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Baffinland
Iron Mines Corporation

MARY RIVER PROJECT
ENVIRONMENTAL IMPACT STATEMENT

VOLUME 4
HUMAN ENVIRONMENT — HARVESTING
SUPPLEMENT

CONSOLIDATED EFFECTS ON INUIT HARVESTING

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TRADITIONAL HARVESTING SUPPLEMENT
CONSOLIDATED EFFECTS ON INUIT HARVEST ACTIVITIES

1.1 PURPOSE AND APPROACH OF THIS SUPPLEMENT

1.1.1 Purpose

Several reviewers have pointed out that the DEIS does not provide a discussion of how the various individual Project interactions related to harvesting may combine amongst themselves or over the duration of the Project. This supplement is intended to provide additional discussion about how multiple interactions and effects may combine to influence Inuit harvesting and harvest culture. It does not add new information about Project – harvesting interactions. A summary of the interactions identified in the DEIS is presented in Appendix A to this document.

1.1.2 Approach

The approach taken to consider Project effects on harvesting is to set out a framework (Table 1) that can be used to consider the various dimensions/determinants of harvesting activity and the continuums along which each of these determinants can change.

Many characteristics of contemporary (i.e. baseline) harvesting activities are not well documented. For this reason, the framework presented below is a purely "conceptual" tool. It is intended to serve more as an aid to considering various effects more than as a predictive device. It should, nonetheless, be of value in understanding the points at which the Project may interact with harvesting and the direction these interactions have in moving harvesting along the various continuums associated with each dimension. It is acknowledged that some of the "harvesting dimensions" may have more than one continuum end-point. There is, therefore, opportunity for readers to consider alternative or additional dynamics to harvesting "evolution" and how Project interactions set out in the DEIS might affect these.

1.2 FRAMEWORK FOR UNDERSTANDING CHANGES TO HARVEST PATTERNS AND CULTURE

Inuit harvesting activities are a critical component of Nunavut's mixed economy. Harvesting serves to transfer Inuit cultural and environmental values, knowledge and skills to the next generations; produce country food that is recognized for its important contribution to northern food security; and, maintain a human presence across vast territories of the North, thereby contributing to Canadian arctic sovereignty and security objectives.

Many factors combine to determine harvesting patterns. The following table sets out, in the first column, important dimensions of harvesting. Each of these dimensions is subject to change due to many factors. Project effects are only one source of influence. The second and third columns set out points on a continuum between the "traditional" practices and what might be considered a "potential future state." The "potential future state" conditions are not intended to represent a prediction of the future but rather simply serve as an alternative and meaningful end-point for the continuum. To the extent that current trends are understood, these have been considered in setting these theoretical end-points.

Table 1 A Conceptual Framework to Assist in Understanding Changes in Harvest Activities

Harvesting Dimension	*Past/Traditional*	*Possible Trend/Future State*
Why people harvest	Survival, economic necessity, preserve self-reliance	Cultural expression, well-being, economic opportunity, preserve self-reliance
What people harvest	Wide diversity of species from sea, land, fresh water, and air	Focus on smaller number of preferred species
How wildlife is used	Shared across extended kin group	Shared and sold
When people harvest	Open-ended hunting trips, year round	Defined duration hunting trips, select times of year
Where people harvest	Preferred Destinations and Exploratory Travel - wide range	Preferred Destinations – more narrow range
Who harvests – transfer to youth	Youth learn complex skills and are fully engaged in harvesting	Youth learn only basic land skills or none at all. Many are not engaged in harvesting.
Knowledge, Skills & Technology	High knowledge and skills. Lower technology reliance. (Knowledge of terrain, skills to travel across ice and through weather, survival skills for when things go wrong.)	High reliance on technology, lower reliance on knowledge and skill (Powerful machines, GPS navigation, satellite phones and search and rescue for when things go wrong.)
Cost in dollars	Lower	Higher
Cost in time	Higher	Lower
Language of harvesting	Inuktitut – holds complex knowledge	English and "Inuktitut-light"
Wildlife populations	Regional fluctuation of populations	Regional fluctuation, local wildlife scarcity

Source: Brubacher Development Strategies, 2011. Prepared for this document.
Note: The "potential future state" conditions do not represent a prediction of the future but rather serve as a possible alternative end-point for the continuum.

