



Project Proposal

Mary River Phase 2 Expansion Project

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1 Popular Summary

Baffinland Iron Mines Corporation (Baffinland) is a Canadian mining company that operates the Mary River iron ore mine (the Project), located in the Qikiqtani Region of Nunavut on Baffin Island. The Project is authorized to mine up to 22.2 million tonnes per annum (mtpa) of iron ore and to transport up to 18 mtpa of iron ore to market by the Southern Transportation Corridor and Shipping Route and to transport up to 4.2 mtpa of iron ore to market by the Northern Transportation Corridor via the Northern Shipping Route (from Milne Inlet to Baffin Bay) during the open-water season (July to October).

Due to the high cost of development combined with depressed conditions, the Project has not been able to proceed with the development of the infrastructure required to support the transport of up to 18 mtpa of iron ore to market by the Southern Transportation Corridor and Shipping Route. Instead, Baffinland has developed and is operating the Early Revenue Phase (ERP) portion of the Project in an effort to build investor and customer confidence in the Project. Baffinland shareholders continue to invest in the Project to fund its working capital requirements, however to establish an economically sustainable operation production must increase to 12 mtpa by the Northern Transportation Corridor via the Northern Shipping Route with a lower cost rail transport to port. The Mary River Phase 2 Expansion Project (Phase 2) was originally submitted to the Nunavut Impact Review Board (NIRB) in October 2014. Due to improvements in the original project proposal based on two (2) years of operational experience and extensive community consultation, Baffinland was directed to re-submit the Proposal to the Nunavut Planning Commission (NPC) and NIRB to allow it to proceed through the environmental assessment process.

New infrastructure required will include:

- Construction and operation of a railway track and ore loading station required to support the northern railway operation; additional primary crushing equipment and a mine truck workshop to support increased production; and expansion of the existing accommodation camp to support the increase of required personnel at the Mine Site.
- A new rail line approximately 110 km in length and generally following the routing of the existing Tote Road is proposed to be constructed and operated to connect the Mine Site with the Port Site. The rail route would only move away from the Tote Road where required due to terrain and other technical considerations. It is estimated that the cycle time of the rail way will be approximately nine (9) hours and five (5) to six (6) trains would be loaded per day.
- At the Port Site, a second ore dock to accommodate Cape sized vessels, a second ship loader, railway unloading and maintenance facilities, and additional support infrastructure will need to be developed in addition to an enclosed crushing facility.

The increased efficiency and capacity that resulting from the proposed expansion will allow Baffinland to concentrate iron ore shipments during ice free / open water. This strategy was developed based on community feedback regarding concerns over winter shipping. The ore shipping season is proposed to be from July 01 to November 15, but would be adapted annually in consultation with the Pond Inlet Hunters and Trapper Organization (HTO) based on ice conditions and thickness.

All efforts will also be made to ship fuel and freight during the open water season. However, Baffinland will be seeking the ability to conduct winter sea lift of freight if required to support on-going operations.

Peak shipping months for Phase 2 would be July, August and September which would see an estimated total of 38, 65, and 55, incoming and outgoing trips respectively past Pond Inlet, inclusive of ore carriers, freight and fuel.

The updated Phase 2 proposal has been refined based on Baffinland's on-going regulatory, community and stakeholder engagement initiatives. Through these consultations, two (2) primary concerns with the Phase 2 proposal have been identified.

- Concerns about potential winter shipping and ice breaking, including concerns around the possible effects of this activity on the marine environment (including marine mammals) and on Inuit land use activities and travel routes. Baffinland feels this concern has been sufficiently mitigated with the optimized shipping strategy described above.
- Concerns about the air emissions and dust generated by the on-going (and potentially increased) use of the Tote Road to transport ore by truck to the Milne Port site, and the possibility of wildlife injury, mortalities or other negative interactions and disturbances. Baffinland feels this concern will be sufficiently mitigated with the proposed development of the rail line which will result in far less air emissions, dust, noise and other disturbances than would be associated with the continued and increased truck traffic along the Tote Road, as well as reduced potential for interactions with wildlife.

Additional negative effects of the proposal include potential harm to wildlife, harm to wildlife habitat/environment and potential disruption to community travel routes and traditional land use activities. Baffinland feels these concerns can be mitigated with the optimized shipping schedule previously described, constructing the railway in a manner that facilitates ease of crossing for users and animals, a robust adaptive social and biophysical management program, and clear and comprehensive communication and awareness initiatives with effected communities.

Through its early development, the Project has been an important economic driver in Nunavut, creating significant direct employment and business activities throughout its construction and operations phases. Through these direct and spin-off employment and business benefits and associated taxation revenues, the Project has been and remains a vital component of the current socioeconomic structure of the area, and has made significant economic contributions at the community, territorial and national scales. With this proposed Phase 2 expansion, Baffinland feels it can maintain and increase these benefits.

It is noted, this Project Proposal for the Mary River Phase 2 has been prepared for submission to the Nunavut Planning Commission (NPC) as requirement for Conformity Determination under the Nunavut Planning and Project Assessment Act (NuPPAA).

2 Introduction

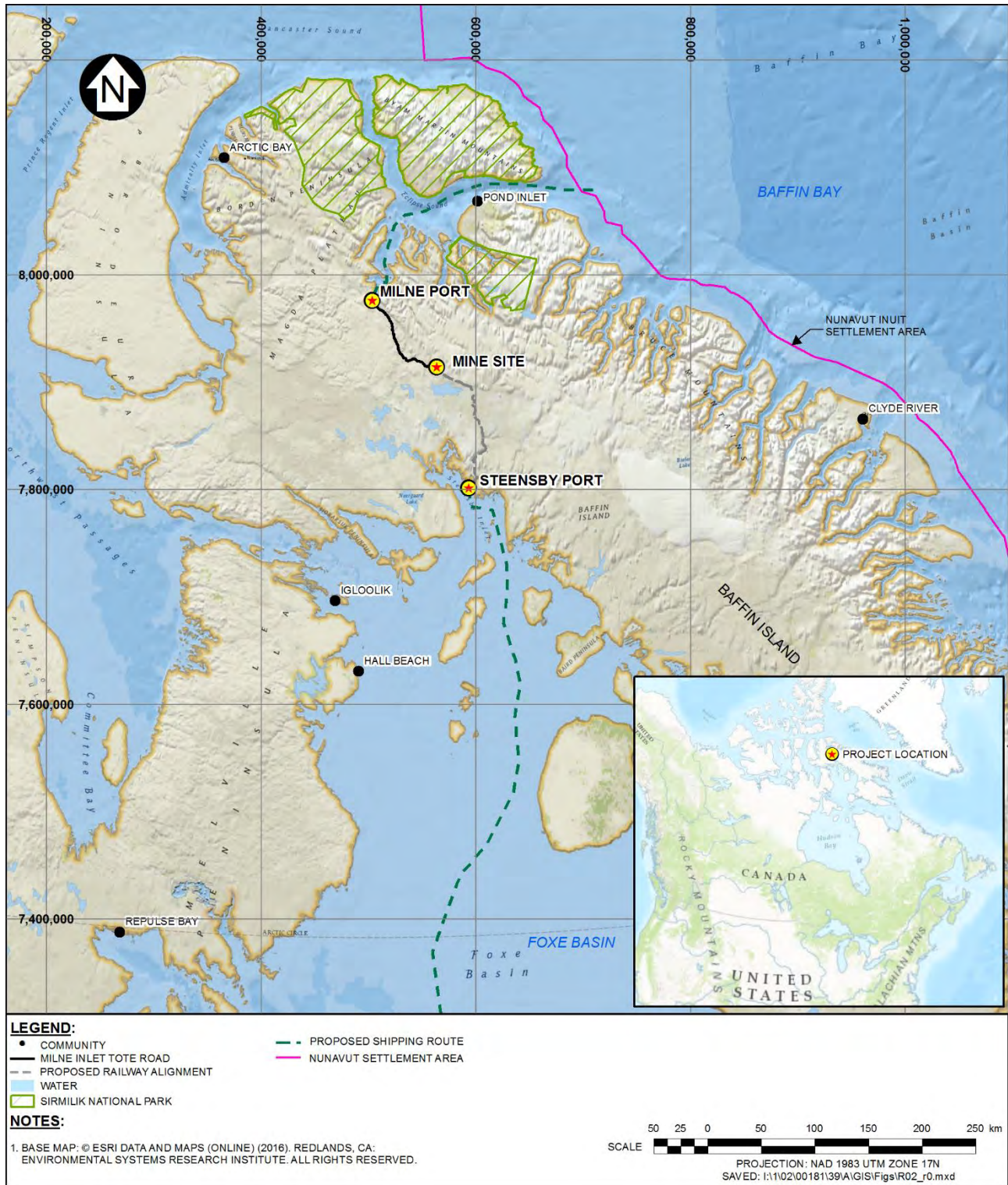
On December 28, 2012, the Nunavut Impact Review Board (NIRB) pursuant to Section 12.5.12 of Article 12 of the Nunavut Land Claims Agreement issued Project Certificate No. 005 for the Mary River Project (the Project) to Baffinland. The basis for this Project Certificate is Baffinland's Final Environmental Impact Statement (FEIS) which presented in-depth analyses and evaluation of potential environmental and socio-economic effects associated with mining of the reserves of Deposit No. 1 at a nominal rate of 18 Million tonnes per year (mtpa). Development of this project includes the construction, operation, closure and post-closure activities associated with the Mine and its related infrastructure, the

development of a Southern Transportation Corridor (southern railway and Steensby Port) and by year-round shipping along the Southern Shipping Route (Foxe Basin - Hudson Strait) via construction of a 150km railway from the Mine Site to a new port facility at Steensby Inlet, and the construction of Steensby Port (see Figure 2.1). The FEIS for the approved Mary River Project was prepared in adherence to Guidelines for the Preparation of an Environmental Impact Statement for the Baffinland Iron Mines Corporations Mary River Project (NIRB file No. 08MN053; the Guidelines), issued on November 16, 2009; and the Nunavut Impact Review Board (NIRB)'s Preliminary Hearing Conference Decision for Baffinland Mary River Project, December 9, 2011.

Following the issuance of the Project Certificate, Baffinland applied to the NIRB to conduct further assessment and reconsideration of the terms and conditions in the Project Certificate to reflect additional activities to be carried out under a 4.2 mtpa Early Revenue Phase (ERP). The ERP operation involving the haulage of ore by truck over the Milne Inlet Tote Road year-round, and shipping of the iron ore from Milne Port to market by the Northern Transportation Corridor (Tote Road and Milne Port) via the Northern Shipping Route (Milne Inlet - Eclipse Sound - Baffin Bay) during the open-water season (July to October). In May 2014 the Minister, based upon the NIRB recommendation, approved amendment of Project Certificate No.005 to allow for the ERP. Since that time, Baffinland has been developing and operating the ERP of the Project. In 2016, production and transportation of ore at the Mary River site allowed the shipment of 2.7 mt of iron ore through the Northern Shipping Route.

Baffinland shareholders continue to invest in the Project to fund its working capital requirements, however, to establish an economically sustainable operation production must increase to 12 mtpa by the Northern Transportation Corridor via the Northern Shipping Route with a lower cost rail transport to port. This additional proposed development phase is currently termed Mary River Phase 2 Expansion Project.

Figure 2.1 Mary River Project Location



3 Proponent Information

Baffinland is a Canadian mining company that operates the Mary River iron ore mine, located in the Qikiqtani Region of Nunavut on Baffin Island, Canada. Baffinland is owned by ArcelorMittal and by Iron Ore Holdings (IOH). Baffinland's Head Office is located in Oakville, Ontario, Canada and its Northern Headquarters are located in Iqaluit, Nunavut. In addition to its Head Office, Baffinland maintains a year-round presence at the Mary River Mine Site and Milne Port (Milne Inlet) as well as having community liaison offices in Pond Inlet, Arctic Bay, Clyde River, Hall Beach, and Igloolik.

4 Community Consultation and Public Participation

Baffinland is committed to meaningful engagement with stakeholders potentially affected by the Mary River Project, including the five (5) North Baffin Inuit Communities and QIA, applicable regulatory agencies and the general public. Baffinland's engagement efforts are guided by a Stakeholder Engagement Plan (SEP) which was most recently revised in 2016. Strong community engagement has allowed Baffinland to identify concerns and develop appropriate mitigation measures to address them.

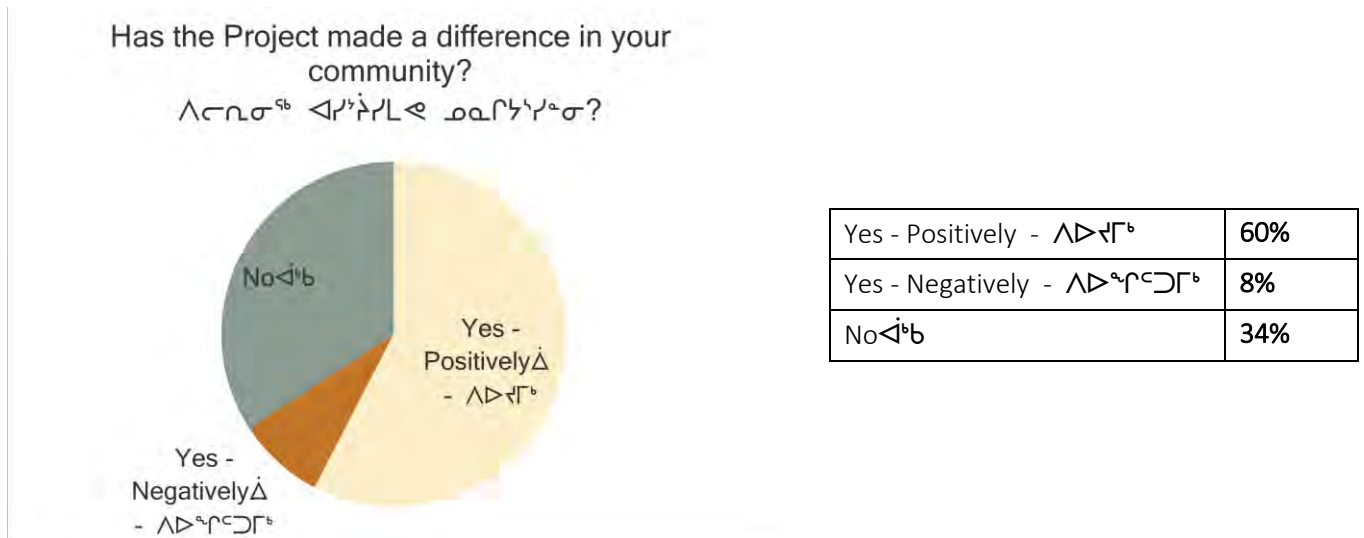
The objectives of Baffinland's engagement activities are to:

- Provide stakeholders with relevant Project information in a timely, accessible and culturally appropriate manner in order to enable stakeholders to identify issues and concerns and provide input into the development of appropriate mitigation measures;
- Facilitate effective implementation of and compliance with commitments contained in the Inuit Impact and Benefit Agreement (IIBA);
- Allow traditional and local knowledge to be taken into consideration to improve internal decision-making processes; and
- Reduce business and reputational risks and contribute to the "social licence".

