Quality Assurance and Quality Control Plan;</li><li>Blasting Management Plan; and</li><li>Quarry Management Plans.</li></ul></li></ul></li></ul>	<p>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.</p> <p>Overall, the residual effect of the Project on freshwater quantity and quality is predicted to be:</p> <ul style="list-style-type: none"><li>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;</li><li>Low in magnitude given planned mitigation and the small footprint affected relative to the watershed scale in the region;</li><li>Geographically confined to the LSA;</li><li>Infrequent effects are associated with the water withdrawals and continuous effects are associated with the stream diversions and water/sediment quantity and quality alterations;</li><li>Of a duration that will occur throughout the life of the Project; and</li><li>Reversible with additional mitigation and the cessation of Project activities.</li></ul> <p>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.</p>	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	<ul style="list-style-type: none"><li>Effects on health and condition of Arctic char</li><li>Effects on habitat of Arctic char</li><li>Effects on risk of mortality of Arctic char</li></ul>	<ul style="list-style-type: none"><li>Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013b, 2016).</li><li>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.</li><li>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.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on freshwater biota and habitat are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low in magnitude given planned mitigation and the small footprint effected relative to available habitat in the region;</li><li>Geographically confined to the LSA;</li><li>Infrequent effects are associated with the water withdrawals and continuous effects are associated with the habitat and water/sediment quantity and quality alterations;</li><li>Of a duration that will occur throughout the life of the Project; and</li><li>Reversible with mitigation and the cessation of Project activities.</li></ul> <p>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.</p>	Not significant	Not significant	No transboundary effects
Marine Environment VECs							
Marine Ice, Water, and Sediment Quality	<ul style="list-style-type: none"><li>Marine ice</li><li>Marine water quality</li><li>Marine sediment quality</li></ul>	<ul style="list-style-type: none"><li>Effects on marine ice</li><li>Effects on marine water quality</li><li>Effects on marine sediment quality</li></ul>	<ul style="list-style-type: none"><li>Review and update the following plans:<ul style="list-style-type: none"><li>Environmental Protection Plan;</li><li>Marine Environmental Effects Monitoring Plan;</li><li>Shipping and Marine Wildlife Management Plan;</li><li>Surface Water, Aquatic Ecosystems, and Fish and Fish Habitat Management Plan;</li><li>Fresh Water Supply, Sewage, and Wastewater Management Plan;</li><li>Emergency Response Plan;</li><li>Spill Contingency Plan;</li><li>Oil Pollution Emergency Plan;</li><li>Spill at Sea Response Plan; and</li><li>Plans required under the Type A Water Licence, which will be submitted to the NWB for review and approval, including:<ul style="list-style-type: none"><li>Aquatic Effects Monitoring Plan; and</li><li>Surface Water Sampling Program – Quality Assurance and Quality Control Plan.</li></ul></li></ul></li><li>Manage runoff, sewage, and wastewater discharges to comply with the effluent quality discharge limits specified in Type A Water Licence.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on marine ice, water, and sediment quality are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low in magnitude that is low given planned mitigation;</li><li>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;</li><li>Frequent;</li><li>Of a duration that lasts for the life of the Project; and</li><li>Reversible with additional mitigation and the cessation of Project activities.</li></ul> <p>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.</p>	Not significant	Not significant	No transboundary effects
Marine Habitat and Biota	<ul style="list-style-type: none"><li>Marine fish habitat</li><li>Arctic char</li></ul>	<ul style="list-style-type: none"><li>Effects on marine fish habitat</li><li>Effects on Arctic char health and condition</li></ul>	<ul style="list-style-type: none"><li>Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC.</li><li>Adhere to applicable DFO authorization and offsetting requirements (DFO, 2013b, 2016).</li><li>Obtain Project-specific <i>Fisheries Act</i> Authorization(s) from DFO, where required for in-water works, and comply with associated terms and conditions.</li><li>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</li></ul>	<p>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.</p> <p>Overall, the residual effect of the Project on marine habitat and biota is predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low in magnitude given planned mitigation;</li><li>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);</li></ul>	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