1.3 HOW THE PROJECT MAY DIRECTLY AFFECT HARVESTING DIMENSIONS

The conceptual framework set out above is used to consider how Project interactions may act on the multiple dimensions and determinants of harvesting. In this section, the framework dimensions identified above are considered individually. In Section 1.4 below, the aggregate or "net" effects are considered. Section 1.5 presents a conceptual risk analysis of Project – harvesting effects based on this framework.

1.3.1 Project interactions identified in the DEIS

The DEIS presents an assessment of the Project's interactions on factor's affecting harvest activities. These include assessments of direct effects on Inuit wildlife harvesting success per level-of-effort, travel and camps. Interactions on factors that may have indirect effects on harvesting were also assessed—wage employment, lifeskills, and population stability.

In addition to these "key indicator" assessments, several "subjects of note" of relevance to understanding how the Project may affect harvesting are also discussed under various VSECs. These include traditional harvesting (under Livelihood and Employment VSEC); traditional economic activities (under Economic Development and Self-Reliance VSEC); food security (Human Health and Well-Being VSEC); and, cultural well-being (Cultural Well-Being VSEC).

For convenience, the relevant DEIS findings are summarized at the end of this supplement (Appendix A).

1.3.2 Why people harvest

The Project is not expected to have a substantial influence on the rationale for harvesting. Based on our current understanding, there appear to be several contributing motivations that act in concert to encourage or drive someone to harvest wildlife:

- Economic necessity – a means to put food on the table and/or as a means of being productive, similar to why people participate in the wage economy
- Recreation – it is enjoyable and rewarding to be out on the land focused on a goal, and enjoying the environment and the fruits of the harvest with companions or family
- Heritage – wildlife harvesting is a central component of Inuit heritage, and persons are motivated by instinct or by a conscious desire to practice and retain Inuit land skills
- Status – there is a social benefit to harvesting, in terms of providing for family and community, and being recognized as an important leader or provider in this regard

If current harvesting decisions are driven (in whole or part) by economic necessity, then access to Project income might relieve this motivation by enabling households to purchase store food rather than harvesting. However lack of income is frequently identified as a barrier to harvesting. Therefore, Project income may actually improve ability to harvest in order to meet food security and household economic objectives.

In terms of recreation, we know that this in an important element of harvesting, as families who can do so make a point to go spend “family time” camping out on the land, particularly during the summer. Non-Inuit living in the north, as well as southern Canadians similarly enjoy hunting and fishing as a recreational activity. As with economic drivers to harvesting, the Project may improve the ability of people to harvest for recreation, because harvesting is expensive and employment income from the Project will make more money available in the community.

In terms of the heritage rationale, Elders have indicated that they “crave” certain country foods at certain times. This is certainly a motivation for harvesting. As indicated in the bullet above, to some in the community harvesting is and will continue to be an important part of their life; something they may have grown up with that they instinctively want to spend time doing (“it is what they do” or part of who they are). Others will pursue harvesting because it is part of their heritage, but perhaps something that is not integrated into their current life and something they consciously seek to do as part of being Inuit or immersing themselves in an activity central to Inuit life in the past and present. We heard a number of people in the communities talk about the sense of connection with their forefathers by hunting and camping in the same location as their ancestors, as evidenced by archaeological or more recent remains from camping.

The status aspect of harvesting is not well understood. We know that Inuit harvesting and the required land skills are rightfully a source of pride within the Inuit community. We understand anecdotally from the elders in the community there is pressure on youth to participate in harvesting as an important part of Inuit life. We also know from speaking to a small sampling of youth that their interests in how to spend their time are oriented towards more mainstream life, and that some prefer store-bought food over some country foods. It is believed that the Project will have little influence on this motivation to harvest.

1.3.3 What people harvest

The Project is not expected to influence the wildlife species people choose to harvest. This arises from an expectation that no interactions will arise that would influence local dietary preferences. A possible exception to this expectation is that if Project income serves to increase the ability of households to harvest, the "taste" for certain country food species might be maintained—or even expanded—beyond where existing trends might otherwise lead. This is considered to be speculative, given lack of baseline information on the determinants of current food preference trends in the LSA.

