Addendum to the Final Environmental Impact Statement - Baffinland Response to Technical Comments November 15, 2013		
Qikiqtani Inuit Association		Baffinland's Response
Number	Recommendation	
Note: See Baffinland Response to Project Certificate 005 Amendment Considerations attached for suggested word changes and new conditions; also see Appendix A,where referenced, for more detailed responses to technical comments.		
FM-01	It is recommended that dust dispersal modeling be revisited to reduce uncertainty and inform monitoring. The quantity and chemical composition of dust entering aquatic systems should be monitored to ensure that mitigation measures are effective. Sediment impact thresholds should be established for Arctic char, and possibly other taxa, to inform impact assessment, monitoring, and mitigation.	Dust dispersion modelling presented in the FEIS was “worst case” as it involved highly conservative assumptions and no dust controls. The FEIS Addendum considered dust controls and other refinements to the model. This is the reason for the reduction in dust deposition despite the overall tonnage increasing with the ERP from 18 to 21.5 Mt/a. Nonetheless, a comprehensive dust monitoring program has been developed and initiated which will include transects across the tote road and radially out from Milne Port and the Mine Site. This has been discussed with the TEWG. TSS will enter the Phillip’s Creek watershed from roadside fugitive dust emissions and this will be added to TSS deposited directly onto Phillip`s Creek at its mouth at Milne Port. However, it remains a small proportion of the Phillips Creek watershed and calculations suggest that dust deposited along the tote road within the Phillip’s Creek watershed will increase TSS at the mouth of Phillip’s Creek up to a maximum of 0.005 mg/L during freshet when dust that has accumulated in the snowpack run off. Flows during the freshet period are typically higher turbidity in the baseline. Therefore, the FEIS Addendum suggested no change to the assessment. Based on this assessment, QIA's request for threshold is not warranted. With respect to dust suppressants, all dust suppressants on the market have elements of toxicity, including calcium chloride (CaCl) which receives widespread use across North America. We note that an advantage of EK35 over CaCl is that the EK35 is not soluble in water. Another advantage of EK35 is that unlike CaCl the substance is non-corrosive to aircraft aluminum, which is why EK35 is used at northern airports in Nunavut, the NWT and Nunavik, as well as northern mines including EKATI and Diavik. Baffinland contends that the aquatic toxicity of EK35 is not an issue provided the dust suppressant is applied correctly, which mainly means applications are carefully applied to the roadway (or airstrip) only at the correct dosage avoiding ponding or other accumulation, as outlined in the Government of Nunavut’s (200) Dust Suppression Guideline.
FM-02	• The Proponent should provide NIRB, regulators and relevant stakeholders (including QIAand impacted communities) with detailed information on the number and characteristics of chartered vessels, vessel tracks and transit times, the frequency of transits along the northern shipping route, locations where vessels pass each other en route, and the number of days that are lost to weather or other delays during the shipping season. This information should be provided to interested parties on a timely basis. This information shall be used when comparing monitored data to actual impacts. • There will be trade-offs with potential impacts between the number and size of vessels used as part of the proposed ERP, and the Proponent should conduct a sensitivity analysis to explore these effects (e.g., differences in bowhead collision risk, cumulative noise exposure, risk of aquatic invasive species introductions, etc. from smaller number of larger vessels versus larger numbers of smaller vessels). This information should be used to inform and develop effective mitigating measures. • Thresholds are required to trigger further impact assessment in response to changes in shipping volume, frequency, seasonality, routing, and possibly other changes related to design specifications (e.g., hull strength, seasonal sea ice, ballast water treatment). As such, thresholds for shipping activity that will trigger a reassessment of impacts should be defined.	• The quantity of shipping will be determined by the annual production of 3.5 Mt. The EIS addendum provides a description of the shipping season length, the anticipated annual duration of shipping, the route to be followed, the vessel sizes to be chartered and the number of vessel transits anticipated. While there will be some variance in shipping season and vessel numbers, these are all within a prescribed range. (Refer to FEIS Addendum ERP Volume 3, 2.4.3) • These issues have been addressed in the FEIS Addendum ERP (e.g. collision risk: Vol. 8, 5.4.2, 5.6-5.12; cumulative noise exposure: Vol. 8, 5.4.1; risk of aquatic invasive species introductions: Vol. 8, 4.4, Appendix 8B-4.) • Baffinland will need to retain the flexibility to operate within a reasonable range of parameters in order to be successful in the annual delivery of 3.5 Mt of ore to market. The reasonable threshold for further impact assessment is suggested as any proposed increase in ore shipments that exceeds 20% per annum of the proposed ERP quantity. This information will be provided on a timely basis to the Marine Working Group, of which QIA is an active participant.
FM-03	• BIMC should re-calculate both their dispersal modeling and risk assessments taking to consideration mid-ocean exchange alone as well as in combination with treatment options that offer the best potential for mitigating risks from foreign species introductions. • A robust monitoring program for ballast water and its potential impacts should be in operation prior to any ballast water discharges into Milne Inlet. Options for adaptive management should be identified for defined thresholds.	• The dispersal modeling of ballast water was presented in the FEIS Addendum (ERP) Volume 8 Appendix 8B-3. The ballast water risk assessment was presented in the FEIS Addendum (ERP) Volume 8 Appendix 8B-4. This modeling and risk assessment are based on the assumption of mid-ocean exchange, as per regulated practice. • A monitoring program will be applied for ballast water exchanges in compliance with regulatory requirements.