To achieve these objectives, Baffinland has conducted extensive consultation with interested and potentially affected stakeholders, including the five (5) North Baffin Inuit Communities and the Qikiqtani Inuit Association (QIA), applicable regulatory agencies and the general public. This has included the continual provision of information and receipt of stakeholder input through Baffinland Community Liaison Officers, public meetings and open houses, community and employee surveys, focus groups, workshops, site visits, meetings with individual groups, participation in multi-stakeholder forums, and the distribution of Project information through websites, newsletters, advertisements and other means.

As a result of Baffinland's engagement activities, there is general support for the Mary River Project. Evidence of community support is provided by the results of a community survey of the five North Baffin communities which Baffinland conducted in September, 2016. The survey was intended to provide information about the potential impacts of the Project upon communities, the environment (biophysical and socio-economic) and the overall way of life in North Baffin Island as well as the state of the relationship between Baffinland and the communities. 205 surveys were completed and the results indicate a general level of satisfaction with the Project and with the current relationships between the communities and Baffinland (see Figure 4.1).

Figure 4.1 Community Survey Results



Positive impacts of the Project identified in the survey included:

- Jobs for local residents;
- Providing income and work benefits for families and communities;
- Increased social benefits - well-being;
- Providing local residents with life skills;
- Good communication between the communities and Baffinland.

The survey also indicated that a majority of respondents (65%) had no environmental concerns relating to the Project. Of the remainder, 18% of respondents identified concerns respecting the potential impacts of the Project on terrestrial and marine wildlife and wildlife habitat due to dust, changes in water quality, shipping and blasting noises. 17% were concerned about impacts on harvesting activities, the need for more Inuit employment, substance abuse and stress of familial separation.

4.1 Phase 2 Expansion Project Engagement Activities

Baffinland's consultation program has included considerable engagement related to the Phase 2 Expansion Project, including the associated identification and discussion of any questions or concerns on the part of consultation participants regarding the proposal and its potential effects. As described in the subsections that follow, the Phase 2 proposal described herein have been informed and guided by the views and perspectives raised during Baffinland's on-going regulatory, community and stakeholder engagement initiatives, and reflect its desire to address the various questions and concerns raised in a proactive manner.

Since the first submission of the Phase 2 development proposal to the NIRB in October 2014, Baffinland has regularly and directly engaged with the five (5) North Baffin communities and community groups to provide information on the Phase 2 Expansion Project and to discuss any issues of concern. These engagement activities have included the following:

- February, 2015: Community tour of the five (5) North Baffin communities;
- January, 2015: Open House in Pond Inlet;
- March - November, 2015: Workshops in Pond Inlet on Contemporary Inuit Land Use of the Eclipse Sound and Navy Board Inlet Areas, Shipping through Ice, Open Water Shipping, and Caribou (a copy of the Phase 2 Community Workshop Report has been uploaded to the NPC Project Proposal portal alongside this proposal as a separate document);
- April, 2015: Tour of the Voisey's Bay winter shipping route with key individuals from Pond Inlet to personally observe shipping through ice (A report on the Nain site visit has been uploaded to the NPC Project Proposal portal alongside this proposal as a separate document);
- May, 2016: Workshop on Phase 2 in Arctic Bay;
- May, 2016: Meeting with Pond Inlet Youth Council;
- July, 2016: Shipping Update delivered in Pond Inlet;
- September, 2016: Community Survey of the five (5) North Baffin communities;
- November, 2016: Community tour of the five (5) North Baffin communities, meetings with each Hamlet council and meetings with the Hunters and Trappers Organizations (HTO) of Pond Inlet and Arctic Bay to discuss Phase 2; and
- December 6, 2016: Four (4) meetings in Pond Inlet (MLA, Hamlet Council, Mittimatalik Hunters and Trappers Organization and Public Meeting) to review Phase 2 and proposed winter sealift.

Through these initiatives, Baffinland has become aware of a number of issues which are relevant to the planning and eventual implementation of this next stage of the Project, which participants have asked Baffinland to consider and attempt to address as it moves forward. These issues relate both to the originally proposed winter shipping as well as use of the Tote Road to transport ore and may be described as follows:

- Concerns about potential winter shipping and ice breaking, including concerns around the possible effects of this activity on the marine environment (including marine mammals) and on Inuit land use activities and travel routes; and
- Concerns about the air emissions and dust generated by the on-going (and potentially increased) use of the Tote Road to transport ore by truck to the Milne Port site, and the possibility of wildlife injury, mortalities or other such interactions and disturbances.

Each issue will be considered in turn.

4.2 Northern Shipping Corridor

There has been comprehensive consultation on the possibility of winter shipping associated with the original Phase 2 proposal, particularly with Pond Inlet as the community most directly affected by winter shipping.

In April, 2015, Baffinland brought select participants from Pond Inlet and QIA to Nain, Labrador to directly observe shipping through landfast ice and discuss associated mitigation measures to ensure safety and access to the area of the ship's track for traditional and recreational land use activities (hunting, fishing, firewood collection and cabin usage) and other aspects of winter shipping operations with the Labrador Inuit. Topics discussed during the site visit included:

- Impact of shipping through ice on hunting practices;
- Differences in ice conditions between Nain and Pond Inlet;
- Impact on marine wildlife, particularly seals and whales (impact on birthing lairs, impact of noise, wildlife fatalities);
- Frequency of ship travels and routes;
- Refreezing and ice formation;
- Spills and other emergencies; and
- Set up of ice bridge and pontoon crossings.

The site visit was structured as an informational session, in anticipation of a series of subsequent workshops sponsored by Baffinland on aspects of the Phase 2 Expansion Project.

Between March 2015 and May 2016, Baffinland conducted a series of workshops on Phase 2 of the Mary River mine development. The workshops focused on five (5) main themes: *Contemporary Inuit Land Use in the Eclipse Sound and Navy Board Inlet*, *Shipping Through Ice*, *Open Water Shipping*, *Caribou*, and *Phase 2 and Arctic Bay*. The first four (4) workshops were held in Pond Inlet and the fifth in Arctic Bay. Each workshop was followed by an afternoon/evening public open house and in Pond Inlet. A meeting with the Mary River Community Group (MRCG) was also held following the workshops to gather additional feedback. Workshop participants included representatives of Baffinland and contemporary land users, elders and other residents of Pond Inlet and Arctic Bay with detailed knowledge of the workshop topics. Information gathered at the five (5) workshops was verified by a subsequent meeting with workshop participants on May 9-10, 2016 in Pond Inlet.

The Phase 2 workshops on *Shipping Through Ice* (Workshop #2) and *Open Water Shipping* (Workshop #3) have provided valuable feedback to Baffinland regarding community views around the timing, routing and conduct of the shipping component of the Phase 2 proposal.

Comments made at both Workshops #2 and 3 indicate that potential effects upon the marine environment (including marine mammals) and potential interference with Inuit travel routes and land use activities arising from ice breaking activities were identified as key concerns associated with the possibility of shipping through ice. In order to mitigate these effects, participants suggested that Baffinland avoid shipping in June, as this month is the peak period for Inuit hunters and families going out on the ice to

hunt, travel and camp. Similarly, it was also recommended that shipping through Eclipse Sound occur only after community travel to the floe edge was shut down by the Pond Inlet HTO. Shipping during March was a concern for some participants (due to seal pupping) and it was suggested that shipping be avoided during this period. Other participants proposed that shipping be avoided in April and May and that ship traffic should be stopped during times when Nunavut Quest dog team racers would be crossing the ship track. It is also particularly noteworthy that some individuals also advocated for an increase in open water transits to reduce the necessity of shipping through ice. These concerns are summarized in Table 4.1.

Table 4.1 Potential Land Use Interaction and Community Concerns

Potential Land Use Interaction	Community Concern
<ul style="list-style-type: none"> • Pond Inlet Floe Edge Activities • Sea Ice Seal Hunting • Seal Pup Hunting • Use of Ice Cracks • Ship track crossing (e.g. to access floe edges and Button Point, marine mammal harvesting, sport hunting, fishing, travel to Arctic Bay) 	<ul style="list-style-type: none"> • Shipping through ice in Eclipse Sound raises concerns for the residents of Pond Inlet and is not a preferred route for many residents. A number of residents questioned whether Navy Board Inlet could be used by Baffinland during ice covered months instead. • Local residents lack experience with shipping through ice and are unfamiliar with all of its potential effects • Potential negative effects on marine wildlife, Inuit harvesting, and Inuit travel may occur as a result of shipping through Eclipse Sound • Crossing an unstable ship track can be dangerous • The ship track and crossings will be difficult for Inuit hunters to see in the dark • Shipping in June is a concern. June is the peak period for Inuit hunters and families going out on the ice to hunt, travel, and camp. • Shipping during March is a concern as seal pups are born in this month. Shipping during April and May is also a concern for some individuals. • Hunter safety during the months of March to June is a concern, as the ice is weaker at this time and its stability could be affected by ice breaking. The potential for emergencies and rescue situations is a concern. • Large pieces of ice may break off when ships pass by, creating dangerous conditions for hunters • Pieces of the floe edge could potentially break off during June ice breaking • Community members will need to be notified of the shipping schedules and ship track crossing safety protocols • The travel route to Arctic Bay could be cut off due to the ship track • The Phase 2 shipping route may affect the route of the Nunavut Quest dog team race

Although participants at Workshops # 2 and #3 also identified some concerns about the possible effects of Phase 2 on the marine environment (including marine mammals) and on Inuit land use activities, open water shipping raised far fewer concerns than shipping through ice. Open water shipping was regarded

far more favourably by Pond Inlet since community residents had past experience with this type of shipping and because similar open water shipping activities through Pond Inlet had already been approved by regulators (including in the ERP).

However, workshop participants did identify potential Phase 2 interactions relating to Inuit harvesting areas and travel routes that would overlap with proposed open water shipping activities. In addition, concerns respecting potential adverse effects upon the marine environment, marine wildlife and harvesting associated with underwater noise (e.g. from ship loading activities), use of acoustic devices and underwater monitoring devices, ballast water discharge, sewage, and garbage disposal were also raised. Concerns relating to the increased number of open water shipping transits were noted but were characterized as of lesser severity due to the adaptive ability of marine mammals and the lack of long-term effects that would result from open water shipping. Community concerns are summarized in Table 4.2.

Table 4.2 Community Concern Summary by Season

Potential Project - Land Use Interactions	Community-Identified Concerns
Upirngaaq (Late May to July) <ul style="list-style-type: none"> Pond Inlet floe edge activities (during ice cover) Sea ice seal hunting (during ice cover) Use of leads (during ice cover) Ship track crossing (during ice cover - e.g. to access floe edges and Button Point, bird/egg harvesting, camping/cabins, marine mammal harvesting, fishing) Ocean travel 	<ul style="list-style-type: none"> Eclipse Sound an acceptable location for open water shipping but some potential negative effects on the marine environment, marine wildlife, and Inuit harvesting Concerns related to underwater noise, ballast water, sewage, garbage disposal, and the use of acoustic and underwater monitoring devices Need for greater communication between Baffinland and Pond Inlet regarding shipping schedules and results of existing monitoring programs
Aujaq (End of July to September) <ul style="list-style-type: none"> Open water seal and narwhal harvesting Fishing Goose harvesting Ocean travel Tourism 	
Ukiaksaaq (October to Mid-November) <ul style="list-style-type: none"> Narwhal and seal harvesting (primarily open water) Ocean travel Ship track crossing (once ice is safe to travel on) 	

Baffinland has considered the community concerns which have been expressed respecting both shipping through ice and open water shipping and in light of these concerns has developed its Phase 2 proposal to maximize open water shipping. The shipping window which Baffinland now proposes to ship ore from July 01 to November 15, but will be adapted annually in consultation with the Pond Inlet Hunters and Trapper Organization (HTO) based on ice conditions and thickness. Shipping was discussed at Baffinland's

November 21 to 26, 2016 tour of the five (5) North Baffin communities. The tour consisted of a combination of community meetings and open houses as well as separate meetings with Hamlet councils. Meetings were also held with the Mittimatalik Hunters & Trappers Organization and the Ikajutit Hunters and Trappers Organization. The purpose of the tour was to present an update on current operations and plans for future expansion and to provide residents with an opportunity to identify issues of concern and potential mitigation measures. In addition to public question and answer sessions during each community meeting, community residents were also provided with comment forms to enable written anonymous feedback to Baffinland. A total of 332 residents attended the public meetings and open house events.

A dominant theme of the community meetings was an interest in Project employment opportunities. However, there were 36 instances at which concerns related to shipping were raised. These concerns centred upon the potential effects of shipping including:

- Environmental effects from ballast water and waste;
- Effects of shipping routes on local wildlife and sea ice formation;
- Size of fleet and frequency of shipping activities;
- Duration of the shipping season;
- Community safety;
- Ability to respond to emergency situations; and
- Mechanisms to keep residents informed about the shipping program.