			<p>construction of the second ore dock at Milne Port. TSD 23 outlines a conceptual Marine Offsetting Plan.</p> <ul style="list-style-type: none"><li>Continue to implement existing plan for Aquatic Invasive Species Monitoring of Milne Inlet Marine Ecosystem.</li></ul>	<ul style="list-style-type: none"><li>Geographically confined to the LSA, apart from aquatic invasive species introduction;</li><li>Continuous, apart from sediment resuspension concerns during construction; and</li><li>Reversible with additional mitigation and the cessation of Project activities, apart from aquatic invasive species introduction.</li></ul> <p>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.</p>			
Marine Mammals	<ul style="list-style-type: none"><li>Ringed seal</li><li>Walrus</li><li>Beluga whale</li><li>Narwhal</li><li>Bowhead whale</li><li>Polar bear</li></ul>	<ul style="list-style-type: none"><li>Change in habitat</li><li>Acoustic disturbance effects</li><li>Hearing impairment effects</li><li>Auditory masking effects</li><li>Effects on risk of mortality</li></ul>	<ul style="list-style-type: none"><li>Implement the commitments listed above for the Marine Ice, Water, and Sediment Quality VEC.</li><li>Review and update the following additional plans:<ul style="list-style-type: none"><li>Shipping and Marine Wildlife Management Plan;</li><li>Polar Bear Safety Plan; and</li><li>Biophysical Environmental Effects Monitoring Framework, Appendix 4 (Candidate Environmental Effects Monitoring Studies Marine Mammal).</li></ul></li><li>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.</li><li>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.</li><li>Reduce vessel speeds when transiting along the established shipping corridor and operating in Milne Port.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on marine mammals are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low in magnitude given planned mitigation;</li><li>Geographically confined to the LSA;</li><li>Infrequent;</li><li>Of a duration that extends throughout the life of the Project; and</li><li>Reversible with additional mitigation and the cessation of Project activities.</li></ul> <p>In consideration of the information available and the results of ongoing monitoring related to marine mammals, there is:</p> <ul style="list-style-type: none"><li>A moderate to high level of confidence in the residual effects predictions related to a change in habitat; and</li><li>A moderate level of confidence in the residual effects predictions for all other residual effects on marine mammals.</li></ul> <p>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.</p>	Not significant	Not significant	Not significant
Human Environment VSECs							
Population Demographics	<ul style="list-style-type: none"><li>Demographic stability</li></ul>	<ul style="list-style-type: none"><li>Change in in-migration of non-Inuit Project employees into the North Baffin LSA</li><li>Change in out-migration of Inuit residents from the North Baffin LSA</li></ul>	<ul style="list-style-type: none"><li>Direct hire from within and outside the LSA.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on population demographics are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low to moderate in magnitude;</li><li>Occurring within point-of-hire communities;</li><li>Intermittent in frequency;</li><li>Long-term in duration; and</li><li>Reversible.</li></ul> <p>There is a high probability of the residual effects occurring.</p> <p>In consideration of the information available and the results of ongoing monitoring related to community population demographics, there is:</p> <ul style="list-style-type: none"><li>A moderate level of confidence in the residual effects predictions related to the out-migration of Inuit residents from the North Baffin LSA; and</li><li>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.</li></ul>	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	<ul style="list-style-type: none"><li>Life skills</li><li>Education and skills</li></ul>	<ul style="list-style-type: none"><li>Improvement of life skills among LSA residents</li><li>Change in incentives related to school attendance and success</li><li>Change in opportunities to gain skills</li></ul>	<ul style="list-style-type: none"><li>Review, update and implement Human Resources Plan.</li><li>Implement IIBA initiatives, and the Q-STEP training program</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on education and training are predicted to be:</p> <ul style="list-style-type: none"><li>Positive to mostly positive in direction;</li><li>Moderate to high in magnitude;</li><li>Occurring within point-of-hire communities;</li><li>Continuous in frequency;</li><li>Of a duration that extends throughout the life of the Project to long-term in duration; and</li><li>Non-reversible or spontaneous.