FM-04	It is recommended that the Proponent assess in detail the risk of Project-related shipping accidents, noting areas along the ship tracks where ships may be particularly vulnerable to environmental conditions including sea ice, seasonal differences in accident and impact risks, and the sensitivity of risk predictions to navigation errors and vessel ice class. The Marine Environmental Working Group should consider tagging studies to assess shipping interactions with juvenile murres from Cape Graham Moore and the Cape Searle-Reid Bay areas, and possibly other species. Controls may be required to avoid loss of materials performance by non-polar class ships (see ERP FEIS v.9, app.9E, p.9 of 28). It is recommended that the Proponent reassess its spill predictions to inform spill response planning. The Proponent should revise and rerun its oil spill dispersal modeling to consider: 1) local forcing, 2) the whole ship track in Canadian waters, 3) ice conditions, 4) spill volumes up to and including loss of a full tanker cargo, and 5) differences in the quantity and properties of each type of bulk fuel transported by ships when they are at, or in transit to, Milne Port. The results should be used to reassess seasonal spill impact predictions along the ship tracks and in port, and to reassess the adequacy of spill response planning and preparedness.	Modelling is a tool that assists in establishing priority for response. Baffinland acknowledges EC's expertise and essential role in coordinating efficient response to spills. Discussions are in progress with EC to define additional modelling requirements that will be useful in establishing priority response.
FM-05	The Proponent should work with QIA, Inuit in impacted communities, and other interested parties (via the MEWG) to develop a robust monitoring plan that identifies the monitoring tools to be used and the details of how, where and when the various tools will be used (e.g., aerial survey coverage and scheduling, deployment locations for autonomous acoustic recorders, shore-based monitoring locations). It is critically important that the degree of monitoring required to detect a change of 10% in a measurable parameter be adequately determined, and that changes to measurable parameters be linked to appropriate mitigation steps at specific threshold levels. The acceptable levels for impact thresholds and the mitigation steps to be employed should be determined in collaboration with Inuit and regulators. A range of mitigation steps, linked to increasing severity of impacts, should be identified. For example, a shore-based monitoring program was initiated in 2013 to investigate narwhal response to sealift traffic and provide insight into narwhal response to shipping along the northern route. This project will need to continue for an extended period should ore shipments take place, and the research schedule will have to be determined in an adaptive manner (i.e., based on observed effects, statistical power, cumulative effects, etc.). The intensity (in time and space) of application of the different monitoring tools that are to be employed (e.g., aerial surveys, MMOs, passive acoustics) will similarly have to be determined on an on-going basis. Monitoring programs should be developed by the MEWG and with extensive input from Inuit.	Baffinland is working with the MEWG and has developed monitoring programs in accordance with its Environmental Effects Monitoring (EEM) Framework. Note, the threshold associated with each monitoring program will be a reflection of, among other factors, the natural variability present and the design of monitoring (especially of replicates) as determined through Power analysis of baseline data collection. Baffinland will develop a program for acoustic monitoring of the Milne Inlet area.
	QIA recommends that a variety of monitoring tools be used, and that the Proponent and MWEG identify ways to conduct monitoring in a manner that is robust, cost-effective, responsive to Inuit concerns, and maximizing benefits to impacted communities. For example, passive acoustic monitoring (PAM, see QIA ERP Technical Comment FM-06) can be used to measure vessel noise outputs, refine sound transmission models, and monitor marine mammal distribution and relative abundance. Narwhal vocalization rates recorded via PAM may serve as a cost-effective method to monitor narwhal relative abundance and use of important habitats within the RSA and northern route LSA (see Marcoux et al. 2011). Similarly, community based-monitoring (CBM) could be a cost-effective way to monitor narwhal habitat use and distribution, and could provide initial early warnings of seasonal abandonment of important habitat (see QIA ERP Technical Comment FM-09).	

FM-06	The Proponent has to conduct verification studies to assess the accuracy of their sound propagation models and associated zones of impact. Acoustic monitoring programs should be developed following guidelines identified by Wartzok and Tyack (2008) and Moore et al. (2012). These programs will require intensive deployments of hydrophone systems and detailed sound modeling, which should start immediately.	Baffinland will conduct acoustic monitoring to characterize background sound levels, as well as sounds from ERP activities. The program will take into consideration the guidelines in Wartzok and Tyack (2008) and Moore et al. (2012) and will be developed with input from the MEWG. See Appendix A, Extended Responses to Technical Comments: In Response to QIA Recommendation FM-06.
FM-07	The ERP (v.8, s.5.10.2.5) proposes to have observers present on “some vessel passages”, and only in “the early stages of ERP operations”. Effective monitoring will require observer coverage throughout the entire ERP of the Project, not just the early stages. Bowhead whale numbers are increasing in the eastern Arctic so collision likelihood will change over time. Triggers for adaptive management should be linked to a collision, regardless of outcome, and not just a mortality event (i.e., any injury). The Proponent should conduct a modeling exercise to explore possible relationships between bowhead density, vessel density, and vessel characteristics and bowhead collision risk.	The requirement for Ship Based Observers is addressed in the IIBA, article 9 Maritime Shipping. BIM stands by the analyses contained in the ERP that whale mortality is not expected to occur as a result of ERP activities because of the relatively slow ship speeds.
FM-08	The Proponent should the Marine Environment Working Group before deciding whether pile driving will occur under ice or during the open water season. Consultation with Inuit in impacted communities is also required before any acoustic seal deterrents are used. A bubble curtain is an important mitigation tool for noise impacts on marine mammals and should always be employed. An acoustic contractor should be hired to measure sound levels from pile driving immediately at the start of activities. Sounds measurement should also be taken to verify the efficacy of the bubble curtain. Accurate data are needed to test the accuracy of existing models and refine impact predictions, given the differences in the size of the sheet piles being proposed in the ERP and those modeled for noise impact predictions. A new set of simulations should be conducted to improve confidence in the predictions, and verification studies conducted to confirm predictions (of both pile-driving impacts and bubble curtain effectiveness). Depending on the analysis completed, there may be a need to refine mitigation, monitoring and impact predictions. Sewage should not be discharged in port but instead pumped into a sewage truck and carried to the sewage treatment facilities. Bilge water should also not be released in port due to possible foreign biota and contaminants, and could be collected and pumped ashore for treatment in the tank farm containment area, similar to meltwater.	Baffinland will obtain all appropriate permits associated with pile driving, and will inform the interested communities and general public as to the timing selected for this component of construction. Construction activities, including pile driving will be monitored to measure sound propogation in the marine environment. Treated sewage effluent will be discharged in accordance with applicable regulatory limits. Bilge water will not be released to Milne Inlet by Project vessels.