The frequency of shipping issues raised on a community-by-community basis is illustrated in Figures 4.2 through 4.6:

Figure 4.2 Frequency of Topics Raised - Arctic Bay

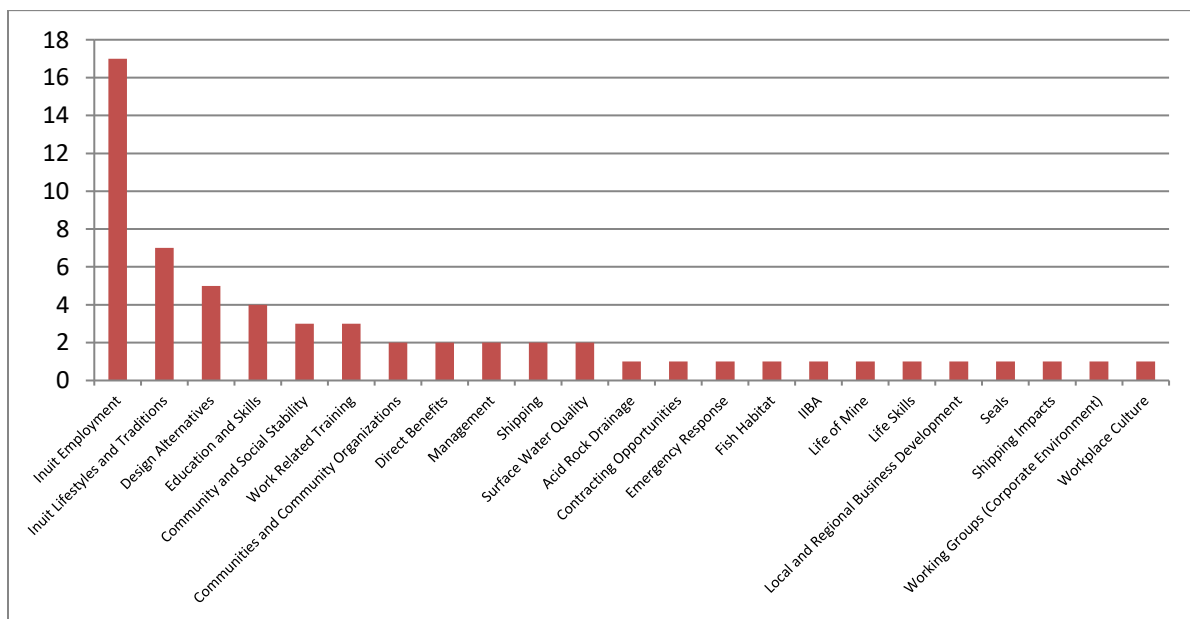


Figure 4.3 Frequency of Topics Raised - Clyde River

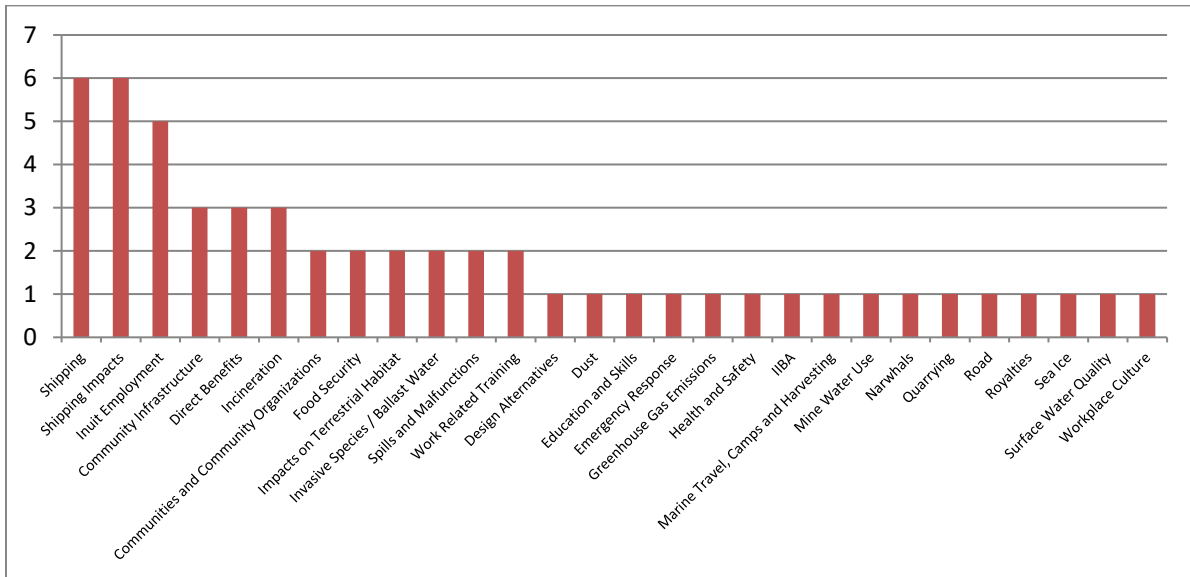


Figure 4.4 Frequency of Topics Raised - Hall Beach

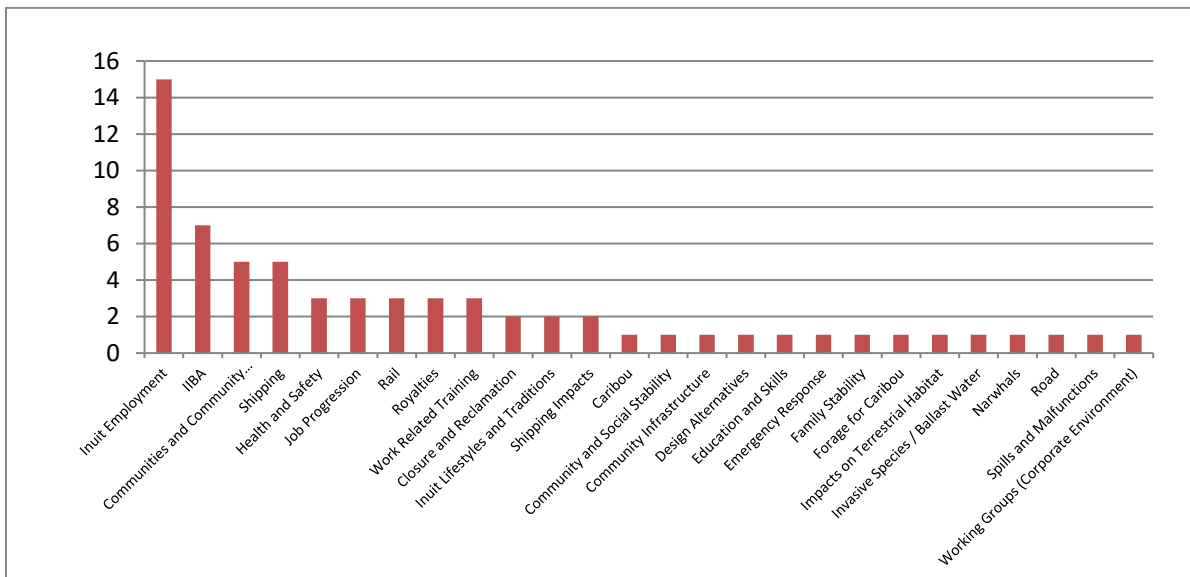


Figure 4.5 Frequency of Topics Raised - Igloodik

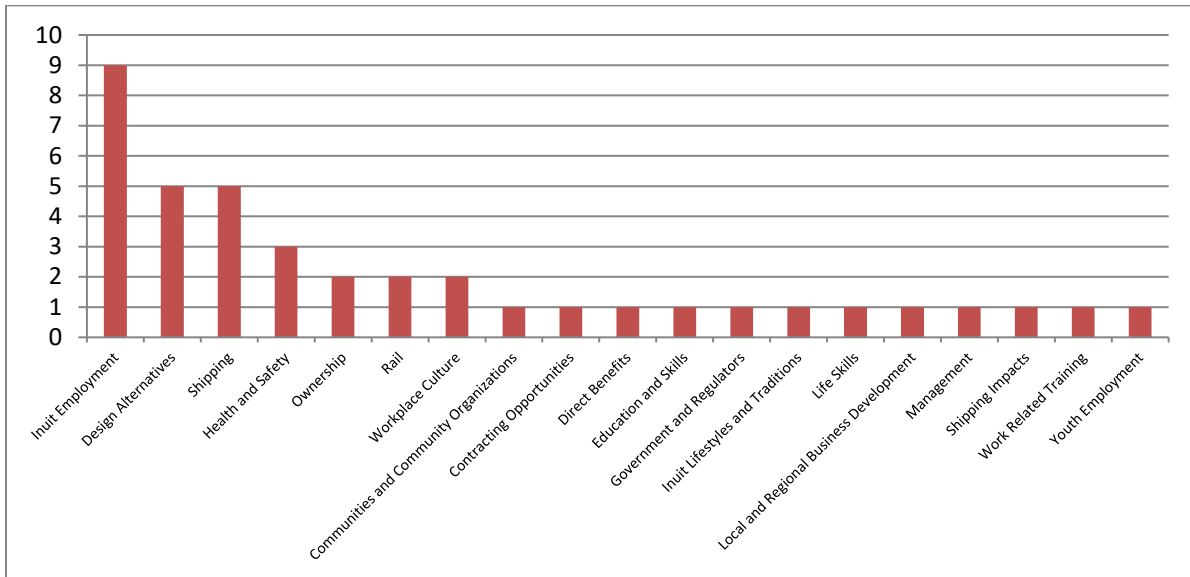
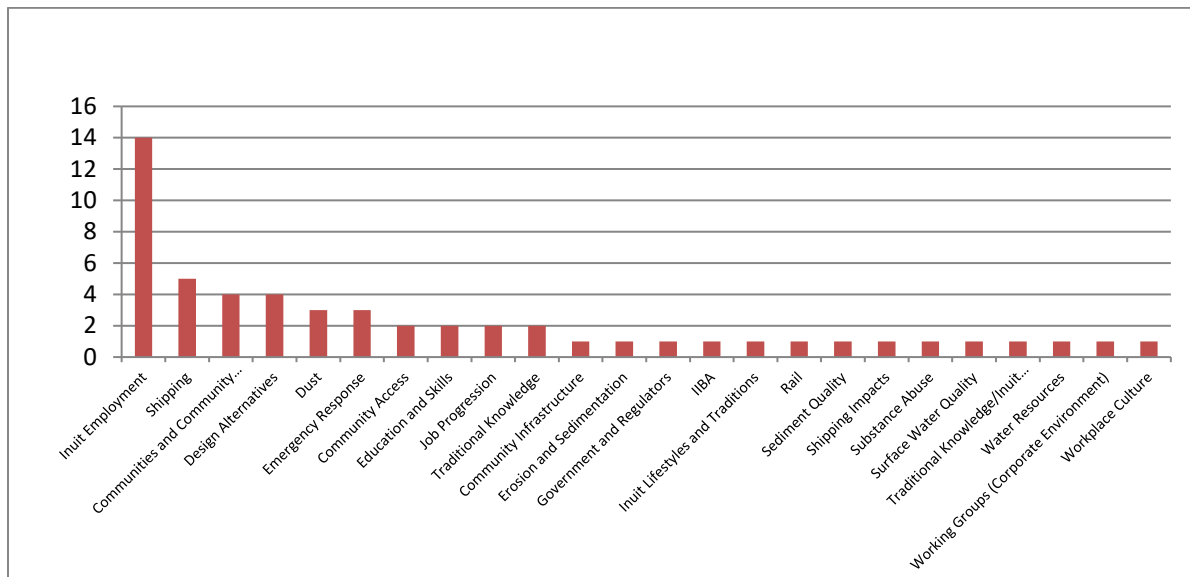
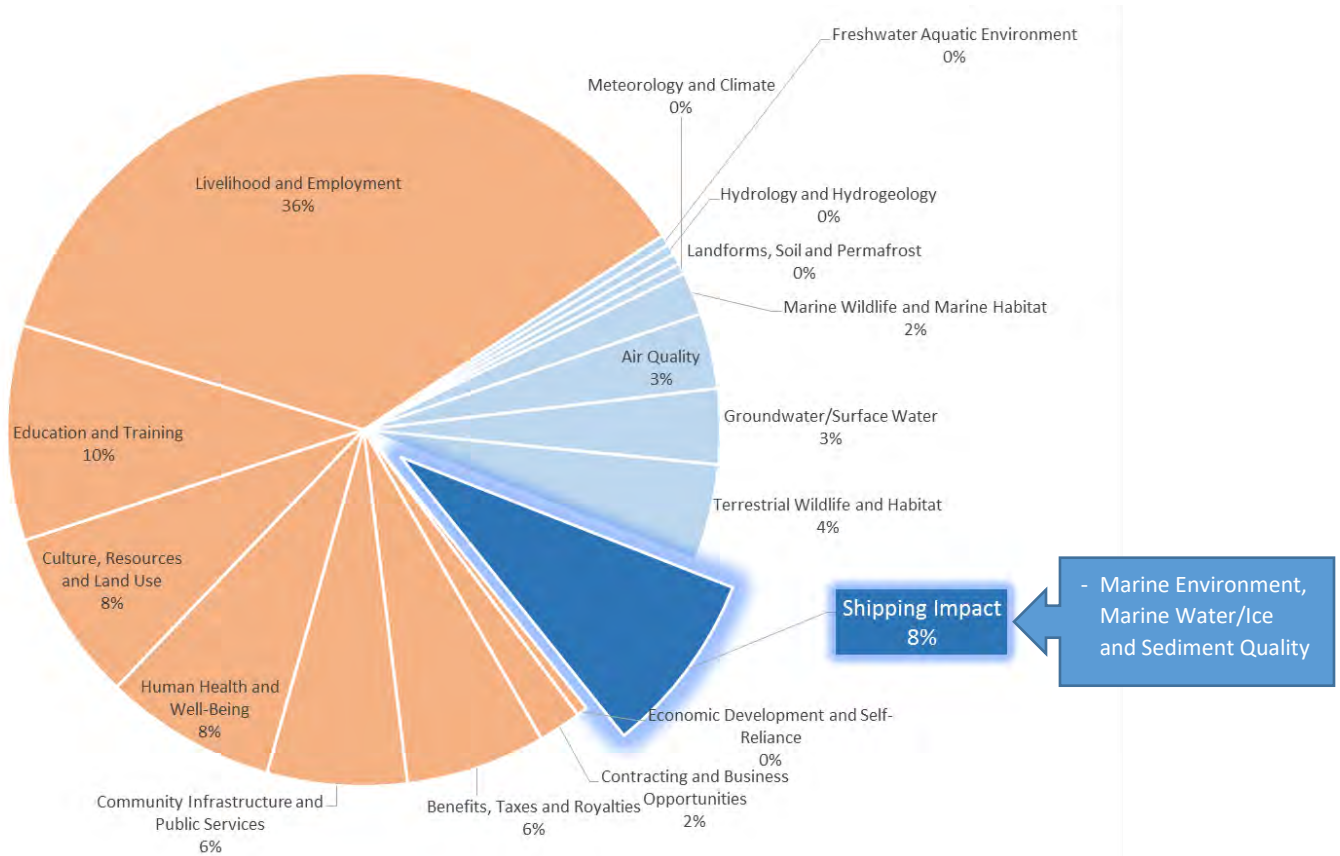


Figure 4.6 Frequency of Topics Raised - Pond Inlet



The percentage of shipping concerns in relationship to other Valued Eco-System Components (VECs) is depicted in Figure 4.7.