1.3.4 How wildlife is used – "sharing" versus "sale"

The Project might influence the continuum between "sharing" and "sale" of certain species of country food in several ways.

For example, some individuals who take on full-time jobs may find they have money but little time to engage in harvest activities. This could increase the demand for country food available for purchasing either through formal retail avenues (stores and HTOs) or directly from harvesters. However, the rotational nature of Project employment should be less likely, than other forms of full-time employment, to cut into the harvest opportunities of those who wish to engage in these activities. Further, it is not uncommon in Nunavut for those with income to provide fuel or lend equipment to others who have time to harvest in exchange for some of the country food that is harvested. This may be seen as reinforcing rather than weakening traditional sharing culture.

Revenues from the Project that flow to Inuit or government might be utilized to support local country food enterprises. Some communities have included development of commercial fish plants within their community economic development plans. Should these funds be utilized to set up such a plant or plants, this would increase the local demand for harvesters to supply country food. Further, Baffinland intends to procure country food to serve at the Project. This may provide a modest increase in the demand for commercial country food. Expansion of local commercial markets for country food could provide a source of income to harvesters. How this income would be used by harvesters' households is not known—it might support hunting for household use and for sharing—or it might be used for other purposes.

1.3.5 When people harvest

Personal time use and time management is likely to be influenced amongst those individuals who gain employment at the Project. How this relates to the amount of time allocated to harvesting prior to and during Project employment will be highly variable depending on previous time-use and personal characteristics.

Some individuals who previously engaged in intensive harvest activities and then go on to work at the Project may experience a substantial decline in time available to harvest. Others who are not employed but do not engage in intensive harvest activities may find they continue to have the time they need to carry out their desired level of harvesting. Some individuals may find that they acquire new time management skills and/or motivation from Project employment and that these skills enable them to make better use of their off-time than when they were not employed and had more time available to them.

Individuals who are not employed in the Project may or may not be affected in terms of the time they have available to pursue their desired harvesting activities. Some individuals who have partners employed at the Project may find they have increased obligations—such as child or Elder care—during the period their partner is working. This could lead to a loss of flexibility in the ability to allocate time to preferred tasks. This

could be a particular challenge for those who work regular jobs in the community, and thus don't have the option to make up these lost opportunities during the two weeks the partner is not working at the mine.

In most cases, individuals who don't have a close connection to the Project through employed family members should not experience Project-induced changes to the time they have available to harvest. The one possible exception to this will be the increased time that will be required to detour around the Steensby ship track. The increased "commute time" to access preferred harvesting areas may serve to decrease the time available to spend harvesting, particularly amongst those who have defined windows of opportunity for harvesting.

1.3.6 Where people harvest

Based on efforts to map out harvesting areas, presented in DEIS Appendix 4C (2011), Project activities are not expected to prevent access to preferred harvesting destinations. However, as noted above, some interference with the ability to travel freely throughout the area will arise from the Project.

Accessibility issues are addressed in the DEIS discussion of Project effects on travel and camps. The ship track through Steensby Inlet will lead to a requirement for those wishing to harvest at the other side to detour through the port site. This will add time to getting to that particular destination.

These effects will be experienced by those who seek to harvest in the affected areas regardless of whether or not they are involved in the Project through employment or business relationships.

1.3.7 Who harvests – transfer of harvesting culture to youth

Based on anecdotal information, there appears to be a general decline in per capita harvesting intensity over successive generations; elders have stated that youth are in school all day, are not hunting, and therefore need jobs. This finding is not contradicted by southern food import data which, as noted in the DEIS, shows a substantial increase in the per capita imports of food from the south.

The Project is not expected to directly influence the transfer of harvesting values, culture, or skills from generation to generation. However, indirect effects arising from Project interactions on household income and individual lifeskills may serve to remove barriers that some youth face with respect to their involvement in harvesting. Income flowing from the Project to Inuit and government may also serve to remove fiscal capacity barriers to the implementation of on-the-land programs that these agencies seek to provide. Should such programs be implemented, these could serve to support intergenerational transfer of harvesting skills and culture to the next generation.