</li></ul> <p>The probability of the residual effects occurring is high.</p> <p>In consideration of the information available and the results of ongoing monitoring related to education and training, there is:</p> <ul style="list-style-type: none"><li>A moderate level of confidence in the residual effects predictions related to improved life skills among LSA residents; and</li><li>A high level of confidence in the residual effects predictions related to incentives for school attendance and success and opportunities to gain skills.</li></ul>	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Livelihood and Employment	<ul style="list-style-type: none"><li>Wage employment</li><li>Job progression and career advancement</li></ul>	<ul style="list-style-type: none"><li>Creation of jobs in the LSA</li><li>Change in employment of LSA residents</li><li>New career paths</li></ul>	<ul style="list-style-type: none"><li>Review, update and implement Human Resources Plan.</li><li>Implement IIBA initiatives, and the Q-STEP training program.</li><li>Designate all LSA communities as points-of-hire.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on livelihood and employment are predicted to be:</p> <ul style="list-style-type: none"><li>Positive in direction;</li><li>Moderate to high in magnitude;</li><li>Occurring within point-of-hire communities;</li><li>Continuous in frequency;</li><li>Medium-term to long-term in duration; and</li><li>Spontaneous.</li></ul> <p>The probability of the residual effects occurring is high.</p> <p>In consideration of the information available and the results of ongoing monitoring related to livelihood and employment, there is:</p> <ul style="list-style-type: none"><li>A moderate level of confidence in the residual effects predictions related to employment of LSA residents and new career paths; and</li><li>A high level of confidence in the residual effects predictions related to creation of jobs in the LSA.</li></ul>	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Economic Development and Self-reliance	<ul style="list-style-type: none"><li>Land</li><li>People</li><li>Community economies</li><li>Territorial economy</li></ul>	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.	<ul style="list-style-type: none"><li>Review, update and implement Human Resources Plan.</li><li>Implement IIBA initiatives, and the Q-STEP training program.</li><li>Designate all LSA communities as points-of-hire.</li></ul>	<p>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.</p> <p>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.</p>	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	<ul style="list-style-type: none"><li>Well-being of children</li><li>Substance abuse</li><li>Community social stability</li></ul>	<ul style="list-style-type: none"><li>Changes in parenting</li><li>Change in household income and food security</li><li>Change in transport of substances through Project sites</li><li>Change in affordability of substances</li><li>Change in attitudes toward substances and addictions</li><li>Effects of absence from the community during work rotation</li></ul>	<ul style="list-style-type: none"><li>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.</li><li>Implement IIBA initiatives.</li></ul>	<p>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.</p> <p>The adverse residual effects of the Project on human health and well-being are predicted to be:</p> <ul style="list-style-type: none"><li>Low to moderate in magnitude;</li><li>Occurring within point-of-hire communities;</li><li>Intermittent to continuous in frequency;</li><li>Medium-term to long-term in duration; and</li><li>Spontaneous.</li></ul> <p>The probability of the adverse residual effects occurring is high for:</p> <ul style="list-style-type: none"><li>Residual changes in parenting; and</li><li>Residual effects of absence from the community during work rotations</li></ul> <p>The probability of the adverse residual effect occurring is moderate for a residual change in the transport of substances through Project sites.</p> <p>In consideration of the information available and the results of ongoing monitoring related to human health and well-being, there is:</p> <ul style="list-style-type: none"><li>A moderate level of confidence in the adverse residual effects predictions related to changes in parenting; and</li><li>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.</li></ul>	Not significant	Not significant	Not significant