Figure 4.7 Percentage of Concerns Raised Relative to Shipping by Valued Ecosystem Component (VEC)



Based upon comments received from the communities, the proposal to focus iron ore shipping to open water was well-received, provided that adequate processes and procedures to ensure environmental protection and public safety were put in place.

More recently, open water shipping was discussed at the series of meetings held in Pond Inlet on December 6, 2016. The shift to open water shipping was met with general approval by participants, in particular the members of the Mittimatalik HTO.

4.3 Northern Transportation Corridor

The Phase 2 Expansion Project proposal to transport ore by means of rail rather than over the Tote Road has also been discussed with stakeholders during recent engagement activities. The original Phase 2 proposal anticipated transportation of ore by means of truck along the Tote Road and was the subject of Phase 2 Workshop #4 *Caribou*. In addition to general concerns associated with existing impacts from the Project on caribou, issues raised during the Workshop specifically related to use of the Tote Road included: potential interference with travel routes and camp sites (snow filling in on traditional Tote Road crossing areas), increased opportunity for wildlife injuries and fatalities, hunter safety (due to potential for increased Tote Road traffic), potential road closure in summer (affecting inland travel routes), possible

interference with caribou migration routes, adverse effects from dust on vegetation on caribou and human health and adverse impact of traffic noise on caribou.

A summary of community concerns respecting the Tote Road includes:

- Hunters may have difficulty crossing the Tote Road in two (2) locations due to excessive snow buildup;
- Increased potential for wildlife injury and fatalities due to vehicular traffic and limited driver visibility at night and in dusty situations;
- The Tote Road may act as a potential barrier to migrating caribou (e.g. snowbanks on the side of the road may hinder caribou from crossing the road);
- Dust from Tote Road activities may fall on roadside vegetation. When consuming this vegetation, caribou may ingest dust-borne metals and other contaminants;
- Potential human health effects associated with harvesting (and eating) caribou that have consumed dust-laden vegetation; and
- Caribou are sensitive to noise and will often flee when it is excessive.

Baffinland has considered these concerns and in response proposes to transport ore by rail rather than by truck along the existing Tote Road. The proposal to shift from road to rail transport will eliminate or reduce many of the issues identified by stakeholders in relation to trucking along the Tote Road. The potential for adverse interactions with wildlife will be decreased due to the limited number of train transits in comparison to the high frequency of truck travel along the Tote Road. Similarly, transport by rail will result in lesser dust emissions, minimizing potential caribou and human health hazards. Reduced frequency of rail transport will also significantly lessen interference with Inuit travel and harvesting activities.

The proposal to transport ore by means of rail rather than via the Tote Road was discussed during the recent community tour of November 21-26, 2016 and was the subject of only minimal comments. One category of comments related to environmental concerns (bio-physical, socio-economic). The second category concerned the relationship of the rail option to benefits to communities (either in the form of benefits from Nunavut Tunngavik Inc. or pursuant to the Inuit Impact and Benefit Agreement (IIBA)).

With respect to environmental concerns, several participants noted negative aspects associated with transportation along the Tote Road including hunter safety (possibility of accident or injury due to high speeds on the Tote Road and driver visibility issues), dust and interference with harvesting opportunities resulting from wildlife injury or fatality and use of salt on the road (wildlife attraction) and queried whether the shift to rail would minimize or exacerbate these adverse impacts. As Baffinland noted in response, rail represented a preferable option to road transport as the use of rail would reduce dust levels, increase hunter safety (due to limited number of rail trips per day) and minimize the opportunities for adverse interactions with wildlife. There were no explicit concerns voiced which suggested that the shift to rail would create an increased interference with traditional land use activities. In fact, as Baffinland pointed out, given the relative infrequency of rail trips versus truck usage of the Tote Road, impairment of access to travel routes would be less likely. One comment was made relating to socio-economic impacts of rail versus road upon the availability of trucking employment opportunities. Baffinland acknowledged that while the overall number of truck drivers would be reduced with the substitution of rail for road

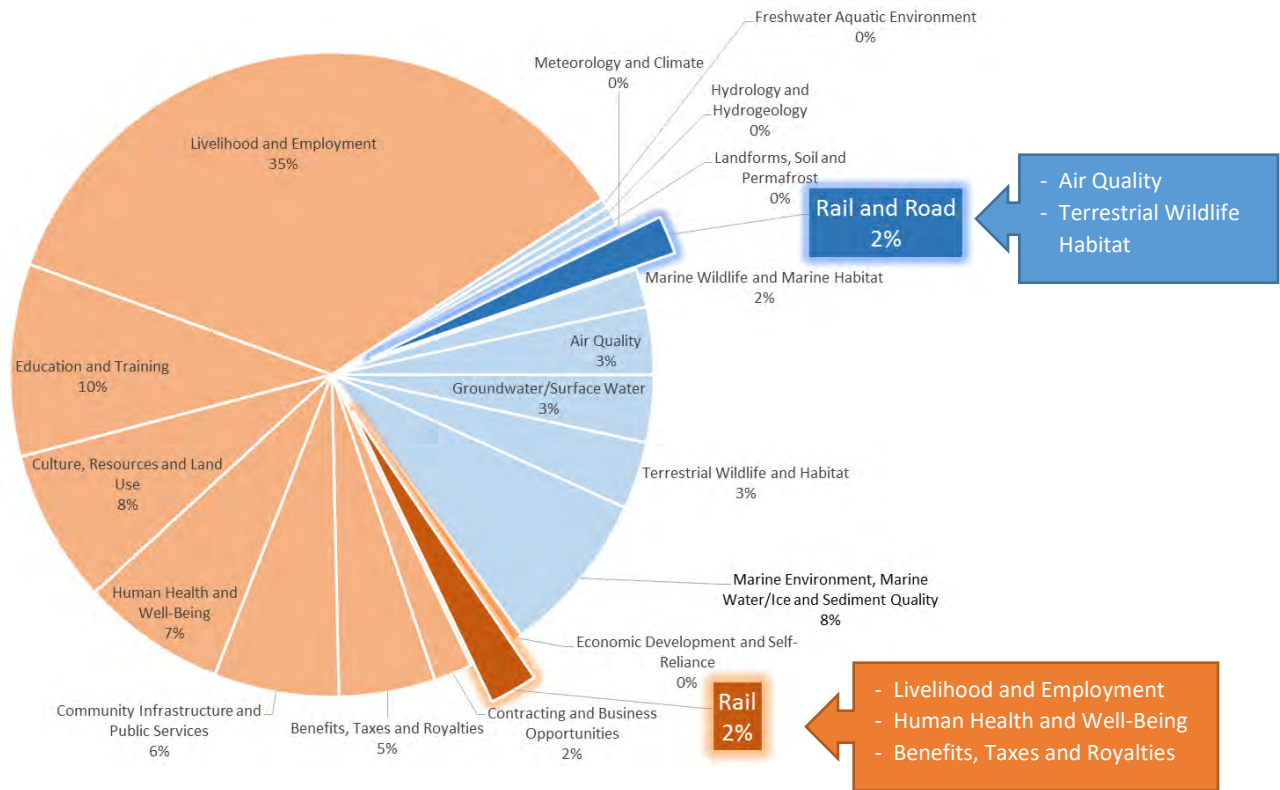
transport, the transition to rail would ultimately increase the number and duration of potential jobs for Inuit in other aspects of the production, transport and shipping of ore to markets. Finally, one resident of Igloolik asked whether ore could be transported by means of airship rather than by road or rail to completely eliminate any adverse environmental effects. Baffinland explained that such a transport method was not currently viable given the large quantities of ore proposed to be transported and the current technologies available.

Other comments relating to rail did not indicate an objection to rail per se but raised issues respecting the impact, if any, that a northern rail line would have upon the planned rail route south to Steensby and upon the distribution of benefits to smaller communities which would be less impacted by a northern rail line. One resident of Pond Inlet asked why a northern rail line was required and demanded an apology from Baffinland, asserting that Pond Inlet's support for the Project had been based upon an understanding that the only rail line would run to Steensby Inlet to the benefit of Igloolik. In response, Baffinland explained that a Northern Rail alternative had been originally investigated during the Mary River Project Feasibility Study of 2008, but as stated in Mary River FEIS Volume 3 (pages 116-118), this option had been rejected due to uncertainties associated with shipping through ice. However, with the decision to abandon shipping through ice, concerns related to the feasibility of the Northern Railway had been resolved.

A resident of Igloolik questioned whether the proposal to construct a rail line to Milne port implicitly eliminated the need for a rail line south to Steensby. In response, Baffinland reiterated that the rail line to Steensby remained a viable future option. Several residents of Hall Beach expressed concern that the construction of a northern rail line might impact the level of benefits available to smaller communities which would not be impacted to the same extent as Pond Inlet and one resident asked whether this could in turn result in an amendment of the Inuit Impact and Benefit Agreement (IIBA) to exclude smaller, less impacted communities. Baffinland provided assurances that there would continue to be an equitable distribution of benefits across the communities and that there was no intention to amend the IIBA to exclude smaller communities.

The frequency of comments associated with road/rail in comparison with other topics raised during the course of community meetings is illustrated in Figure 4.8.

Figure 4.8 Percentage of Concerns Raised Relative to Northern Transportation Corridor by VEC



No concerns associated with rail were raised at the December 2016 meetings in Pond Inlet.

4.4 Next Steps

The Phase 2 Expansion Project focusing on open water shipment of ore and transport of ore by rail have been informed and guided by the views and perspectives raised during Baffinland's on-going regulatory, community and stakeholder engagement initiatives, and reflect its desire to address the various questions and concerns raised in a proactive manner in the planning, design and eventual implementation of this next phase of the Project.

To ensure that community views continue to be taken into account, Baffinland will continue to undertake an active and on-going approach to engagement on the Phase 2 Expansion Project with the communities and other stakeholders. Baffinland has specifically committed to return to the five (5) North Baffin communities early in 2017 to provide further and more detailed information respecting the Project update and associated regulatory processes. Relevant documentation will be provided in advance of any community, hamlet and HTO meetings to ensure that stakeholders have a meaningful opportunity to identify and discuss issues of concern. All stakeholder engagement activities will be documented through 'Staketracker' consultation software and issues will be addressed and reported as required. Baffinland will continue to ensure that its engagement activities comply with the terms and conditions of all relevant standards, regulations, Project authorizations and the IIBA.

5 Project Proposal Description

5.1 Purpose

The purpose of this project proposal submission is to provide the information necessary for the Nunavut Planning Commission (NPC) to determine if the Mary River Phase 2 Expansion Project conforms to the North Baffin Regional Land Use Plan (NBRLUP).

5.2 Scope

The scope of the Mary River Phase 2 Expansion Project is described in the proceeding subsections on Table 5.1 below.

Table 5.1 Key Project Facts

Category	Item	Amount	Notes/Comments
Schedule	Project Start Date	November 1, 2018	<ul style="list-style-type: none"> Start date relates to start of construction for Phase 2 portion of Mary River Project Date is estimated and subject to change based on approval process
	Project End Date	December 31, 2046	<ul style="list-style-type: none"> End date assumes completion of construction, operation, closure and post closure phases Phase 2 portion of Project does not change life of mine, will end same time as ERP and 18 mtpa project
Personnel	Estimated Number of Personnel on Site	615 persons	<ul style="list-style-type: none"> Quantities provide are on a per month basis for the estimated marginal increase of personnel required for Phase 2 in a peak month (400 @ Port Site, 215 @ Mine Site) Month for peak marginal workforce for Phase 2 estimated to occur during Construction Phase Assumed 30 days per month for purpose of estimate
	Estimated Number of Days On-Site	30 days	
	Total Number of Person Days	18,450 person-days	

Category	Item	Amount	Notes/Comments
Equipment	Heavy Mine Equipment	28 units	<ul style="list-style-type: none"> Quantities provided include peak production and rail equipment required for 12 mtpa production and therefore applies to Phase 2 Operation Phase Heavy Mine equipment includes: Haul Truck (e.g. Cat 777), Shovels, Wheel Loader (e.g. CAT 992), Rotary Production Drill, Dozer (e.g. CAT D10) Ore Processing equipment includes: Cone Crusher, Jaw Crusher, Reclaim Conveyor, Stockpile Conveyor, Screens Rail Equipment includes: Ore Locomotives, Ore Cars, Wheel Loader (e.g. CAT 992). Port Equipment includes: Articulating Rock Truck (e.g. CAT 740), wheel loader, Shiploader, Reclaim Conveyor, Crushers, Stockpile Conveyor, Screens Site Services equipment includes: generators, frost fighters, pickup trucks, heating units, light plants, aircraft
	Ore Processing	9 units	
	Rail Equipment	153 units	
	Port Equipment	16 units	
	Site Services Equipment	134 units	
Fuel Use	Arctic Diesel - Mobile Equipment	32 ML	<ul style="list-style-type: none"> Based on estimated peak annual consumption for the Phase 2 portion of project Additional fuel storage to account for marginal increases of fuel consumption related to Phase 2 requires installation for two (2) 10 ML, one (1) 12 ML arctic diesel tanks and one (1) 750 kL Jet A tank at Milne Port No change to bulk fuel storage at Mine Site anticipated to be required
	Arctic Diesel - Fixed Power Generation	28 ML	
	Arctic Diesel - Building Heating	8 ML	
	Jet A Fuel - Flights	2.7 ML	