1.3.8 Knowledge, Skills & Technology

Knowledge and skills

The Project is a remote Project operating year round in a harsh Arctic environment. As such, individuals who are employed at the Project will utilize their land and survival skills in the course of their work. Individuals who may not have gained these skills will acquire some degree of land skills through pre-employment and on-the-job training. This is expected to include knowledge related to assessing risk, responding to emergency situations, as well as skills related to travel across the land. While the skills gained through the Project will not be adequate to support traditional harvesting activities, they will be relevant and could lead some individuals to seek to gain further knowledge and skills from experienced harvesters and Elders.

Individuals who are not employed at the Project may gain some exposure through programs that might be supported through community initiatives funded through the IIBA. For example, during the bulk sample work, BIM provided support for on-the-land programs.

Based on these considerations, the Project is expected to value and support the maintenance and acquisition of knowledge and skills relevant to harvesting.

Technology and its affordability

The Project is not expected to directly influence the balance between "knowledge" and "technology" in terms of how people engage in harvest activities. It will, though, affect the affordability of technology. Affordability of harvesting equipment and supplies will improve for those who gain employment at the Project and for individuals who may be part of the sharing networks of these individuals.

Individuals who do not benefit from Project-derived income are not expected to experience any change in affordability. The local cost of these items should not experience price inflation since they are supplied from large external markets that will not be influenced by small local spikes in demand.

1.3.9 Language of harvesting

Harvesting knowledge and the ability to efficiently communicate critical information while engaged in harvesting activities is closely tied to language. The Inuktitut language has developed within the context of the arctic environment and is well-suited for this task. English is expected to be the main language used on-the-job at the Project. However, the Project is designed to also support Inuktitut language in association with English, as described in the DEIS. The context in which Inuktitut will be used at the Project is somewhat similar to the context in which it is used during harvesting activities. For example, weather conditions will be highly important and will be the subject of many conversations. Inuktitut terminology related to knowledge of weather patterns and forecasts should be expected to be maintained and perhaps strengthened. The Project is not expected to exert pressures leading to a decline in Inuktitut land and harvesting-related language.

1.3.10 Wildlife populations

The Project was assessed for its effect on caribou, marine mammals, and fish. Adverse impacts to these wildlife populations were determined to be "not significant." The Project is not expected to affect wildlife populations either in the context of wildlife population health nor for the purpose of harvesting.

1.4 NET EFFECTS OF PROJECT ON HARVESTING

The DEIS assesses the significance of specific Project-related effects on key indicators related to harvest activities. These include effects on key wildlife species as well as on effects that may influence travel and camps, and hence access to wildlife. None of the Project interactions were considered to lead to significant impacts on any of the indicators related to harvesting. However, might the combination and accumulation of multiple non-significant residual effects lead to significant net impact when they are considered all together?

For example, might a modest decline in wildlife density—occasional death of caribou due to collisions, for example—combined with a slight inconvenience to travel—detours to access rail line crossings, say—and a feeling of disadvantage relative to other hunters—due to reliance on older and slower snow machines—lead an individual to consider a formerly preferred hunting location to be less preferred?

The possibility for such aggregations of residual effects is acknowledged. However, given what is known about Inuit land-use and harvesting practices the probability that any such combination would lead to a significant adverse effect on Inuit harvesting is considered to be unlikely.

The following points provide some rationale in support of this conclusion:

- Households that gain access to better transportation and harvesting equipment directly or indirectly related to Project-derived income may improve their opportunity to harvest. This is important to intergenerational transfer of harvesting values, culture, and knowledge to the younger generations.

- Contribution of the Project to trends related to "sharing" versus "commercialization" of harvested country food is considered to be complex and multi-directional. Some aspects of the Project may support the development of commercial harvesting activity. Other aspects may serve to strengthen traditional sharing networks. Absence of adequate baseline data to substantiate existing trends and determinants of sharing decisions prevents confident prediction of the likely outcomes. However, given its multi-directional effects, the Project is not considered to serve as a significant determining force related to this important issue.

- To illustrate the previous point, the culture of sharing food that is harvested is difficult to maintain amongst families that are dependent on social assistance for their sustenance. The ability of members of these households to gain employment may, for some, present the ability to have enough income that groceries, money, hunting equipment, or the proceeds of harvesting can be shared beyond the immediate household. This sharing could serve to maintain and strengthen traditional sharing cultures by enabling a greater portion of the population to participate in sharing relationships.