Community Infrastructure and Public Services	<ul style="list-style-type: none"><li>Hamlet staff recruitment and retention in the North Baffin LSA</li></ul>	<ul style="list-style-type: none"><li>Effects on competition for skilled workers</li><li>Change in labour force capacity</li></ul>	<ul style="list-style-type: none"><li>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).</li></ul>	<p>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:</p> <ul style="list-style-type: none"><li>Moderate in magnitude;</li><li>Occurring within point-of-hire communities;</li><li>Intermittent in frequency;</li><li>Short-term in duration; and</li><li>Reversible.</li></ul> <p>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.</p>	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	<ul style="list-style-type: none"><li>Business opportunities</li></ul>	<ul style="list-style-type: none"><li>Expansion of market for business services to the Project</li><li>Expansion of market for consumer goods and services</li></ul>	<ul style="list-style-type: none"><li>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.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on contracting and business opportunities are predicted to be:</p> <ul style="list-style-type: none"><li>Positive in direction;</li><li>Moderate to high in magnitude;</li><li>Occurring within the LSA, RSA, and point-of-hire communities;</li><li>Continuous in frequency;</li><li>Medium-term in duration; and</li><li>Spontaneous.</li></ul> <p>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.</p>	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Culture, Resources, and Land Use	<ul style="list-style-type: none"><li>Cultural resources</li><li>Harvesting</li><li>Travel and camps</li></ul>	<ul style="list-style-type: none"><li>Effects related to ground disturbance</li><li>Effects on caribou harvesting</li><li>Effects on marine mammal harvesting</li><li>Effects on safe travel within Pond Inlet, Eclipse Sound, Milne Inlet during open water</li><li>Sensory disturbance at camps</li><li>Effects on safe travel inland through Milne Port</li><li>Sensory disturbance and effects on safety along the Milne Inlet Tote Road</li><li>Effects on difficulty and safety relating to railway crossing</li></ul>	<ul style="list-style-type: none"><li>Review, update, and implement Cultural Heritage Resource Protection Plan.</li></ul>	<p>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.</p> <p>Overall, the residual effects of the Project on culture, resources, and land use are predicted to be:</p> <ul style="list-style-type: none"><li>Adverse in direction;</li><li>Low to moderate in magnitude;</li><li>Occurring generally within PDA and extending to areas that may experience additional noise and dust;</li><li>Infrequent, though in some cases continuous for effects related to access, throughout the life of the Project; and</li><li>Reversible in nature with the exception of potential ground disturbance effects on cultural resources.</li></ul> <p>There is generally a high probability of the residual effects occurring, except for:</p> <ul style="list-style-type: none"><li>residual effects on marine mammal harvesting, which have a moderate probability of occurring; and</li><li>residual effects on caribou harvesting, which have a low probability of occurring.</li></ul> <p>In consideration of the information available and the results of ongoing monitoring related to culture, resources, and land use, there is:</p> <ul style="list-style-type: none"><li>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</li><li>A moderate level of confidence in the residual effects predictions for all other residual effects on culture, resources, and land use.</li></ul>	Not significant	Not significant	No transboundary effects
Benefits, Royalty, and Taxation	<ul style="list-style-type: none"><li>Benefits, royalties, and taxation</li></ul>	<ul style="list-style-type: none"><li>Change in benefits, royalties, and taxation</li></ul>	<ul style="list-style-type: none"><li>Implemen IIBA initiatives.</li></ul>	<p>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.</p>	Significant (positive)	Positive cumulative effects	Positive transboundary effects
Governance and Leadership	<ul style="list-style-type: none"><li>Governance and leadership</li></ul>	<ul style="list-style-type: none"><li>Not applicable (assessed as subject of note)</li></ul>	<ul style="list-style-type: none"><li>Implement IIBA initiatives.</li></ul>	<p>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.</p>	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	<ul style="list-style-type: none"><li>Geo-hazards</li><li>Extreme Weather Events</li><li>Global Climate Change</li></ul>	<ul style="list-style-type: none"><li>Ground Stability</li><li>Slope Stability</li><li>Seismic Events</li><li>Extreme Temperatures</li><li>Extreme Precipitation and Flooding</li><li>High Winds and Waves</li><li>Storm Surges</li><li>Severe Fog or White-Outs</li><li>Increasing Temperatures</li><li>Reduced Sea Ice</li><li>Sea Level Changes</li><li>Increasing Precipitation</li><li>Increasing Active Layer Thickness</li></ul>	<ul style="list-style-type: none"><li>Appropriate engineering design</li></ul>	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