Category	Item	Amount	Notes/Comments
Hazardous Materials and Chemical Use	Batteries	28 t/year	<ul style="list-style-type: none"> For purpose of 'worst case' estimate, assume personnel required for Phase 2 in a peak month (412 persons) present all year. Rounded to nearest ton. Generation rates assumed to be consistent with rates stated in Baffinland Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) Month for peak marginal workforce for Phase 2 estimated to occur during Construction Phase All hazardous waste is stockpiled and shipped offsite annually for treatment at licenced facilities in Southern Canada
	Hydro Carbon Contaminated Material	65 t/year	
	Waste Oil	389 t/year	
	Waste Fuels	29 t/year	
	Waste Grease	10 t/year	
	Waste Hazardous Liquids	126 t/year	
	Waste Aerosol Canisters	1 t/year	
	Contaminated Containers/Solids	100 t/year	
	Misc. Hazardous Materials	79 t/year	
Waste Generation	Organic Waste	662 t/year	<ul style="list-style-type: none"> For purpose of 'worst case' estimate, assume personnel required for Phase 2 in a peak month (412 persons) present all year Rounded to nearest ton Generation rates assumed to be consistent with rates stated in Baffinland Waste Management Plan (BAF-PH1-830-P16-00281) Month for peak marginal workforce for Phase 2 estimated to occur during Construction Phase As per Waste Management Plan, Organic, paper, cardboard, cloth, and some plastics and multi-material are incinerated prior to disposal in on-site landfill. Remaining nonhazardous, solid waste streams sent directly to landfill.
	Paper Waste	190 t/year	
	Plastic Waste	136 t/year	
	Cardboard	145 t/year	
	Cloth	44 t/year	
	Multi-Material	31 t/year	
	Metal	19 t/year	
	Glass	18 t/year	
	Wood	13 t/year	

Category	Item	Amount	Notes/Comments
Water Consumption	Milne Port (Source: Phillips Creek summer; Km 32 Lake winter)	367.5 m ³ /day	<ul style="list-style-type: none"> Water demand based on 'Water Use Authorized for Domestic and Industrial Purposes during Project Construction Phase' under current Type A Water Licence 2AM-MRY1325 Based on current planning, Baffinland is not expected to request increases of water use limits to account for Phase 2 * indicated for dust suppression only. Some restrictions depending on source.
	Mary River Mine Site (Source: Camp Lake)	657.5 m ³ /day	
	Phillips Creek*	212 m ³ /day	
	Km 32 Lake*	364 m ³ /day	
	CV128*	579.5 m ³ /day	
	CV099*	110 m ³ /day	
	CV087*	90 m ³ /day	
	CV078*	75 m ³ /day	
	Katiktok Lake*	318 m ³ /day	
	BG50*	150 m ³ /day	
	BG32*	120 m ³ /day	
	CV217*	130 m ³ /day	
	Muriel Lake*	212 m ³ /day	
	David Lake*	132 m ³ /day	
	BG17*	75 m ³ /day	
	CV233 (Tom River)*	135 m ³ /day	
	Camp Lake*	86 m ³ /day	

5.2.1 Mine Site

The planned Phase 2 development will see an increase in mine production over time, from the 4.2 Mtpa rate of production achieved through the initial ERP development, up to a production output of 12 Mtpa for shipment via the Northern Transportation Corridor.

Existing infrastructure at the Mine Site is shown in Figure 4.1 and 4.2. New infrastructure required at the Mine Site (see Figure 4.3 and 4.4) will include the construction and operation of a railway track and ore loading station required to support the northern railway operation; additional primary crushing equipment and a mine truck workshop to support increased production; and expansion of the existing accommodation camp to support the increase of required personnel.

Figure 5.1 Existing Mine Site - Photo #1



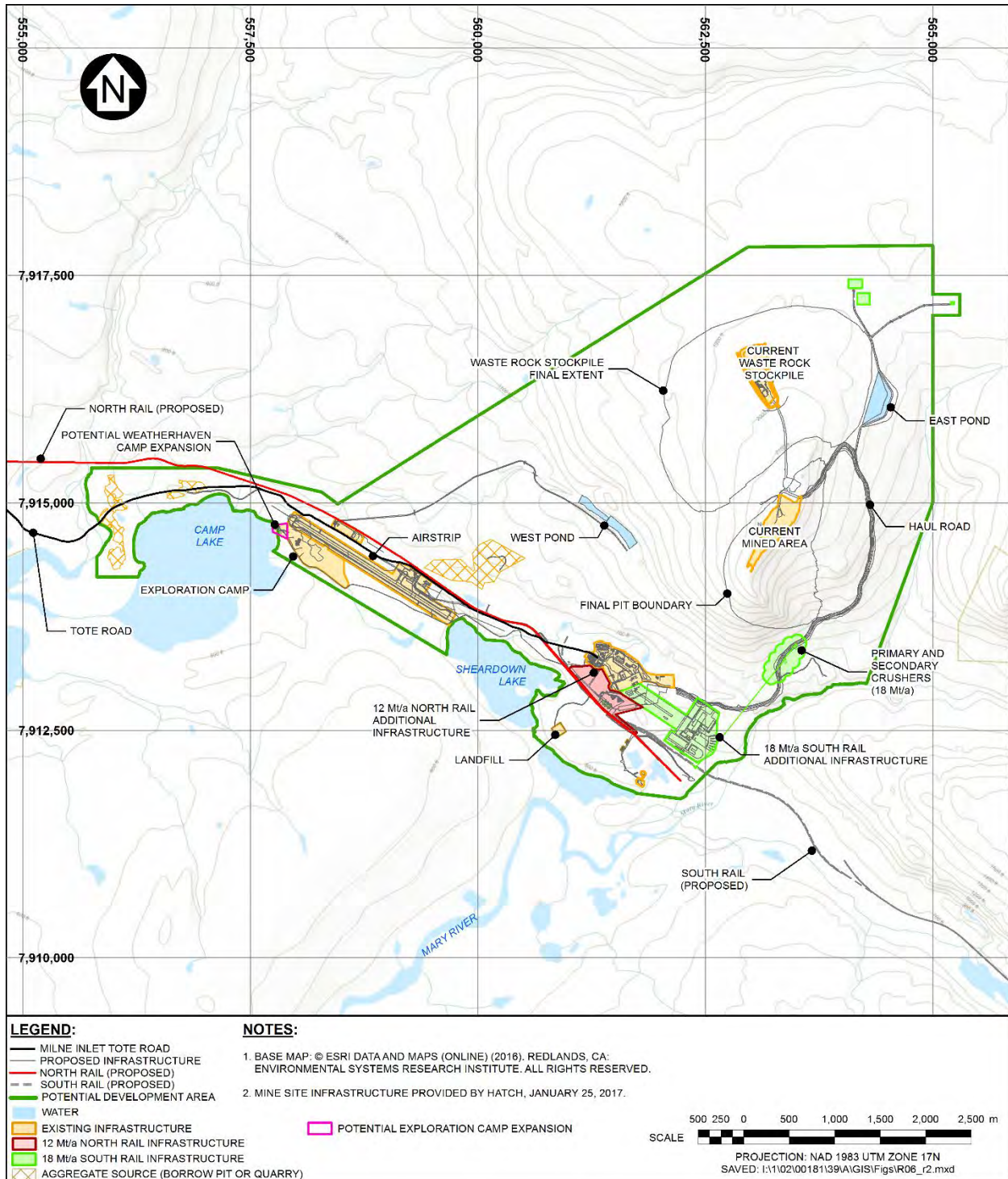
Figure 5.2 Existing Mine Site - Photo #2



Figure 5.3 **Proposed Phase 2 Additional Components at Mine Site**



Figure 5.4 Mine Site Layout



Total mine life is not expected to change as result of the proposed Phase 2 expansion relative to what was initially submitted in the FEIS. This is attributed to a slower ramp up in production than originally planned. See Table 5.2 for proposed mine production schedule that considered Phase 2 proposal.

Table 5.2 Proposed Development Schedule

Calendar Year	Operating Year	Annual Production Rate (Mpta)	Cumulative Production (Mt)	ERP Construction	ERP Operation	Phase 2 Construction	Phase 2 Operation	Steensby/South Rail Construction	Steensby/South Rail Operation	Mine Closure	Post-Closure Monitoring
2013	-	-	-								
2014	-	-	-								
2015	1	1	1								
2016	2	2.75	4								
2017	3	4.2	8								
2018	4	4.2	12								
2019	5	6	18								
2020	6	6	24								
2021	7	6	30								
2022	8	12	42								
2023	9	12	54								
2024	10	12	66								
2025	11	12	78								
2026	12	12	90								
2027	13	12	102								
2028	14	12	114								
2029	15	12	126								
2030	16	30	156								
2031	17	30	186								
2032	18	30	216								
2033	19	30	246								
2034	20	30	276								
2035	21	30	306								
2036	22	30	336								
2037	23	30	366*								
2038	-	-	-								
2039	-	-	-								
2040	-	-	-								
2041	-	-	-								
2042	-	-	-								
2043	-	-	-								
2044	-	-	-								
2045	-	-	-								

*Resource is 365 Mt

5.2.2 Northern Transportation Corridor

A new rail line approximately 110 km in length and generally following the routing of the existing Tote Road (see Figure 5.5 and 5.6) is proposed to be constructed and operated to connect the Mine Site with the Port Site moving away from the existing Tote Road only where required due to terrain and other technical considerations (see Figure 5.8).

The development of the railway will include a number of associated components and activities, including:

- The installation of railway embankment and track, comprised of sub-ballast and ballast materials, with ties and steel rails (see Figure 5.7);
- Establishment of bridges and railway sidings at several locations;
- Locomotives, ore rail cars, fuel cars and freight cars;
- The development of bungalows, or small sheds containing power switching systems;
- Communication towers (estimated up to 15 structures);
- Terminals with ore and freight loading / unloading facilities at the Mine Site and Milne Port; and
- A railway maintenance workshop and yard at Milne Port.

The required railway fleet is estimated at approximately five (5) locomotives and 176 cars. In order to support the planned 12 mtpa rate of mine production, it is expected that the rail operations will consist of two train sets, each consisting of two diesel-electric heavy haul locomotives hauling between 72 and 80 open top ore cars. The locomotives themselves are approximately 23 m long, weigh 190 tonnes and are powered with AC diesel generators, as well as other equipment and control systems that are suitable for the cold climate.

The design speed for the railway will be a maximum of 75 km/h, and the initial maximum operating speed is expected to be 60 km/h or less. Ore trains will not operate on the same section of track simultaneously. Safety systems will assist in the detection of any malfunctioning railway rolling stock or rails. A rigorous schedule of inspections and maintenance for all railway equipment and infrastructure will be implemented. Loaded trains will be subject to a visual safety inspection at the start of every trip, and locomotives and cars will be subject to regular inspection and maintenance as required. Regular train schedules will be generally sufficient for keeping the main line free of snow. Remote switches at sidings will be provided with snow blowers to prevent the switch points from becoming blocked, and track maintenance equipment will "broom" turnouts in yards. Sites identified during early operations as susceptible to drifting may be protected with snow fencing and will be subject to regular observation by the track maintenance crews. It is estimated that the cycle time of the rail way will be approximately nine (9) hours and five (5) to six (6) trains would be loaded per day.

Caribou crossings will be established based on observed caribou migration trails. Level crossings with the existing Tote Road along the rail line will be established with safety and communications systems in place prior to operation.

Level crossings will be established along the railway to accommodate travel by hunters and trappers using snow mobile and ATV. The location of the crossings will be confirmed based on traditional knowledge and consultation with the local communities.

In addition to the construction and operation of a rail line within the Northern Transportation Corridor, the proposed Phase 2 expansion will see a number of upgrades and improvements to the existing Tote Road to facilitate its use during the initial stages of Phase 2 for the transportation of iron ore and the movement of construction materials for the railway. These will include the installation of new bridges, culvert replacements and extensions, road base improvements, the realignment of several road sections and grade reductions in places.

These construction activities will require material from several approved quarry and borrow sites in the region. There will also be an associated (temporary) increase in the number of truck transits on the roadway until the railway is developed. Once the railway is in place the Tote Road will remain operational, but its use by Baffinland will drop substantially and will be limited to moving personnel and key goods.