FM-09	BIMC should provide a cumulative impact assessment that integrates the impacts of all Project activities on all VECs and VSECs, in the context of other human activities, natural stressors such as climate change, and developments including Project expansion, and considering all interactions	Baffinland has completed a cumulative effects assessment in accordance with applicable guidelines and consistent with current EA methods.
B1	The Proponent must re-evaluate the potential impact on caribou movement of upwards of 200 trucks per day, the majority of them haul trucks, travelling along the Tote Road for the life of the mine. This re-evaluation should include revisions to the mitigation and adaptive monitoring plans and an assessment of residual impacts after mitigation. The Roads Management Plan should specify how caribou presence on and in the vicinity will be monitored and what thresholds (other than the tracks) will be used to trigger specific levels of traffic management. Baffinland should investigate dash camera technology and wildlife road surveillance systems to prevent collisions and use remote camera monitoring to describe caribou use of the road corridor.	See Appendix A, Extended Responses to Technical Comments: In Response to QIA Recommendation B1.

B2	The Proponent must re-evaluate the potential impact on caribou calving of upwards of 200 trucks per day, the majority of them haul trucks, travelling along the Tote Road for the life of the mine. This re-evaluation should include revisions to the mitigation and monitoring plans.	Baffinland acknowledges that calving may occur near the Tote Road and that updated mitigation and monitoring is necessary given the substantial increase in traffic on the Tote Road. If calving caribou are displaced from preferred calving habitats, there could be effects to caribou fitness and calf survival, as suggested by the QIA and as assessed as not significant in the Approved Project's FEIS. Monitoring efforts will be increased during the calving season. For example, 17 height-of-land survey stations were established during the calving season in 2013 from the Mary River camp to Milne Inlet. These surveys are designed to detect caribou along the roadway and monitor behaviour in relation to the road and/or traffic. Over time these surveys could provide insight into caribou use near the road during this season, as well as responses to road disturbances. In combination with these surveys, a wildlife monitor will be on site during the calving season to detect calving activities near the road. If a caribou is found to be calving near the Tote Road, mitigation and monitoring measures that could be implemented include: • Wildlife monitor(s) - To guide traffic through the area in a manner that reduces disturbance to the cow and calf and/or monitor the cow and/or calf's behaviour in relation to the road and traffic; • Designate a temporary no-stopping zone; and • Document the procedures and measures taken to reduce sensory disturbances to the calving caribou (with TEWG).
B3	The Proponent must re-evaluate the potential impact on caribou injuries and deaths from upwards of 200 trucks per day, the majority of them haul trucks, travelling along the Tote Road for the decades to come. This re-evaluation should include revisions to the mitigation and monitoring plans particularly the TEMMP, to include enhanced designs for monitoring and mitigation of potential impacts of the increased traffic along the Tote Road on traffic-related injuries and deaths.	The threshold for caribou mortality that would trigger traffic controls on the Tote Road was not clearly communicated in the ERP Addendum. Baffinland's management objective is to have no caribou mortalities, and mitigation actions to reduce caribou mortalities will be in place as long as the road is operating. If one caribou is killed along the Tote Road, Baffinland will conduct an investigation to determine the cause and develop any further mitigative actions if necessary. If more than one mortality occurs, traffic limitations, such as convoys, pilot cars, and reduced speed limits in sections with caribou could be implemented. Baffinland acknowledges that updated mitigation and monitoring is necessary given the substantial increase in traffic on the Tote Road. Potential mitigation measures for caribou mortality across the road will be similar to measures for the railway, and may include: • Radio communication between operators; • Wildlife signage in known crossing areas; • Wildlife monitor on site - can provide operators with information about caribou along the road; • Speed limit restrictions; • Snow bank height maintained at less than 1 m; and • Trained drivers with wildlife awareness. The caribou decision tree presented in the CEPP provides specific minimum stopping distances to allow caribou to move across the road. Baffinland acknowledges that caribou may be more likely to use the road as a travel corridor later in the winter/early spring when the snow is softer and more difficult to travel on. Baffinland smoothes the snow banks on the edges of the roadways to reduce the probability of drifting, but also to mitigate snow embankments as a barrier to caribou movement and escape from the road. Snow bank height will be maintained at less than 1 m so that caribou can easily move off the road. Monitoring for mortality will include recording and reporting on any Project-related mortalities and near-misses (i.e., potential incidents).