- The Project may contribute to trends in the adoption of technology by harvesters. It will provide some households with the income they need to acquire and support this technology. This could lead to a divergence between those harvesters who have access to the technology and those who do not. However, current income differentials already exist amongst households in the LSA. Those with access to the largely public sector jobs have far more income than households who do not have substantial wage employment income. Introduction of mine jobs may lead to improved wealth distribution in communities. Traditions of sharing equipment in exchange for country food should serve to further reduce the gap between technology "haves" and "have-nots."

1.5 RISK ANALYSIS

The potential risk factors arising from the Project with respect to nine dimensions of harvesting are considered. These are presented in Table 2, below. For each of these dimensions, both the consequence of the risk being realized, as well as the probability that this may occur as a result of Project effects, is presented. It is recognized that there are many forces and influences at play that will influence these harvesting dimensions. In some cases, it should be possible to tease out the influence arising from Project effects while in many other cases it is unlikely that observed changes could be confidently attributed to the Project. This table is intended more for the purpose of eliciting reflection on the issues around risk and attribution than as a rigorous analysis. This is due, as has been previously suggested, to the absence of adequate baseline knowledge to support detailed understanding of harvest trends and the factors driving these trends. For this reason, Table 2 is presented as a "conceptual" risk analysis only. It may, nonetheless,

have value in supporting decisions and strategies related to monitoring of biophysical and, particularly, socio-economic factors associated with harvesting.

Table 2 Conceptual Analysis of Project – Harvesting Risk Factors

Risk Factor	*Consequence*	*Probability*	*Attribution possible?*
Decline in target wildlife population numbers or health attributable to biophysical Project interactions	High	Low	Possible
Decline in target wildlife population numbers due to socio-economic interactions (such as increased hunting) attributable to Project	Moderate	Low to Moderate	Unlikely
Loss of Inuit sharing traditions attributable to Project effects	High	Very Low to Low	Unlikely
Increase in the sale of country food attributable to Project effects	Low	Low to moderate	Unlikely
Socio-economic or demographic shift in who engages in harvest activities	Low to Moderate (some shifts would be seen to be positive)	Moderate	Possible
Decline in harvesting knowledge and skills attributable to Project effects	High	Very Low	Unlikely
Decline in interest in harvesting attributable to Project effects	Moderate	Low	Possible
Change in timing of harvest activities, attributable to Project effects	Low	Moderate	Possible
Change in preferred harvest locations, attributable to Project effects	Low	Moderate	Possible

Source: Brubacher Development Strategies, 2011. Prepared for this document.

Appendix A
Summary of Interactions Between Mary River Project and Harvesting As Identified in the DEIS

The following subsections describe the various potential effects on harvesting, both arising from socio-economically derived effects (e.g., increased income) as well as potential effects to wildlife populations including fish, caribou and marine mammals. These effects are shown visually on Figure 1.

Socio-Economic Effects (DEIS Volume 4, 2011)

- Inter-community Inuit migration – may lead to more Inuit interested in hunting in a particular region (and a consequent reduction in hunting in some other region). This is predicted to be a low magnitude effect;
- Improved life skills – increased well-being associated with improved life skills could lead to a greater interest in rediscovering traditional Inuit values and activities, including perhaps a renewed interest in harvesting. This could lead to more hunting activities;
- Changes in parenting – the fly-in/fly-out nature of Project employment could affect the time spent with family members, including the time spent getting out on the land. This change could lead to decreased or increased time engaging children in land-based activities depending on many factors. For example, an individual may find that the two week off period may offer a greater block of time for these activities;
- Increased household income – those who gain income from the Project will have improved access to purchasing the gear and supplies needed to support harvest activities of family and friends. They may or may not choose to apply their purchasing power to these ends however. If this does occur to a substantial degree, it is possible that hunting intensity may increase. Whether this leads to a change in harvesting patterns is not known—the baseline does not provide adequate insight into current harvest patterns in terms of the balance between “weekend hunters” and “intensive hunters.”
- Absence from community during work rotation – those engaged in Project employment will not be available to engage in hunting activities. This could serve to reduce hunting pressures locally…or perhaps it will lead to pent up demand for getting out on the land and result in greater harvest efforts overall.
- Expanded market – business services to Project – the potential for local business supplying country food to the Project through meat and fish plants could arise. This might lead to more opportunities for harvesters to gain some income by supplying the plants.
- Wildlife harvesting by Inuit (p159) – harvesting by Inuit was assessed based on the parameter of harvest quantity per level of effort, meaning the number of harvests by species, or total quantity (i.e., weight) of country food obtained, in relation to an estimated level of effort (amount of time spend hunting). Taking into consideration the results of the assessments on marine wildlife and arctic char the residual effects on harvesting were predicted to be negligible. The residual effects on caribou harvesting were predicted to be not significant because the measurable parameter was predicted to change by less than 1% in magnitude.
- Travel and camps (p165) – change in travel and camping locations as a result of project activities will occur particularly around Steensby Port, where a detour around the port site will be required. This can impact harvesting activities in the area, although the majority of harvesting in Northern