Figure 5.5 Existing Northern Transportation Corridor (Tote Road) - Photo #1



Figure 5.6 Existing Northern Transportation Corridor (Tote Road) - Photo #2



Figure 5.7 Proposed Rail Cross Section

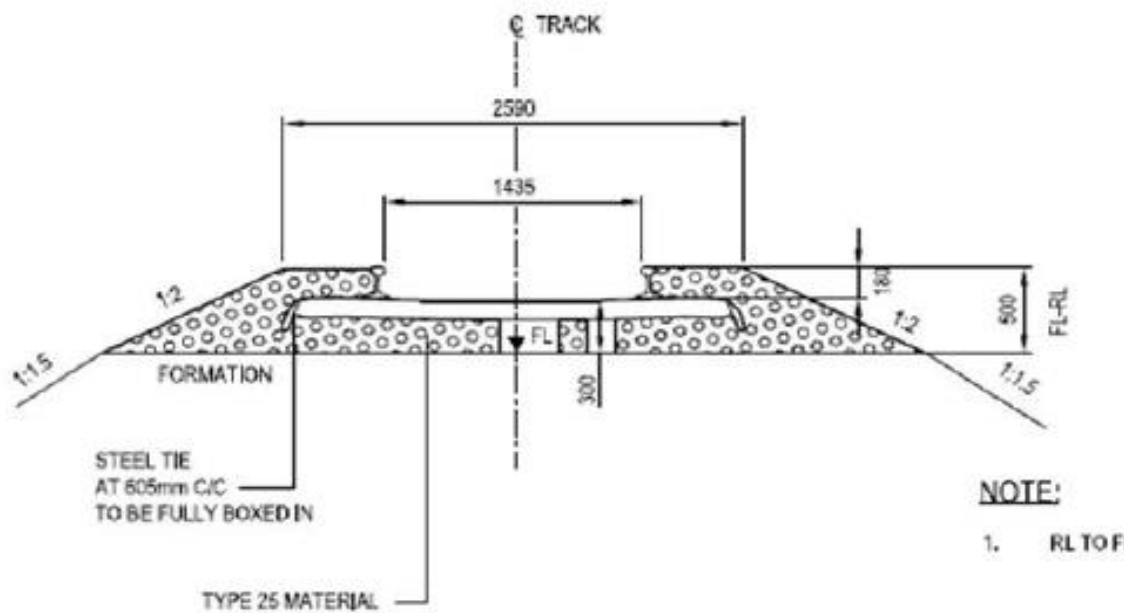
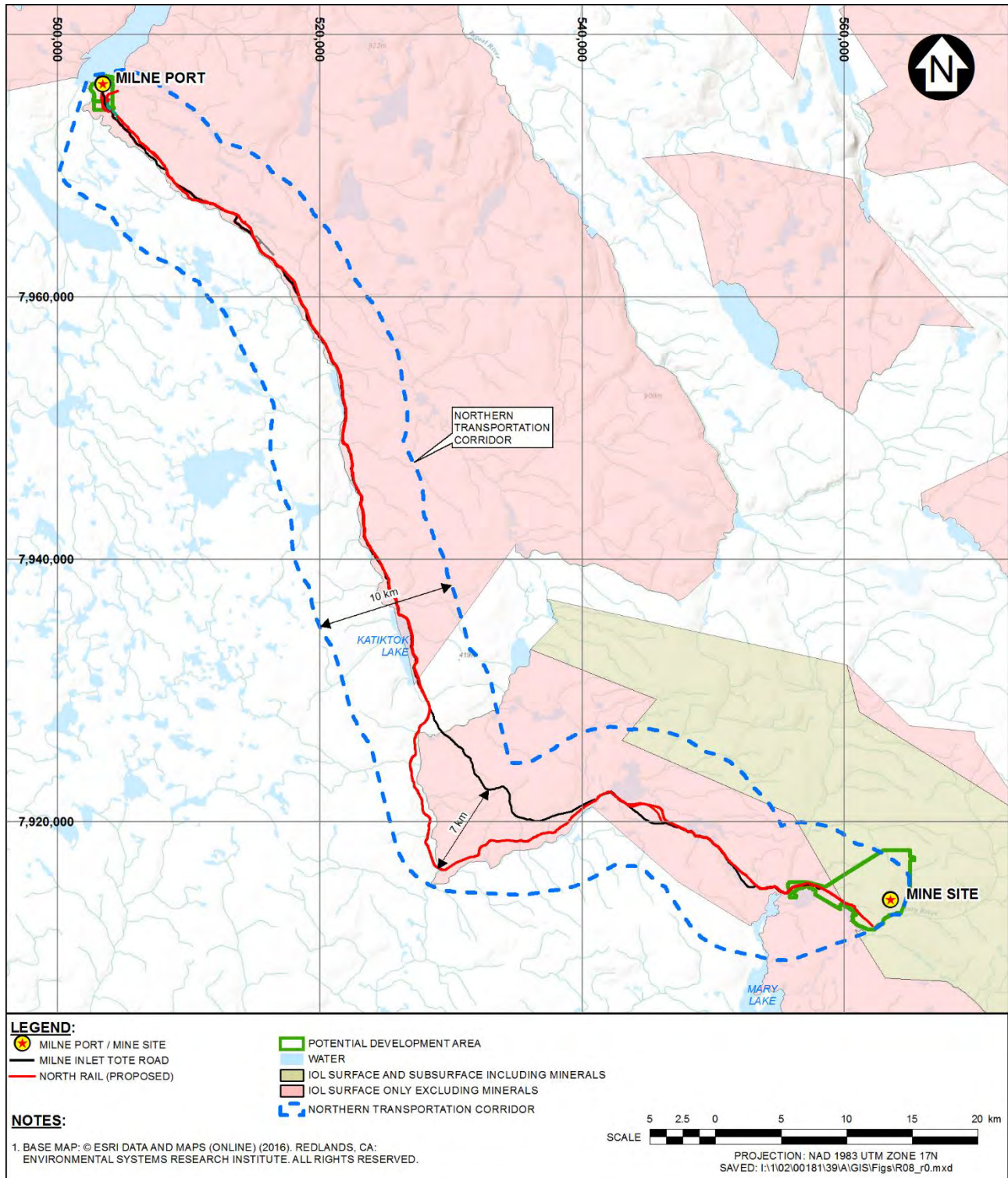


Figure 5.8 The Northern Transportation Corridor and Planned Railway



5.2.3 Port Facility

Existing infrastructure at the Port Site is shown in Figure 5.10 and 5.11. At the Port Site, the proposed Phase 2 development will see an increase in ore handling and shipping from the 4.2 mtpa rate of production achieved through the initial ERP development, up to an output of 12 mtpa. In order to facilitate this increase of production while accommodating Baffinland's shipping strategy the Project Development Area (PDA) is required to be slightly expanded to the South at the Port Site and the following infrastructure is proposed to be developed: a second ore dock and ship loader to accommodate Cape sized vessels; development of railway car unloading system, rail yard, and railway maintenance facility; installation of an enclosed ore crushing facility (indoor secondary crushing and screening); additional fuel storage; additional accommodation and support infrastructure (sewage treatment, water treatment, power generation); and expansion of the existing ore laydown area (see Figures 5.10 and 5.11).

Figure 5.9 Existing Milne Port Facility



In terms of the operation of the port site, until the completion of the planned rail infrastructure the iron ore haul trucks will again continue to travel to the port via the Tote Road. Once at the port site, they will dump coarse ore on a stockpile adjacent to the crusher building. This ore will be reclaimed by front-end loaders and fed to the crushing plant.

Rail infrastructure and access at the port will include tracks to provide service to the ore unloading facility and the railway maintenance yard. The railway maintenance facility at the port site will include maintenance shops and management offices. A shop for the care of track maintenance equipment, and a general storage area for spare parts and consumables will support year-round operations. Track maintenance crews will be housed at Milne Port. Locomotives will be fueled by a fixed tank located next to the track or mobile equipment. Locomotives at the far end of an ore train will be fueled by fuel truck. Fueling locations will be designed with spill containment to reduce the risk of a release.

Once the railway itself is developed and operational, the cars will be unloaded at Milne Port using a rotary dumper without any requirement to uncouple the cars. The material will then be stockpiled and conveyed from the rail unloading area to the crusher building.

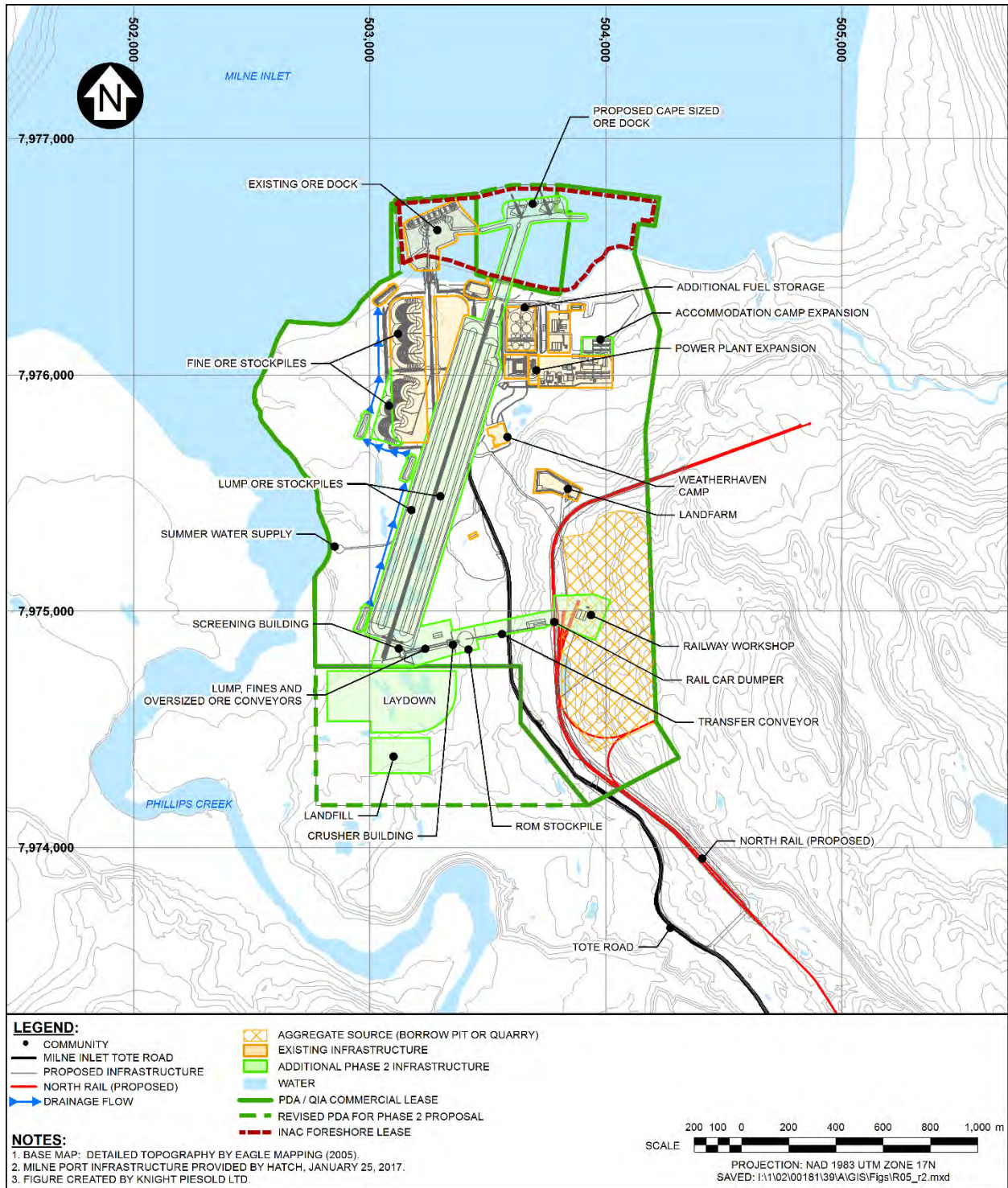
During the shipping season ore will be reclaimed using the travelling reclaimer, which will load the ore onto the stacking / reclaim conveyor. The dock complex will be equipped with truss supported belt conveyors which will transfer iron ore from the stockpile feed conveyors to a ship-loading assembly at the two ore docks. The ship loaders will be anchored to the dock and be designed to load a range of cargo vessels. A systems control unit will be employed for control of the ship loaders and conveyors. Weigh scales and product samplers will be installed on the conveyors as required to facilitate inventory recording and quality control sampling.

Tugs and line boats will be used to shift the ore vessels from anchorages onto and of the dock. Market ore carriers transiting towards Milne Port will proceed directly to either an open loading dock, or to one of several anchorages available in the event that the dock space is full. The tugs will also assist in vessel undocking as required.

Figure 5.10 Proposed Phase 2 Additional Components at Mine Site



Figure 5.11 Milne Port Infrastructure and Planned Expansion



5.2.4 Northern Shipping Corridor

The Phase 2 Expansion Project will also see an increase in total vessel traffic to and from Milne Port but proposes no changes to existing Northern Shipping Corridor. Baffinland's optimized shipping strategy has been developed to maximize shipment during the open water season by increasing the capacity of the proposed second ore dock to increase the capacity of the port, as described in the previous section. In response to community input, the ore shipping season is proposed to be from July 01 to November 15, but will be adapted annually in consultation with the Pond Inlet Hunters and Trapper Organization (HTO) based on ice conditions and thickness.

To maximize the capacity and use of the port, a variety of market vessels will be used depending on the time of year and availability. These may include:

- Supramax vessels (55,000 dwt);
- Panamax vessels (75,000 dwt);
- Post Panamax vessels (90,000 dwt); and
- Cape size vessels (250,000 dwt).

Ore shipments will be focused on optimizing shipping during the open water season. Direct shipping with market ore carriers during the open-water season in July will start with ice class Supramax and Panamax market vessels. This will be followed by the use of market Panamax, Post-Panamax and Cape vessels transiting direct to customer ports. All efforts will also be made to ship fuel and freight during the open water season. However, Baffinland will be seeking the ability to conduct winter sea lift of freight if required to support on-going operations. All vessels (ore carriers, freight vessels and fuel tankers) will adhere to the current speed restrictions when transiting through Eclipse Sound and Milne Inlet and follow the existing Northern Shipping Corridor (see Figure 5.12).

All efforts will also be made to ship fuel and freight during the open water season. However, Baffinland will be seeking the ability to conduct winter sea lift of freight if required to support on-going operations.

All vessels (ore carriers, freight vessels and fuel tankers) will adhere to the current speed restrictions when transiting through Eclipse Sound and Milne Inlet. Peak shipping months for Phase 2 would be July, August and September which would see an estimated 38, 65, and 55, trips past Pond Inlet respectively, inclusive of ore carriers, freight and fuel. It should be noted, one trip past Pond Inlet amounts to two vessel transits along the shipping route (inbound and return from Milne Port). A potential 'optimized' iron ore shipping schedule, subject to change based on ship availability, operational constraints, climatic conditions, and community consultation in a given year is presented in Table 5.3.

Table 5.3 Potential 'Optimized' Iron Ore Shipping Schedule

Period	Dates	Ship Type	Ships Loaded Dock #1	Ships Loaded Dock #2
Early Season	Jul 25 – Aug 14	Ice Class	14x Supramax	24x Panamax
Mid-Season	Aug 15 – Sep 20	Non-ice class	22x Panamax	28x Cape Size
Late Season	Sep 21 – Oct 15	Ice Class	8x Supramax*	24x Panamax

* Loading of fines at Dock #1 has been maximized early season during milder weather conditions. There is surplus capacity to load additional Supramax ships Late Season if required to ship excess product (fines or lump).

Figure 5.12 Northern Shipping Corridor



5.3 Schedule

Based on current planning and subject to change based on the approval process and other factors, the Phase 2 Expansion execution schedule is anticipated to integrate into the existing project schedule as outlined in Table 5.2.

5.4 Authorizations

A preliminary review of authorizations required for the Phase 2 Expansion indicates that the following approvals may include, but are not limited to:

- NPC Conformity Determination;
- Amended Project Certificate;
- Amended Inuit Impact Benefit Agreement;
- Amended Commercial Lease for Inuit Owned Land;
- Amended Type A Water Licence;
- Type B Water Licence - Construction;
- Amended Land Use Lease - Milne Foreshore;
- Land Use and Quarrying Permits;
- Quarry Concession Agreement (Quarries on Inuit Owned Land);
- Fisheries Authorization - Second Ore Dock;
- Fisheries Authorization - Railway Crossings;
- Navigable Waters Authorizations;
- Licences for the Manufacture and Storage of Explosives

5.5 Basis for Selection

The following section describes the basis of selection of the rail alignment route that is proposed. The basis for selection for the Northern Shipping Route is not addressed as not changes to this route are sought.