B4	1. The Proponent must re-evaluate the potential effects of 200 trucks per day on TSP, PM10 and PM2.5 dust particle deposition and the extent of the dustfall. The re-evaluation should explain why the predicted effects are so much less than those recorded elsewhere with a much lower frequency of ore truck hauling. 2. The Proponent should revise the mitigation, monitoring and management plans (particularly the TEMMP) to include enhanced designs for monitoring and mitigation of potential impacts of the increased traffic along the Tote Road on dustfall, vegetation including lichens and mosses at a spatial scale sufficient to monitor gradients centered on and beyond the road. Active and passive dustfall sampling should be applied as well as sampling the road surface. Consideration should be given to the Red Dog risk assessment and monitoring plans as models. 3. The Roads Management Plan states that dust suppression will be conducted "where and when appropriate" (Appen. 10-D8, Sect. 3.2.1). The Air Quality and Noise Abatement Management Plan provides a similar statement during construction and closure "These best management practices include: watering roads, as necessary.... using other dust suppressants as appropriate" (Appen. 10D-1, Sect. 3.2.1, pg 12). No specific mitigation measures are proposed during the operation phase of the Tote Road, other than to cover the truck beds with a tarp (Append. 10D-1, Sect. 3.3.2, pg 14). Details should be provided on the types of dust suppression that will be used, how the effectiveness of dust suppression will be measured, and what triggers use of dust suppression.	1. The dust deposition levels modelled for the ERP are actually comparable to levels observed at Diavik, Ekati, and Red Dog; analysis conducted by RWDI indiciates that model predictions of dustfall as a function of distance from the mine site and Tote road are in the same order of magnitude as the measurements from the other sites (See Appendix A, Extended Responses to Technical Comments: In Response to QIA Recommendation B4). Dustfall is rather unpredictable, as it is affected by many variables but, considering the uncertainties involved, we feel that our model predictions are satisfactory. However, the maps in Volume 5 of the FEIS Addendum for the ERP are somewhat difficult to read due to low resolution; this makes understanding the results of the dustfall modelling challenging. These maps will be revised to more clearly display the modelling results. The dust deposition modelling results presented for the ERP are less than those predicted previously in the FEIS. This is due to refinements made to the modelling since the FEIS; the main refinement being that, in the FEIS, the modelling did not take into account any dust suppression used during the summertime, or natural dust suppression in winter. For the ERP, this was taken into account, applying percentage reductions in emissions based on data from other sites. 2. The Mary River dustfall monitoring program commenced in the summer of 2013 and currently includes 16 monitoring stations to track levels of dust deposition along the Tote Road, as well as monitoring stations at Milne port, the Mary River mine site, and regional reference sites. Once several months' results have been received from the lab, a power analysis will be conducted to determine whether the current sampling program is sufficient to monitor dustfall levels or if additional sampling stations are necessary. Associated with the dustfall monitoring, baseline vegetation sampling has been conducted throughout the RSA, including sites along the Tote Road — vegetation samples focused on lichens, willow leaves (Salix spp.) and blueberry leaves and twigs (Vaccinium uliginosum) and were paired with soil samples at each of the sampling locations. This sampling provides the baseline conditions for a monitoring program looking at the uptake of trace metals and other potential contaminants by vegetation along the Tote Road and other Project components. Baffinland is also planning to conduct vegetation species composition monitoring along various Project components including the Tote Road (monitoring program planned to commence in the summer of 2014) and is looking into snow and moss sampling to complement the current dustfall monitoring program. Given the current and planned monitoring programs, Baffinland does not see the benefit of including active sampling along the Tote Road because we are assessing total accumulation which is measured with passive sampling techniques. 3. During summer months, water may be used for dust suppression. Due to safety reasons, water will not be used as dust suppressant during freezing periods (9 months of the year). Coarse gravel or sand will be used thorughout the year for maintenance of the road bed (this has the benefit of added traction for safety and dust supression). With regards to thresholds, monitoring of TSP was initiated in 2013. Results of this monitoring and monitoring into the future will inform on any additional mitigation measures that may need to be employed as it related to potential impacts on vegetation and forage for caribou. The Road Management Plan and Air Quality Management Plan can be updated in the future based on monitoring efforts and adaptive management.
B5	The Proponent must re-evaluate cumulative effects for caribou to include the operation of the tote road preceding and during the operation of the railway and mine.	The cumulative effects assessment for caribou was not changed in the ERP Addendum because the Caribou Energetics Model (Appendix 6H of the Approved Project's FEIS) accounts for effects of traffic on the Tote Road. The scenarios presented in the Caribou Energetics Model examine complete abandonment of the entire zone of influence (ZOI) as well as parts of the RSA north and west of the ZOI, and the scenario of caribou being within the ZOI for the whole year. The Energetics Model was very conservative regarding the level of disturbance and assumed disturbance along both the Tote Road and the railway. The energetics model assesses impacts at different levels of caribou abundance (Appendix 6H of the Approved Project's FEIS Section 4.2). The combined Project effects on mortality risk (referred to by QIA as cumulative effects) remain not significant. Mortality risk is low given proven mitigaton to reduce road and rail related mortality.
C1	It is recommended that the following be implemented as conditions for the amendment to the Project certificate: • The nominal production rate for Deposit #1 for the Mary River Mine Project be set at 21.5 Mt/year with a maximum allowable variance of 25% above the nominal production rate.	Baffinland agrees with QIA's suggestion on variance for production. This allows for operational flexibility as was noted during the hearings for the FEIS. Ultimate production limits should not be arbitrary, but rather should be based on environmental effects monitoring (EEM). Baffinland believes that EEM and any required adaptive management is precautionary. It is important to note that production does not necessarily relate in a linear fashion to observed effects.

C2	It is recommended that the following be implemented as conditions for the amendment to the Project certificate: • Approval from the Nunavut Water Board and QIA shall be obtained by the Proponent prior to the deposition of any dredging waste material on Inuit Owned Lands. • The quantity and quality of any dredging waste material shall be quantified by BIMC prior to deposition, and information will be submitted to NIRB and the NWB. • Any dredged waste deposited on land shall be monitored, and shall have defined monitoring parameters and frequency approved by NWB and the QIA.	• Any dredged material produced as a result of Project Construction (ore dock footprint) will be handled and disposed of in accordance with applicable regulatory processes. • The current approach is to relocate any dredged material within the oredock footprint such that on-land or other approaches to disposal are not required. The Type A authorizes discharge on land of construction (Part D item 26) and details of this land disposal will be provided to the NWB should Baffinland proceed with this option. Dredging procedures are under development and Baffinland has been in discussion with Environment Canada, DFO and QIA regarding the implementation of appropriate mitigation measures for use during the dredging operation and the disposal of the dredged sediment. The alternative preferred by Baffinland is the use of the dredged sediment as fill for the construction of the causeway of the ore dock.
C3	It is recommended that the following be implemented as a condition for the amendment to the Project certificate: • Prior to camp occupation, a rigorous monitoring protocol shall be developed for any camp located along the Tote Road that accounts for the aquatic, atmosphere and land environments.	Baffinland no longer anticipates requiring this camp.
C4	It is recommended that the following be implemented as a condition for the amendment to the Project certificate: • A spill contingency plan shall be implemented that provides defined procedures that allow a spill response to be mounted before the worst case spill migrates to the shore line. • Spill response drills shall be implement that demonstrate the ability of the spill response program at Milne Inlet to adequately respond to the worst case scenario spill within 4 hours.	Modelling is a tool that assists in establishing priority for response. Baffinland acknowledges EC's expertise and essential role in coordinating efficient response to spills. Discussions are in progress with EC to define additional modelling requirements that may be useful in establishing priority response. In addition, Baffinland has secured the support of an international response organization to assist in emergency response should a spill occur. As a regulatory requirement, the OPEP is updated annually and reviewed by Transport Canada to ensure it addresses all the concerns.