Foxe Basin occurs west of Koch and Rowley Islands, away from port site activities. The addition of the railway also has the potential to impede harvesting if harvesters are in active pursuit of game and are unable to cross the railway. The need to find suitable and predetermined crossing points can result in pray getting away from the hunter.

- Cultural well-being (p176) – the need and desire to maintain cultural heritage and cultural pursuits such as harvesting in the communities has been identified by community members throughout the course of the assessment. Need for job opportunities for youth to gain self-reliance is also frequently expressed.

Effects on Caribou (DEIS Volume 6, 2011)

- Sensory effect on wildlife – the sensory effects of the Project on wildlife include noise and dust emissions that are limited to the zone of influence and are addressed under loss of habitat.
- Caribou habitat – the Project will lead to small reductions in caribou habitat and habitat effectiveness. *Assessment conclusion:* We are moderately confident that Project related activities will have a "not significant" loss of habitat and a "not significant" reduction in the effectiveness of caribou habitat within the North Baffin caribou range.
- Movement – The overall residual effect of the project on caribou movement may be that caribou travelling on five of 52 (9.6%) known trails of may experience a barrier to their movement on those trails. Few caribou exist within the RSA, so few caribou will be affected by the mine infrastructure and activity; however, if caribou numbers return again in large numbers to the area or the migratory caribou return, then further monitoring is necessary to determine adaptive management. *Assessment conclusion:* We are moderately confident that Project related activities will have a not significant effect on traditional caribou migration on north Baffin Island.
- Mortality – There are no expected residual effects of the project on caribou mortality. Mortality, if it occurs, will be limited to individuals, within the PDA.

Effects of the Project on Marine Mammals

Walrus (DEIS Volume 8, 2011)

- Habitat change – The footprint of the Steensby Port dock structures is a negligible part of nearshore habitat in the Inlet. Less than 2% of the total landfast ice edge leading into Steensby Inlet will be changed because of icebreaking. During a single transit to and from Steensby Port, an ore carrier will temporarily change < 1% of pack ice in Hudson Strait, Foxe Basin and near Steensby Inlet.
- Disturbance due to construction – The Steensby Inlet port site is not known as a key haul-out site for walrus, but some walruses do occur in the area during the period when construction is planned to occur. Walruses in the vicinity of dredging operations and the associated construction activity (vessel traffic, dock construction) may exhibit localized avoidance of the area, but the numbers of affected animals will be few. Although pile driving is expected to be the loudest sound source during Construction and Operation Phases at Milne Inlet, sounds are expected to have little effect on walruses because most sound will not propagate further than 11.5 km from the site (Figure 8-5.4) and very few (if any) walruses are expected to occur there.
- Disturbance due to shipping – Walruses hauled out on ice may temporarily avoid an ore carrier transiting to and from Steensby Inlet by diving into the water, perhaps at distances ranging from 400–500 m up to several km. The area west of Rowley Island (the island is located >18 km west of the nominal shipping route) is thought to be calving area for walrus, and calving is thought to occur

from March to July (Figure 8-5.5). Walruses in the calving area are not expected to respond to ore carriers transiting through eastern Foxe Basin either during the ice-covered or open water period.