5.5.1 Railway Route Selection

Selection of the preferred routing for the north rail involved the consideration of the performance criteria for assessing alternatives. This includes:

- Technical feasibility;
- Regulatory acceptability;
- Cost-effectiveness;
- Impacts on the natural environment;

- Impacts to the socio-economic environment (mainly land use); and
- Community preference or acceptability.

The preferred route selected parallels the Milne Inlet Tote Road to the extent feasible, considering ground conditions as well as grade and turn radius limitations of railways (see Figure 5.8 and 5.13). Selection of the proposed rail route considered the following factors:

- Minimises negative impacts on community lifestyles by following the existing Tote Road to the extent feasible;
- Improves access to other resources having high potential for development, maintaining the shortest practicable distance between the primary resource areas and the trans-shipment location;
- Designed in accordance with existing and prospective land use capability including topography, soil, permafrost and wildlife has been designed in accordance with the availability of granular supplies;
- Strives to not negatively impact community business, residential and projected expansion areas;
- Strives to not negatively impact important fish and wildlife harvesting areas;
- Strives to not impact key habitat for fish and wildlife species, especially areas used by endangered species; and
- Strives to not impact high scenic, historic, cultural and archeological value.

5.5.1.1 General Characteristics of the Northern Transportation Corridor

The Northern Transportation Corridor generally follow a northwest-southeast oriented glacial valley between Milne Port and the Mine Site. Surficial deposits along this alignment include till veneer or blankets on the higher elevations with some drumlins and moraines. Glaciofluvial outwash sediments (gravel and sand) forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand) are typically found in the valley floors.

While limited bedrock exposure is notable along the Northern Transportation Corridor, bedrock is present at relatively shallow depths along much of the alignment, covered by the till veneer. Starting at Milne Port, and alignment crosses approximately 20 km of Precambrian terrain, glaciofluvial sand and gravel terraces. Further south, the rail alignment spans across relatively flat lying Paleozoic rocks mainly dolomitic limestone units for approximately 70 km. The final stretch of the rail alignment traverses glaciolacustrine and glaciofluvial plains, terraces, eskers and bedrock outcrops ranging from granitic gneiss to sedimentary rocks.

Fragile landscapes in the region are generally associated with frost/thaw sensitive till blankets and the presence of massive ground ice within glaciofluvial deposits. A number of areas of high potential for ground ice content are present along the Tote Road alignment and in the vicinity of the Mine Site. Geotechnical investigations conducted in 2016 along the proposed alignment prompted localized adjustments to the routing to avoid massive ice deposits. Further geotechnical investigations are planned in 2017.

5.5.1.2 Selection of the Preferred Rail Route

The proposed routing of the north railway is shown on Figure 5.8. Starting from Milne Port, the railway will run alongside the Tote Road within the Phillip's Creek valley to the top of the watershed at km 57. From this point until km 84.5, it is necessary for the railway to deviate from the Tote Road alignment, travelling west of the road to circumvent a localized height of land to maintain acceptable grades for the railway. The only alternative to circling this hill would be to undertake a massive excavation, which would be both costly and create a large disturbance on the landscape (see Figure 5.13). The maximum distance between the rail alignment and the Tote Road is 7 km, which is less than the 10 km wide transportation corridor concept indicated by the Nunavut Planning Commission (NPC) in its Draft Nunavut Land Use Plan (NPC, 2016). From km 84.5 to the Mine Site, the railway once again parallels the Tote Road.

Figure 5.13 Coloured Elevation Image of The Northern Transportation Corridor



NOTE:

1. Red = high elevation, Blue = low elevation.

Locating the railway adjacent to the existing Tote Road is preferred for the following reasons:

- The alignment is located along the existing transportation corridor established by Amendment No. 2 of the North Baffin Regional Land Use Plan. Transportation corridors are established under land use planning principles with the intent of accommodating future transportation and/or communications facilities, to minimize the overall disturbance to the landscape. Therefore, construction of the north railway along the existing transportation corridor is consistent with both land use planning principles and with the amended NBRLUP.
- The existing road is available to support construction, which significantly reduces the railway construction costs. By comparison, when Baffinland builds the south rail in the future, it will be necessary to construct a dedicated construction access road to facilitate construction, because a road does not currently exist in that location. Selection of an alternative route for the north railway would require additional construction access roads.
- By using a common transportation corridor, impacts to land users as well as wildlife is minimized. Losses of wildlife habitat, sensory disturbance effects to wildlife, and impacts to Inuit land use and harvesting are minimized.
- Archaeological surveys over multiple years along with mitigation of site through systematic data recovery have established that while archaeological sites do exist within the corridor, no culturally significant sites have been identified to date.

Paleontological studies of the area have identified the existence of several sedimentary deposits may overlap with the railway alignment, and these deposits may contain fossils (Rybczynski, 2008). Paleontological resources are protected under the same territorial legislation as archaeology: the Nunavut Archaeological and Paleontological Sites Regulations, pursuant to the *Nunavut Act*). Baffinland will retain a qualified paleontologist to investigate the potential for fossil-bearing sedimentary bedrock, and will develop a plan to mitigate impacts to paleontological resources that may be affected by cuts into the bedrock associated with rail construction.

5.5.1.3 Consideration of Inuit Land Use

The location of the railway alignment in relation to outpost camps as well as hunting and travelling routes is an important consideration. The only outpost camp in the area is located on the west side of Camp Lake; this is the Mittimatalik Hunters and Trappers Organization (MHTO) cabin that Baffinland constructed in 2013 to compensate for the former MHTO cabin located within the Mine Site. In the vicinity of the outpost camp, the railway is located further away than the existing Tote Road.

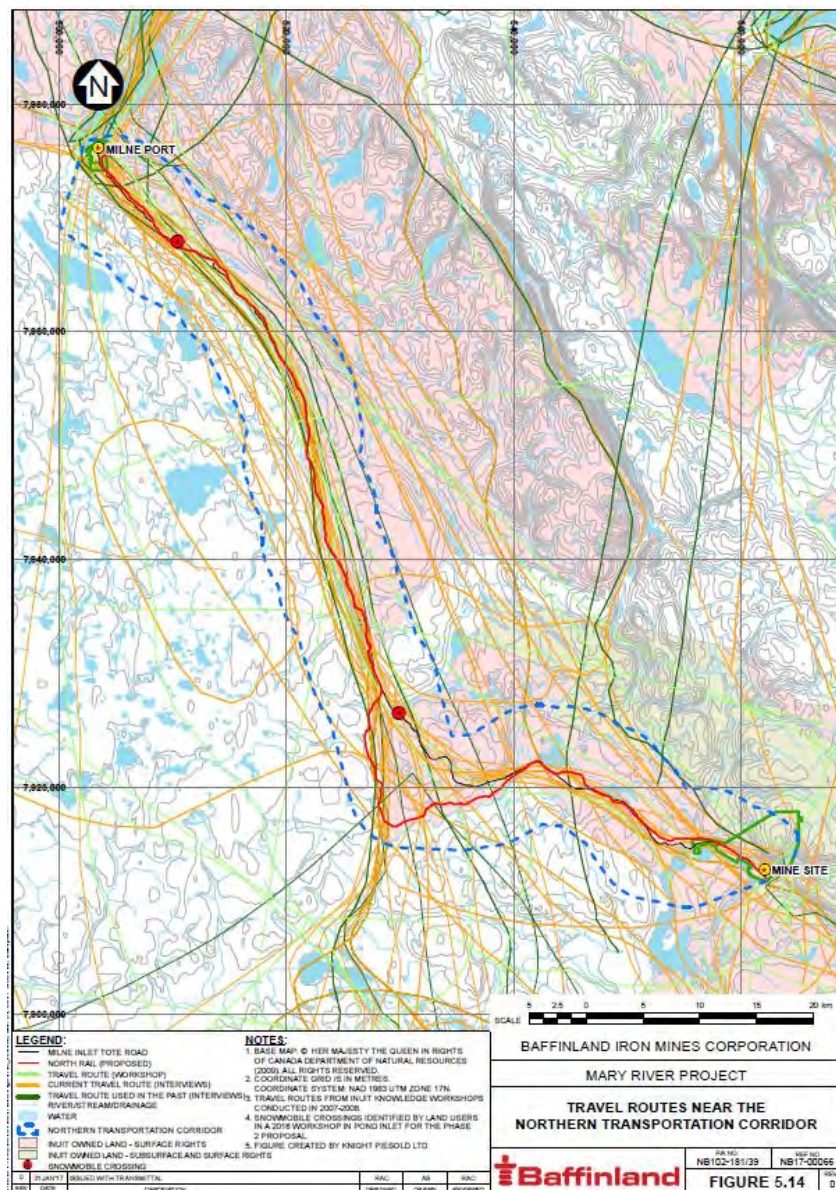
Inuit travel extensively throughout the North Baffin region, including in the vicinity of the Milne Inlet Tote Road and the proposed north railway. Primary travel routes, derived from Inuit knowledge workshops completed in the late 2000's for the Project, is presented on Figure 5.14. This information was presented previously in FEIS Appendix 4C (Knight Piésold, 2010). As shown, travel routes were found to generally travel parallel to the existing Northern Transportation Route alignment without crossing it and have numerous alternatives.

The Phillip's Creek valley, as well as the Tugaat River to the northeast, are important routes for hunters accessing the inland as well as for inter-community travel between Pond Inlet and Igloolik or Hall Beach.

A certain amount of Inuit travel (by snowmobile or ATV) occurs along the Milne Inlet Tote Road, though Inuit knowledge work completed by Baffinland suggests that the road is not necessarily selected as a preferred route, which considerable (pre-project) routes shown to be parallel to but offset from the road. The Pisiksik Working Group (pers. comm., 2006) indicated that travelers follow the road alignment occasionally because of easier travel; however, snowmobile traffic will also follow parallel routes inland, in part seeking better snow conditions.

Some travel from Milne Inlet, the Tugaat River or other coastal entry points inland reach the height of land at the top of the Phillip's Creek watershed (just south of Katiktok Lake) and head due south towards Foxe Basin.

Figure 5.14 Travel Routes near the Northern Transportation Corridor



5.5.1.4 Consideration of Public Safety

The current Tote Road poses a public safety concern due to the interaction of mine trucks and land users. To mitigate these effects and ensure the safety of all users, Baffinland has implemented its Roads Management Plan (BAF-PH1-830-P16-0023), which includes a Hunter and Visitor Site Access Procedure. This controlled access eliminates potential interactions with hunters along the road, and provides a benefit to the hunters also in terms of accessing inland areas.

It will be necessary to continue with the current approach of managing access to the Tote Road on the basis of safety concerns during the first stage of the Phase 2 Proposal, when the combined ore haulage and rail construction activities will be undertaken. Once the railway is operational, Project traffic on the Tote Road will be reduced by not eliminated. Baffinland will likely maintain its current practices in regard to managing access to the Tote Road, as described in its Roads Management Plan. Baffinland will modify the Railway Management Plan developed in the FEIS to be specific to the North Rail.

While Baffinland will manage access along the Tote Road, the railway will be designed and operated to consider safety issues related to crossing the railway track. This was considered for the south rail in the FEIS (Volume 4, Section 10.5.2). Snowmobile crossings will be possible at most but not all locations during snow cover. A representative railway embankment cross-section is provided in Figure 5.7.

The embankment slopes along most of the alignment will be blasted rock, which will be large diameter and angular material. While this material is not dissimilar to the local terrain, and with snow cover, will likely be passable with a snowmobile, ATVs may experience difficulties in some locations. To ensure safe crossing, several mitigation measures were identified in the Railway Maintenance Management Plan presented in FEIS (Volume 10, Appendix 10D-9.1). This plan will be updated to reflect conditions specific to the north railway. The plan considers two primary mitigation measures to address public safety hazards along the railway: public education, and the establishment of designated locations for safe crossing.

To ensure safety the proposed “snowmobile crossings” at strategic locations will consist of signage, a surface treatment of finer filled material over the embankments, and wooden timbers next to the steel rails, to prevent ATVs and snowmobiles from getting caught. The location of these crossings will be finalized after consultation with the communities. Discussions of safety aspects in relation to the railway, crossing it, and travel in inclement weather will be included in these consultations. A photo of a typical crossing was presented in the FEIS Volume 4 as Figure 4-10.9. Standard road crossings will also be constructed at locations where the Tote Road crossings the north railway.

The safety and ease of travel will remain an important aspect post closure. The steel rails, culverts and bridges will be removed, and the railway embankments will remain in place, however natural drainage patterns along the corridor will be restored to the extent practical.

5.5.1.5 Consideration of Effects to Wildlife

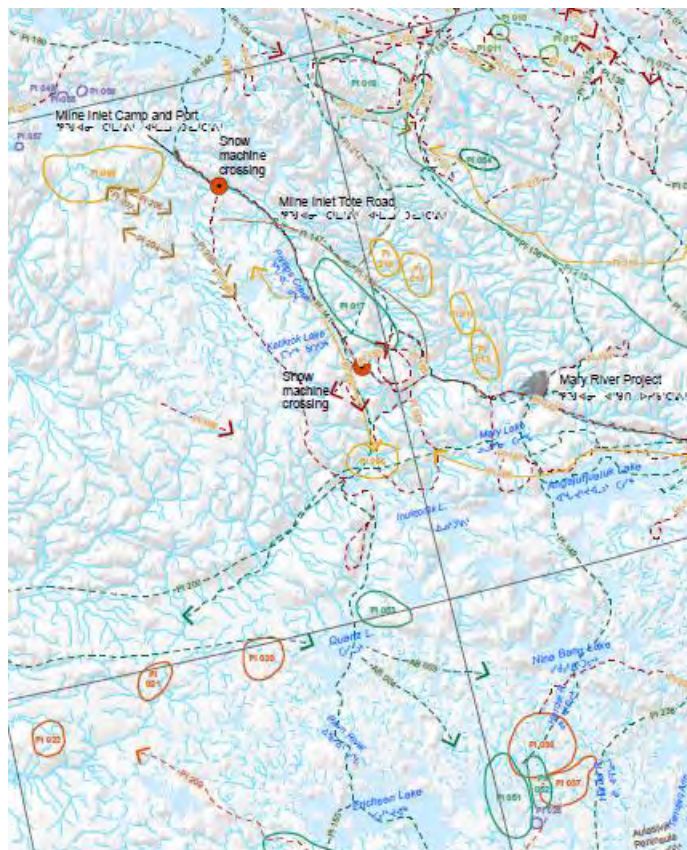
Caribou are a key wildlife resource for local communities, and therefore consideration of impacts to terrestrial wildlife focuses on caribou as a key indicator of other terrestrial wildlife.