C5	It is recommended that the following be implemented as a condition for the amendment to the Project certificate: • A rigorous monitoring program along the Tote Road shall be implemented during the construction and operation of the road,that includes monitoring of water near the road, air quality and landform, soil and permafrost disturbance. The monitoring program should be designed in consultation with QIA.	Monitoring along the Tote Road is part of the: 1) Surface Water and Aquatic Ecosystems Management Plan, 2) The Quarry specific management plans, 3) Air Quality Management Plan, and, 4) Terrestrial Management Plan As an active participant in the Terrestrial Working Group, QIA has input in the development and review of these plans.
C6	The following Project certificate condition should be implemented: • Bridges, culverts and other water crossings associated with the Project shall be decommissioned, and the natural drainage and water flows shall be restored.	This is already part of the Preliminary Abandonment and Reclamation Plan.

Government of Nunavut		Baffinland's Response
Number	Recommendation	
1	The Proponent should contribute to monitoring and mitigation efforts for population level impacts from harvesting due to increased access for the entire North Baffin subpopulation area. To this end, the GN recommends that the Proponent: 1. Record traffic from hunters using the tote road. A log of when individuals use the road and a record what they harvest. 2. Contribute to regional caribou studies currently undertaken by the Government of Nunavut, and work to develop and implement future studies to assess the harvesting impact on North Baffin caribou.	GN is postulating that there will be increased hunter and predator access along the road. There is nothing to suggest increased predator access -- the Tote Road is already in place and has been since the 1960's and upgrades to the road should not provide any improvement in relation to wolf travel. In regards to hunter access -- BIM is not facilitating access to the start of the Tote Road, that access remains the same. As noted by GN, hunters do not currently require roads to access caribou because they can travel off-road and there has been a road/trail through this area since the early 1960s. Upgrades to the Tote Road are unlikely to increase the ability of hunters to access caribou. However, increased traffic along the Tote Road could result in increased local awareness regarding the location of specific groups of caribou. 1. BIM records non-Project use of the road, but does not/cannot compel individuals to report any harvest. Harvest records are collected if the hunters choose to provide them, but documenting harvest from harvesters travelling through site cannot be considered consistent. 2. BIM will consider support of collaring programs led by the GN should those data prove useful for Project mitigation and effects monitoring.
2	The GN recommends that the Proponent contribute to the design and implementation of North Baffin regional caribou studies. The details of these studies can be determined through the Terrestrial Environment Working Group.	BIM will consider support of collaring programs led by the GN should data collected from those programs prove useful for Project mitigation and effects monitoring.
3	The Proponent should clarify and provide further detail on the mitigation measures that will be in place for the tote road and its potential effects on wildlife. This could involve creating a specific section of the Terrestrial Environment Management and Monitoring Plan that describes the mitigation measures that will be put in place for the tote road.	Baffinland acknowledges that updated mitigation and monitoring for caribou is necessary given the substantial increase in traffic on the Tote Road. The TEMMP will be updated to clearly reflect mitigation and monitoring along the Tote Road. Mitigation measures will include: •Wildlife right-of-way policy; • Incorporation of the Caribou Decision Tree (currently in the CEPP) - provides specific minimum stopping distances to allow caribou to move across the road; • Modified embankment heights and finer fill material at known caribou trails that cross the road (i.e., caribou crossings); • Snow bank height maintained at less than 1 m; • Radio communication between operators; • Wildlife signage in known crossing areas; • Check-in/check-out procedure at gates at start and end of Tote Road that includes wildlife reporting; • Speed limit restrictions; and • Trained drivers with wildlife awareness. Monitoring actions focused on the road may include: •Snow track surveys along the Tote Road; • Monitoring of snow bank heights; • Height of land surveys; • Installing cameras at known trail crossings; and • On-site wildlife monitor.
4	Polar bears affected by malfunctions or accidents should be compensated for in the same way as bears killed in defense of life and property. If polar bear compensation for this type of incident is not already addressed in the Inuit Impact and Benefit Agreement for the project, the Government of Nunavut encourages the Proponent to work with potentially affected communities to develop a comprehensive wildlife compensation strategy.	Regarding polar bear, this is addressed in the IIBA in Article 17.

5	Polar bears should be more thoroughly discussed in the Shipping and Marine Wildlife Management Plan. There should be a formal polar bear safety plan for: the port facility (Milne Inlet), the mine (including both operating area and staff quarters), and the road (deterrent and self-defence equipment (firearms for vehicular traffic), and for staff who might be stranded due to mechanical problems or an accident. Each ship should operate under a protocol that identifies what response will be taken should a polar bear be sighted, injured, killed, or contaminated. This protocol should specify who will be contacted, and when, what the response will be, and that the costs of any deterrent activity, or rescue activity or enforcement activity will be borne by the Proponent. The GN DOE can assist with development of a polar bear safety and deterrent plan for fixed sites and polar bear response protocol for ships operating in Nunavut waters. These safety and deterrent plans and protocols will include education for all employees and contractors, possibly electric fences for some areas especially staff living quarters and common areas, patrol areas and frequency of patrol, location and authorization for deterrent and defence devices and firearms, and reporting requirements for incidents.	The SMWMP is a living document and will be updated and modified as required, and in repsonse to review comments. The status of Polar Bears in the Shipping and Marine Wildlife Management Plan (SMWMP, June 2013) was correctly stated "...Committee on the Status of Endangered Wildlife in Canada (COSEWIC); polar bears are also listed as 'Special Concern'." Baffinland's Polar Bear Safety and Deterrent Plan for the land sites has been reviewed by the GN. Polar Bear Safety and Deterrence will be incorporated into the SMWMP and the revision circulated to the MEWG for comment and review.