- Disturbance due to ice-breaking – it is estimated that approximately <10 to 400 walruses may exhibit avoidance of an ore carrier passing through the southern LSA during a single vessel passage. It is likely that at least some individual walruses will be affected multiple times by icebreaking during the course of a single ice-covered season.
- Disturbance due to aircraft overhead flights – It is likely that walruses along the Steensby Inlet flight path, particularly those hauled out on the shoreline, may disperse, particularly as the Boeing 737 will have to maintain a low altitude near the airstrip during landing and takeoff. It is uncertain if walruses that occur in Steensby Inlet will habituate to daily overflights of a commercial jet. Unlike other areas in and near the LSA, Steensby Inlet is not considered an area where walrus haul out in high numbers.
- Hearing impairment – Walruses in Steensby Inlet are not predicted to be exposed to in-air sound levels from aircraft overflights (Boeing 737) that exceed thresholds for hearing impairment in pinnipeds. With mitigation measures in place, walruses are not expected to be exposed to sound levels high enough to cause hearing impairment.
- Masking of environmental sounds – Any masking that might occur along the shipping route, as a vessel passed by, would occur for only a short time (2-3 h) relative to the interval between transits (48h) on the assumption that eastbound and westbound vessels will maintain a significant lateral separation. The amount of masking will be a function of how close to the ship's path the walrus is. Given that sounds important to walruses are predominantly at higher frequencies than shipping noise, and that construction activities sounds are intermittent in occurrence, it is unlikely that masking would significantly affect walrus.
- Mortality from collisions or walrus stampeding at haul out sites – It is unlikely that walruses will experience mortality from vessel collisions because walruses, including mothers and calves, exhibit at least localized avoidance of vessels. Also, ore carriers will reduce speeds to 7.5–11 km/h in areas of pack ice further reducing the risk of collision. During the Construction Phase, when daily flights of a Boeing 737 will occur at the Steensby airstrip, some walruses may occur along the flightpath. However, large herds of walruses, where stampeding events have been observed, are not expected in Steensby Inlet. As part of the proposed marine mammal monitoring program, the shoreline area around the Steensby Inlet construction site will be monitored to document walrus responses to aircraft overflights. With mitigation measures in place, no mortality is expected.
- Note: "It was predicted that with mitigation measures in place, contaminants from the Project will not significantly affect prey (or prey habitat) of marine mammals." — Volume 8, Section 5.3 p 141.

Ringed Seal

- Habitat change – due to the constructions of ore doc structures and ice breaking the change in habitat in landfast ice represents 5.6% and 0.36% of the suitable landfast ice habitat in Steensby Inlet and Foxe Basin, respectively. Less than 1% of pack ice habitat in Hudson Strait, Foxe Basin and near Steensby Inlet will be changed during a single transit to and from Steensby Inlet.
- Disturbance due to construction – temporary avoidance of areas of construction activities is expected. Pile driving the loudest sound emitted during the construction phase is expected to result in temporary and localized avoidance of the pile-driving activities.

- Disturbance due to shipping – it is predicted that ringed seals in the water will avoid ships during the open water period by less than 100 m. Ringed seals hauled out on the ice may temporarily avoid an ore carrier at distances up to 500 m. The avoidance of ships is expected to be localized and short-term.
- Disturbance due to icebreaking – it is estimated that approximately 220 ringed seals may exhibit temporary avoidance of an ore carrier passing through the LSA during a single vessel passage. It is quite likely that the same ringed seals will be affected multiple time by icebreaking during the course of a single ice-covered season.
- Disturbance due to aircraft – during the ice-cover season ringed seals are most abundant in Steensby Inlet vs. Other times of the year, and primarily occur inside of liars. Airborne sounds of aircraft will be diminished inside seal lairs. During open water seals will be more dispersed and individuals may be exposed to sound levels that cause a disturbance response.
- Hearing impairment – ringed seals are not expected to be exposed to received sound levels high enough to elicit TTS. Ringed seals are not predicted to be exposed to in-air sound levels from aircraft overfilghts that exceed thresholds for hearing impairment in pinnipeds. Ringed seas are not expected to be exposed to sound levels high enough to cause hearing impairment.
- Masking of environmental sounds – sounds important to seals are predominantly at much higher frequencies than shipping noise, and given the intermittent nature of construction activity sounds, it is unlikely that masking would affect ringed seals.
- Mortality – it is possible that ringed seals could be struck by icebreaking ships as they move through the ice. A maximum of 15 seal pups could suffer mortality from collisions with icebreaking ore carriers over a relatively short period each year during the Operation Phase. The risk of ringed seals experiencing mortality from blasting is very limited.