Conversion of ore haulage operations from road to rail, and construction of the railway adjacent the existing road within the Northern Transportation Corridor, presents a number of advantages with respect to impacts to caribou. These include:

- The substantial reduction in traffic associated with the railway will reduce sensory disturbance effects;
- The railway can be constructed from the Tote Road, avoiding the need to construct a dedicated construction access road, which will minimize the overall disturbance footprint;
- Use of a railway will minimize dust generation and resultant impacts to vegetation as caribou forage; and
- The location of the railway within the valley avoids sensitive calving habitat at higher elevations.

As described in Section 6, Baffinland has undertaken considerable discussion with local communities and hunters regarding the potential impacts of a railway on caribou. Inuit knowledge widely agrees that the predominant movement of caribou is from the south to the north. More recently, Baffinland conducted a caribou workshop in Pond Inlet focusing on the Phase 2 Proposal. Information on caribou and the proposed north railway was collected at a caribou workshop held in Pond Inlet in November 2015. This information was subsequently verified at follow up workshops in Arctic Bay and Pond Inlet in April 2016. The results of the Phase 2 workshops are summarized by Jason Prno Consulting Services Ltd. (2017) and a copy of the Phase 2 Community Workshop Report has been uploaded to the NPC Project Proposal website alongside this proposal as a separate document. An excerpt from a figure produced by EDI (2016), presented in JPCSL (2017), is presented as Figure 4.15.

Figure 5.15 Inuit Knowledge of Caribou in Relation to Phase 2 Proposal



Additional caribou information relevant to the Northern Transportation Corridor (including the north railway) includes caribou trail mapping completed along the Milne Inlet Tote Road (EDI, 2011). The objective of this work was to determine movement trajectories and identify important crossing areas. Caribou trails were marked, and the angle at which the trail approached the rail line (crossing or parallel) and substrate material (wet vegetation, dry vegetation, sand, and rock) were described. Professional judgement was applied to the data to classify crossing trail density as high, medium, and low. Segments within each of the classes were ground-surveyed for animal sign to verify aerial trail survey results, collect finer-scale wildlife use information, and identify broad timing windows (recent and old) of use. The mapped trails from EDI (2011) are presented as Figure 4.16. Based on the identified caribou movement and crossing areas, crossing design will be incorporated directly into the design and operation of the overall railway. In addition, additional workshops to evaluate likely areas where caribou would likely interact with the rail route based on the current design and where crossings would be best located will occur.

Figure 5.16 Caribou Crossings near the Northern Transportation Corridor



6 Description of the Existing Environment

A comprehensive description of the existing biophysical and socioeconomic environment can be found in Volume 4 thru 8 of the Mary River FEIS and its Amendment No.1. These are available on the NIRB Public Registry, which is available [here](#).

Any updated description of the existing biophysical and socioeconomic environment required for impact assessment purposes will be provided in the associated Environmental Impact Statement (EIS) amendment in the event the proposal proceeds to that stage.

7 Mitigation Measures

In effort to address potential land use interactions and ensure conformity with the NBRLUP, Tables 7.1, 7.2, and 7.3 present a summary of the proposed mitigation measures and monitoring programs related to rail, open water shipping and winter shipping, respectively, associated with the proposed Phase 2 development.

The detailed mitigation measures are focussed on the changes in the project proposed under the Phase 2 Expansion Project and do not include the current monitoring and mitigation measures that are included in the Project Certificate Conditions, Water Licence(s), Inuit Impact Benefits Agreement, Commercial Lease for Inuit Owned Lands and other regulatory permits and agreements for the current Mary River Project.

The current monitoring and mitigation programs have been developed in consultation with the local North Baffin communities through community meetings and traditional knowledge workshops, the Qikiqtani Inuit Association, NIRB, the Marine and Terrestrial Environment Working Groups, and other consultations with government researchers, academia and NGO's.

The proposed mitigation measures below will be discussed and refined through the environmental assessment process and following discussions with all of the interested stakeholders. Following the approval of Addendum No 2 to the Mary River Project Certificate for the Phase 2 Expansion Project, Baffinland will incorporate the agreed to monitoring and mitigation programs into existing environmental management plans.

Table 7.1 Proposed Mitigation Measures and Monitoring Programs - Rail

NBRLUP Conformity Criteria	Potential Land Use Interaction/Concern	Proposed Mitigation Measures and Monitoring Plans
<ul style="list-style-type: none"> Harm to Wildlife 	<ul style="list-style-type: none"> Dust Generation Movement (reduced Frequency of Caribou Crossing infrastructure) Mortality (collisions and harvest) Health (exposure to contaminants) 	<ul style="list-style-type: none"> Standard operating protocols to minimize dust generation and dispersal Switch to rail for ore haulage vs. truck Rail development adjacent to existing Tote Road Low speed train travel Construction of wildlife crossings based on traditional knowledge, community feedback and trail surveys Caribou Crossing Protocol for rail operations Dustfall monitoring Continuous monitoring of SO₂ and NO_x Wildlife observations log Height of Land monitoring Snow track and snow bank monitoring Incidental observations Wildlife monitoring by HTO Speed limits on roads Seasonal traffic limitations if required Record of wildlife collision on railway Record of all observed wildlife mortality reported by personnel Log of hunters passing through the camp “no harvesting/hunting” camp policy Implementation of Terrestrial Wildlife Management Plan, Railway Management Plan, and Railway Emergency Plan On-going engagement HTO, GN Environmental, Department and Terrestrial Environment Work Group

NBRLUP Conformity Criteria	Potential Land Use Interaction/Concern	Proposed Mitigation Measures and Monitoring Plans
<ul style="list-style-type: none"> Harm to Wildlife Habitat/ Environment 	<ul style="list-style-type: none"> Habitat Loss (direct and indirect) 	<ul style="list-style-type: none"> Construction adjacent to Tote Road to consolidate disturbance and avoid need of access road construction Caribou collaring program triggered if abundance monitoring information points to caribou avoidance of Regional Study Area Implementation of Terrestrial Wildlife Management Plan, Railway Management Plan, and Railway Emergency Plan On-going engagement with HTO, GN, and Terrestrial Environment Work Group
<ul style="list-style-type: none"> Disruption to Community Travel Routes and Traditional Land Use Activities 	<ul style="list-style-type: none"> Restriction of Movement of Persons Wildlife Disturbance 	<ul style="list-style-type: none"> Construction adjacent to Tote Road to consolidate disturbance and avoid need of access road construction Low speed train travel Level crossings and delineation of railway with reflective markers and bilingual signage (English and Inuktitut) Site observations; recorded visits to project sites Community consultation, communication plan and notification of activities Safety Plan, including resources to enable an emergency response On-going engagement with HTO, Mary River Community Working Group and Terrestrial Environment Work Group Implementation of Stakeholder Engagement Plan, Railway Management Plan, and Railway Emergency Plan

Table 7.2 Proposed Mitigation Measures and Monitoring Programs - Open Water Shipping

NBRLUP Conformity Criteria	Potential Land Use Interaction/Concern	Proposed Mitigation Measures and Monitoring Plans
<ul style="list-style-type: none"> Harm to Wildlife 	<ul style="list-style-type: none"> Disturbance caused by Underwater Noise, Pulsed or Continuous; Mortality from Collisions with Vessels 	<ul style="list-style-type: none"> Focus shipping on open water from July 1 to Nov 15 with HTO consultation Wildlife observations log Reduce vessel idling at dock side Maintain constant speed and course when possible Educate workers about marine wildlife safety; work areas kept clean of food scraps, garbage, and toxic materials; use of bear monitor at camp sites; use of bear deterrent devices Implementation of Shipping and Marine Wildlife Management Plan and Spill at Sea Response Plan On-going engagement with HTOs, Marine Environment Work Group
<ul style="list-style-type: none"> Harm to Wildlife Habitat/ Environment 	<ul style="list-style-type: none"> Change in Habitat caused by Dock Footprints 	<ul style="list-style-type: none"> Habitat compensation for second dock Focus shipping to open water Wildlife observations log On-going engagement with Marine Environment Work Group Implementation of Shipping and Marine Wildlife Management Plan and Spill at Sea Response Plan
<ul style="list-style-type: none"> Disruption to Community Travel Routes and Traditional Land Use Activities 	<ul style="list-style-type: none"> Restriction of Movement of Persons Wildlife Disturbance 	<ul style="list-style-type: none"> Focus shipping to open water Community consultation, communication plan, ship location notification website and notification of activities Safety Plan, including resources to enable an emergency response On-going engagement with Mary River Community Working Group, HTOs and Marine Environment Work Group Implementation of Shipping and Marine Wildlife Management Plan and Spill at Sea Response Plan

Table 7.3 Proposed Mitigation Measures and Monitoring Programs - Winter Shipping

NBRLUP Conformity Criteria	Potential Land Use Interaction/Concern	Proposed Mitigation Measures and Monitoring Plans
<ul style="list-style-type: none"> Harm to Wildlife 	<ul style="list-style-type: none"> Disruption of Seal Pupping 	<ul style="list-style-type: none"> Seal den survey Wildlife observations log Implementation of Shipping and Marine Wildlife; Management Plan
<ul style="list-style-type: none"> Harm to Wildlife Habitat/ Environment 	<ul style="list-style-type: none"> Change in Habitat caused by Icebreaking and Ice Management Change in Habitat caused by Dock Footprints Disruption of Seal Dens 	<ul style="list-style-type: none"> Seal den survey Wildlife observations log Limited the number of winter sea lifts annually Implementation of Shipping and Marine Wildlife Management Plan
<ul style="list-style-type: none"> Disruption to Community Travel Routes and Traditional Land Use Activities 	<ul style="list-style-type: none"> Pond Inlet Floe Edge Activities Sea Ice Seal Hunting Seal Pup Hunting Use of Ice Cracks Ship Track Crossing (e.g. to access floe edges and Button Point, marine mammal harvesting, sport hunting, fishing, travel to Arctic Bay) 	<ul style="list-style-type: none"> Deployment of ice bridge system to allow for safe passage across ship's tracks Delineation of ship's tracks with reflective markers and bilingual signage (English and Inuktitut) Community consultation, communication plan and notification of sea lift activities Safety Plan, including resources to enable an emergency response Refreeze and ice quality monitoring of ship's tracks; and On-going engagement with Mary River Community Working Group and Marine Environment Work Group

8 Conclusion

Baffinland continues to pursue a phased approach to the development, operation and planned growth of the Mary River Project. Through its early development, the Project has been an important economic driver in Nunavut, creating significant direct employment and business activities throughout its construction and operations phases. Through these direct and spin-off employment and business benefits and associated

taxation revenues, the Project has been and remains a vital component of the current socioeconomic structure of the area, and has made significant economic contributions at the community, territorial and national scales. In an effort to maintain these gains, to insulate the Project from extended negative market environments and to generate sustained positive cash flow from operations required to make the Project viable and attractive to investors for funding for future phases and full project development, Baffinland feels the Project needs an additional development phase to expand to a level of 12 mtpa by the Northern Transportation Corridor via the Northern Shipping Route with a lower cost rail transport to port, also known as Phase 2.

The Phase 2 Expansion Project development concept is based on technical, economic, environmental and other factors. These include:

- It will increase the overall scale of the Project, and in doing so, will extend and help sustain the important employment opportunities, skills development and work experience, and business opportunities that are resulting from it. The Phase 2 proposal further increases and diversifies these economic benefits of the Project.
- The Project itself is at a stage where an increased level of production is required to reach the associated economy of scale necessary to facilitate its on-going operation and future growth as a multi-generational development.
- Although the planned development of the railway has a clear upfront construction cost, once in place it will significantly reduce the operating costs associated with the Project, thereby contributing to overall Project viability over the long-term. Moreover, it would be economically, technically and logistically difficult, if not impossible, to transport the iron ore products associated with a 12 mtpa and beyond mine operation over the Tote Road. The development of the rail to the north is therefore considered critical to the future growth and sustainment of the Project.
- Using increased truck traffic along the Tote Road to increase production road would create important safety concerns related to the overall distances, remoteness, and weather and ice conditions involved. The development of the railway will mitigate the need to suspend road travel each year during periods of freeze up and thaw, thereby improving the reliability of the transportation system, and thus, the supply of iron ore to customers.
- There are environmental benefits associated with the use of rail for the terrestrial transportation of ore as it will result in far less air emissions, dust, noise and other disturbances than would be associated with the continued and increased truck traffic along the Tote Road, as well as reduced potential for interactions with wildlife.
- The planned development of the railway and the expansion of the facilities at Milne Port will allow Baffinland to focus its planned iron ore shipments on the ice free / open water period by ensuring reliable delivery of ore to port and the increase of ship loading capacity.

In addition, the Phase 2 proposal has been informed and guided by the views and perspectives raised during Baffinland's on-going regulatory, community and stakeholder engagement initiatives. Through these initiatives, Baffinland has become aware of two primary community concerns with the Project as it relates to the Phase 2 proposal. First are concerns about potential winter shipping and ice breaking,

including concerns around the possible effects of this activity on the marine environment (including marine mammals) and on Inuit land use activities and travel routes. Baffinland feels this concern has been sufficiently mitigated with the optimized shipping strategy described previously. Second was concerns about the air emissions and dust generated by the on-going (and potentially increased) use of the Tote Road to transport ore by truck to the Milne Port site, and the possibility of wildlife injury, mortalities or other such interactions and disturbances. Baffinland feels this concern will be sufficiently mitigated with the proposed development of the rail line which will result in far less air emissions, dust, noise and other disturbances than would be associated with the continued and increased truck traffic along the Tote Road, as well as reduced potential for interactions with wildlife.

It is recognized that the Phase 2 Expansion may also create potential concerns regarding the harm to wildlife, harm to wildlife habitat/environment and potential disruption to community travel routes and traditional land use activities. Baffinland feels these concerns can be mitigated with the optimized shipping schedule previously described, constructing the railway in a manner that facilitates ease of crossing for users and animals, a robust adaptive social and biophysical management program, and clear and comprehensive communication and awareness initiatives with effected communities.