6	There should be baseline information on distribution (density, sex/age composition, and clumped/uniform/random dispersion) of polar bears along the proposed ship track habitat in all seasons. Once operations begin, there should be surveys back along the ship track to determine if polar bears are attracted to or repelled by the newly broken ice. These 'track back" studies should occur in all the various types of sea ice during all the seasons of ship traffic associated with this project. The GN would be open to collaborative studies with the Proponent to assess and monitor polar bear use of these ship tracks. It may be possible to incorporate these studies into the periodic surveys of Baffin Bay and Foxe Basin that are conducted by the GN.	The timing of Shipping for the ERP is for the purpose of avoiding ice cover and ice breaking. Any ice present during the shipping season is anticipated to be open pack and would not require icebreaking, and hence there will be no track through the ice. Note, the experience at the Voisey's Bay Project has not resulted in increased use of the broken track by seal species, nor has the route become a path for foraging polar bears.
7	Inuit harvesting is both a source of nutritious food and cultural value. Reductions in wildlife harvesting can have a negative impact on livelihood and employment, human health and well-being, resources and land use, cultural well-being, and food security. The potential effects of ERP activities on marine mammals (narwhal) need to be better understood for the Milne Inlet, Eclipse Sound, and Pond Inlet areas. This information needs to be used in conjunction with relevant harvest data and feedback from harvesters to determine with certainty whether or not there is a significant impact. If follow up is required, public consultation should be an integral component of ongoing monitoring and management plans.	Discussions of a hunter harvest study have occurred with MEWG and from these discussions it is clear that to obtain meaningful and comprehensive results, a regional approach needs to be coordinated by the GN and HTO's and possibly, the QSMEC. BIM maintains that its activities with not result in significant impacts to Inuit harvest from the standpoint that we will not be significantly impacting VEC's that Inuit rely on nor will our shipping activities impact on how hunters can utilize their environment. Baffinland will continue to work with the MEWG on the design and implementation of relevant and necessary monitoring studies.
8	NHC does not dispute the statements made in the referenced section, but notes that changes in, and timing of, employment have an effect on Public Housing rental rates. NHC provides needs based public housing across the territory. Rental rates are assessed annually; if a resident's income changes over the year, rent is adjusted accordingly. Thorough analysis of the impacts of drop in employment caused by the shift from ERP Construction to Operation will allow NHC to better assess the impacts the project will have on public housing rental rates, as well as Public Housing wait lists and demand.	The normal decline in employment following major construction works was addressed during the FEIS. This is not a new effect introduced by the ERP. Nonetheless, inclusion of "ERP" to T&C 149 is considered to be a reaonsable request. With regard to public housing rental rates, Baffinland is willing to be consulted on social policy issues. However, the company believes that responsibility for the development of such policy, including carrying out the necessary analysis, is the responsibility of government. Baffinland's monitoring program will provide data that may help to support this public sector analysis.

9	The changes in wage employment and migration are potential results of the ERP. These changes have the potential to impact economic development and housing in the Qikiqtaaluk Region, and therefore should be monitored appropriately. The effects of the ERP and its potential impact on housing should also be considered by the Proponent.	Baffinland agrees to include the ERP in the socio-economic monitoring program.
10	Through the NIRB process, the GN has publically indicated its view of potential tax revenues from the Mary River Project which differed significantly from the 18 MT/a FEIS tax revenue benefits to the Government of Nunavut. Though the GN relies primarily on its own analysis and data than on the revenue data in the FEIS for its tax revenue forecasts, we recommend that the proponent provide new analysis of potential tax revenue that the ERP will generate. This analysis will help interested parties to do a proper review of the ERP benefits. In keeping with Baffinland's original commitment in the approved Mary River Project, of working and meeting with GN Finance officials to assist the GN in preparing its fiscal outlooks and tax forecasts, the GN recommends that it and Baffinland jointly develop a protocol encompassing the ERP to ensure that: 1. The GN is kept informed of major decisions taken by Baffinland which may impact its territorial taxes (e.g. an expected increase in the amount of fuel to be imported); 2. The Proponent responds to the GN's tax-related requests in a reasonable time-frame, either with the requested information or with an explanation as to why the requested information may be unavailable or cause concerns; 3. The Proponent will engage the GN to develop a common understanding of how the GN can treat the confidential tax data to which we already have access, with the goal of instilling confidence in our current tax data management practices.	Baffinland agrees to include the ERP in the socio-economic monitoring program and agrees to include the ERP in its discussions with the Government of Nunavut.
11	The Work ready program pilots have operated as a pre-employment qualification criteria for employment consideration Data from the Work Ready Program (WRP) pilots described in the Addendum indicate that of the 141 applicants, 105 achieved the necessary attendance rates to graduate the program and be considered for employment by the Proponent and/or subcontractors. The Addendum indicates that even higher success rates were achieved in subsequent pilots; however, the Addendum does not show how this success will be communicated to the Departments of Education and Family Services, who participated in the development and funding of the Program. The Proponent concludes that the WRP show a "tremendous success" with "some 200 to 250 successful Work Ready graduates". According to the Proponent, the success of a WRP is purportedly measured by its ability to generate graduates of the WRP program. As a further measure of success, the Departments are interested in determining with the Proponent what the labour market outcomes of the Work Ready Program intervention are.	Baffinland agrees to include the ERP in the socio-economic monitoring program, and anticipates productive collaboration with GN Departments in areas of mutual benefit.