Beluga

- Habitat change – the small area of the dock footprints is a negligible part of nearshore habitat. Belugas can re-use areas of pack ice changed by the passage of an ore carrier. Less than 1% of pack ice cover in Hudson Strait will be changed during a single transit to Steensby Port.
- Disturbance due to construction – belugas are expected to occur in low numbers at the Steensby port site during the open-water period and will be absent when the port sites are encompassed by landfast ice. All construction activities will occur in the open-water period. The zones of avoidance and disturbance onset for belugas are estimated at 0.5 km and 2 km for a cutter-section dredge operating thrusters.
- Disturbance due to shipping – based on acoustic modelling it is predicted that belugas would avoid ore carriers travelling during the open-water period along the Steensby Inlet shipping route by 6 to 7 km depending on location and vessel speed. If belugas do occur near port sites they may exhibit localized avoidance of tugs and other vessels.
- Disturbance due to icebreaking – it is estimated that approximately 10,000 belugas may exhibit avoidance of an icebreaking ore carrier passing through Hudson Strait during a single transit. This corresponds to an estimated 15-20 km avoidance distance. There is uncertainty in terms of this potential effects and about the duration of the effect.

- Disturbance due to aircraft – beluga whales are not expected to occur in large numbers in Steensby Inlet, but any individuals that do occur there, particularly those under the direct flight path of the Boeing 737, may exhibit a disturbance response and potentially swim away.
- Hearing impairment – belugas may incur temporary hearing impairment from exposure to continuous sources of sound of sufficient level and duration, however this is highly unlikely given that belugas are expected to avoid at least the immediate area around ore carriers.
- Masking of environmental sounds – most sounds important to belugas are predominantly at much higher frequencies than shipping noise and the intermittent nature of construction activities sounds, it is unlikely that masking would significantly affect belugas.
- Mortality – it is unlikely belugas will experience mortality from collisions with vessels because belugas exhibit avoidance of vessels. Additionally vessels will reduce speeds to 7.5-11 km/h in areas of pack ice reducing risk of collision. With mitigation measures in place, no mortality is expected.

Narwhal

- Habitat change – narwhals are considered uncommon in Steensby Inlet where the majority of activities will occur. In Hudson Strait, an ore carrier will transit through potential narwhal overwintering habitat roughly every two days, the area of pack ice that will be disrupted temporarily by a single ore carried passage is estimated at 44 km^2 during maximal ice coverage – this represents less than 1% of pack ice in Hudson Strait.
- Disturbance due to construction – narwhal are uncommon in Steensby Inlet and the individuals that could occur in the area may exhibit localized avoidance during construction activities.
- Disturbance due to shipping – it is predicted that narwhals would avoid ore carriers travelling during the open-water period along the Steensby Inlet shipping route by 6-7 km depending on location. Narwhal are more common along the shipping route through Milne Inlet that will be used occasionally during the operation phase of the project as a result of the removal of the road haulage option.
- Disturbance due to icebreaking – it is estimated that approximately 500 narwhal may exhibit avoidance of an icebreaking ore carrier passing through Hudson Strait during a single transit. This corresponds to an estimated 15 to 20 km avoidance distance.
- Disturbance due to aircraft – narwhal will be exposed to aircraft sound, individual narwhal that do occur in Steensby Inlet, particularly those under the direct flight path of the Boeing 737, may exhibit a disturbance response and potentially swim away.
- Hearing impairment – narwhal could incur temporary hearing impairment from exposure to continuous sources of sound of sufficient level and duration, however narwhals are not expected to be exposed to continuous sound level thought to cause TTS.
- Masking of environmental sounds – sound important to narwhals are predominantly at much higher frequencies than shipping noise and the intermittent nature of construction activity sounds, it is unlikely that masking would significantly affect narwhal.
- Mortality – it is unlikely that any narwhals will experience mortality from collisions with vessels because narwhals exhibit avoidance of vessels. With mitigation measures in place, no mortality is expected.