12	Systematic surveys are recommended for any new proposed development areas. Spatial delimitation and intent to survey any new areas have to be defined and submitted for approval in the yearly permit application. C&H would also like to emphasis the fact that no archaeological mitigation (except for avoidance – protection) should be undertaken before the definite footprint of a given activity area is known. This will prevent the unnecessary destruction of archeological sites. The lack of planning by the Proponent has already resulted in the unnecessary destruction of significant archeological sites which is becoming a recurrent problem. Systematic shovel testing of the beach ridges along Milne Inlet is still a valid and important recommendation to identify and protect any additional buried archaeological sites. Since plans have been revised to make the tote road a permanent component, a systematic and thorough survey needs to be conducted. Past implemented mitigation measures (such as staking and flagging) along the then temporary tote road have to be revised and made permanent if appropriate. Monitoring of these locations has to be done on a regular basis. Special attention should also be placed on bridge construction across rivers. In depth studies have to demonstrate that spring flooding will not impact any archaeological sites downstream/upstream, however, this must be confirmed by regular monitoring.	Baffinland notes that potential for archaeological resources to be impacted was assessed in the FEIS and the overall footprint of the Project has not changed with the ERP and submission of the FEIS Addendum. Baffinland would like to point out that since the unfortunate incident in 2007, archaeology has been placed as very high priority. No further incidents related to archeology have occurred. Baffinland will continue to annually propose any protection or mitigations that will be reviewed and approved by the GN in compliance with all regulatory requirements. Baffinland notes that all sites within the footprint of Milne Port have been mitigated as of the end of the 2013 season. All sites within 35 m of the Tote road will be mitigated (9 sites in 2013; the final 7 sites planned for 2014) and any new quarries are surveyed before exploitation. All remaining sites are well removed from the road and will continue to be protected as regulated. Baffinland is open to discussing this further with C & H. In terms of bridges and flooding, bridge construction sites at key crossings have been surveyed. Baffinland notes that bridges are designed to pass the 1:100 year flood event and typically improve flows to more natural conditions when compared to culverts. Therefore flooding at bridge locations potentially affecting nearby archaeological sites is not expected beyond exceptional natural events.

Department of Fisheries and Oceans		Baffinland's Response
Number	**Recommendation**	
2.1	1. Detailed shipping route location and width (maximum deviation expected) should be identified for the ERP along the entire route of the ship track within Canadian waters. 2. Clarification on the actual volume of shipping which will occur during the ERP as well as information on the potential for more shipping than has been identified in the FEIS Addendum to occur. 3. Detailed bathymetric data along the proposed shipping route in Milne Inlet and Eclipse Sound should be provided to ensure safe navigation along the proposed shipping route. 4. As part of the ship specifications for charter bulk carriers (Addendum Volume 10 Appendix 10D-10 Appendix 2) and audit (FEIS Addendum Volume 10 Appendix 10D-10 Appendix 4), BIM should require the charter company to provide detailed sound measurements under expected operating conditions (e.g., speed, load). If these details are not available for each type/size of vessel chartered, then BIM should collect appropriate sound measurements. This information is needed to properly monitor and mitigate potential impacts of vessel noise (e.g., disturbance, masking) on marine organisms.	Any proposal to increase shipping will be developed and presented for approval as per the existing regulatory processes. 1. The entire shipping route within Canadian waters is presented in the EIS Addendum Figure 3-2.11. 2. The volume of shipping associated with the Early Revenue Phase (ERP) is described in the EIS Addendum (Volume 3, Section 2.4.3). 3. Refer to EIS Addendum Volume 3, Section 2.4.2. As well, Baffinland is working in cooperation with Canadian Hydrographic Service to improve charting in the Eclipse Sound and Milne Inlet area. 4. This information is not required. As part of the Acoustic Monitoring Program, a representative sample of ship noise will be obtained. Baffinland is confident that the representative measurements will be sufficent to properly monitor and mitigate potential impacts of vessel noise on marine organisms.
2.2	BIM should provide better rationales for the thresholds they used. The rationales need to be supported by quantitative analyses and should include power analysis of monitoring efficacy to ensure the monitoring program has the ability to detect the identified thresholds (e.g., a change in population abundance for narwhal, beluga and bowhead whales). The Milne Inlet-Eclipse Sound area contains several Arctic Char stocks that could be impacted by Project activities. For that reason, DFO Science recommends a more quantitative approach to evaluating thresholds for them.	In the EIS Addendum, Baffinland employed the same methods for effects prediction as was used and accepted for the FEIS. These methods are consistent with standard, accepted EA methodology. For environmental effects monitoring, Baffinland will follow the procedures and protocols as laid out in its EEM Framework. Note that the threshold for a specific EEM program will not necssarily be the same as used for effects prediction. Furthermore, the issue of using 10% as a threshold has previously been addressed during the FEIS technical review comments responses: Baffinland has, through the Information Request process, provided a listing of EIS documents (including NIRB-approved EAs) where magnitude of effect is determined through population-based thresholds (FEIS - DFO IR# 2.2, Attachment S-2 - see Appendix A, Extended Responses to Technical Comments: In Response to DFO Recommendation 2.2). Arctic char are discussed in the EIS Addendum, however it is difficult to consider them as a monitoring target, given their pelagic nature and the relatively short period of time when individuals would be present within the Project zone of influence. As noted elsewhere (FEIS Addendum ERP Volume 8, 3.3.1), a more suitable monitoring target would be a sedentary species (e.g. benthic communities, water and sediment quality).
2.3	In the absence of clear evidence for no or insignificant effects, a precautionary approach should be adopted.	Agreed. The predictions made have been cautionary, and where there is uncertainty (i.e. the level of confidence in prediction) a suitable monitoring program is to be implemented.
2.4	Surveys of marine forage species should be undertaken following acceptable protocols so that detailed quantitative analysis can be used to monitor species and community trends. Comprehensive baseline quantitative surveys should be undertaken before project activities begin, and these should be designed to allow regular standardized monitoring once the Project starts.	Baffinland has carried out a supplemental baseline survey of Milne Inlet. The work included sampling for sediment, benthos, fish and fish habitat. The workscope and field report have been shared with the MEWG of which DFO is a member.
2.5	1. BIM should re-analyse the data from their surveys using Distance sampling methods (Buckland et al. 2001). 2. BIM does not correct for availability and perception bias in Appendix 8A-2. However, in App. 8C, the densities in tables 8C 3.6, 3.7 and 3.9 are corrected but there is no indication where the values came from. BIM should use correction factors and provide a scientific justification for the values chosen. 3. BIM should improve the precision of their baseline data, assess the species regularly, and/or re-design their monitoring in ways that would allow for rapid detection of changes in marine mammal habitat use or population dynamics, and minimize such impacts. For example improvements to the methodology for subsequent surveys should include the systematic use of double observers for mark–recapture Distance sampling (Innes et al. 2002, Richard et al. 2010). 4. The monitoring program should be carried out in a scientifically defensible way, and with sufficient precision to ensure that potential effects at or above carefully-chosen threshold levels can be identified. In instances when sufficient precision cannot be assured without extraordinary logistical limitations, the Proponent should adopt precautionary approaches such as diverting ships away from known or newly-discovered whale aggregations or pinniped haulout areas.	It is important to recognize the distinction between baseline data for the purposes of EIS predictions versus data collected for monitoring programs. The DFO reviewer(s) is(are) confusing the two and implies that Baffinland has concluded that enough data is available for monitoring effects of the Project on marine mammals. Baffinland acknowledges that additional baseline data on marine mammals will be required for monitoring programs. However, the aerial survey data for marine mammals along the northern shipping route in conjunction with IQ and other published and unpublished research is adequate to serve as the basis of impact predictions. In fact, the survey effort exceeds that collected for many other EISs for major industrial projects. See Appendix A, Extended Responses to Technical Comments: In Response to DFO Recommendation 2.5.

2.6	1. DFO recommends that the Baffinland confirm whether blasting will be required for the construction of the port facilities in Milne Inlet. 2. If blasting is required BIM should undertake an effects assessment of blasting for the Milne Inlet Port area on marine species. 3. If blasting will be required a detailed blasting program, mitigation measures and monitoring program be developed in consultation with DFO.	Blasting in the marine environment is unlikely to be required for the ERP, however the possibility has not yet been fully rejected. If blasting is required, the geographic area, extent and duration will be very limited. Should a blasting program be required, the applicable guidelines (e.g.from DFO) will be applied, and monitoring conducted to ensure there are no lethal effects on exposed marine life.
2.7	BIM should undertake an effects assessment on the impacts of dust deposition on ice melt as well as the impacts on marine species and their habitat for the Milne Inlet-Eclipse Sound area.	Based on work done, no quantifiable effect on ice melt in the Milne Inlet and Eclipse Sound area is anticipated. Dispersion and deposition of ore dust from stockpiles have been modeled (RWDI, 2010) and presented in the DEIS Appendix 5C-5.
2.8	1. The proponent should investigate the impact of pile driving during the ice-covered period. BIM should provide a density estimate for ringed and bearded seals during the ice-covered period. In addition, BIM should provide proper sound propagation models under ice-covered conditions. 2. Prior to construction, the proponent should deploy acoustic recorders around the port and in Koluktoo Bay to measure sound levels from pile driving over broadband frequency. In addition, BIM should monitor the efficiency of the bubble curtain to attenuate noise. If effective, BIM should use bubble curtains to mitigate effects for all species. 3. The proponent should investigate different noise reduction methods such as a vibration pile driver (Matuschek and Betke 2009). 4. The proponent should use marine mammal observers during the entire duration of pile driving. The observers should use both visual and passive acoustic detection to monitor the presence of marine mammals within 10 km of the operation. When a marine mammal is detected, the activity should be stopped until the marine mammal has left the area. 5. The proponent should produce a warning sound before the beginning of each piling operation. This sound should be loud but non-hazardous to warn marine mammals in the area. Alternatively, BIM should use a “soft start” to warn marine mammals in the area. The soft start consists in gradually augmenting the intensity of piling before reaching full impact. Mitigation measures should be carefully monitored to test for their efficacy.	1. Should pile driving be scheduled during periods of ice cover, a density estimate for ringed and bearded seals could be developed, and a sound propogation estimate developed from modeling for under-ice conditions. 2. As stated in the FEIS Addendum (Volume 8, Section 5), BIM will undertake acoustic measurements of pile driving to verify modelling predictions for marine mammal safety zones. 3. Vibratory pile driving will be considered to install the interlocking sheet piles at the ore dock in Milne Inlet. Baffinland will include the consideration of noise emission levels as one of the criteria for pile-driving contractor selection. 4. Monitors will be employed throughout pile driving activity to monitor established marine mammal safety zones for selected species. Pile driving will be suspended if incursions inside the defined zone are observed. Work will resume when the area has been cleared. As stated in the FEIS Addendum (Volume 8, Section 5: ringed seals, page 65; beluga whales, page 90; narwhals, page 103; bowhead whales, page 115; bearded seals, page 135), BIM will use Environmental Monitors throughout pile driving operations to monitor established marine mammal safety zones. DFO’s position of monitoring and stopping pile driving for marine mammals within 10 km of pile driving is not based on any scientific evidence that mammals that far from the pile-driving source will incur negative effects. Based on acoustic modelling, the zone around (impact) pile driving at the Milne Inlet ore dock site where marine mammals may incur temporary hearing impairment is <200 m. This zone is expected to be reduced for vibratory pile driving. The 10-km zone suggested by DFO is completely unnecessary. As noted earlier, prior to pile driving activities, BIM will submit a monitoring and mitigation plan for marine mammals to the MEWG for review and input, which will propose a very conservative safety zone, eg. 500m for whales and 300m for seals. 5. Baffinland believes that the safety zone is adequate to address this point by DFO. See Appendix A, Extended Responses to Technical Comments: In Response to DFO Recommendation 2.8.
2.9	1. The proponent should confirm whether dredging will be required for the construction of the Milne Inlet Port. 2. If dredging will be required an effects assessment should be carried out to determine the impacts on marine mammals, fish and their habitat and provide a map showing the zone of influence. 3. If dredging should occur, BIM should develop a mitigation and monitoring program to avoid negative impacts on marine mammals and fish in Milne Inlet.	1. Dredging is required and it is anticipated that dredge material will be used for fill in the construction of the ore dock causeway. 2. An Operational Statement for Routine Maintenance Dredging has been developed by DFO. Potential effects from any dredging that may be required during construction would not differ materially from those permitted under the Operational Statement, hence an effects assessment is not justified. BIM will apply the statement to the operation. 3. Conventional and proven techniques are available to reduce the environmental effect of this activity and avoid lasting effects on the surrounding marine environment. This will be done in consultation with DFO.
2.10	1. DFO recommends that the proponent continue to assess all opportunities for relocation, redesign and mitigation to avoid negative impacts to fish and fish habitat. 2. DFO recommends that the proponent explore off-setting options to off-set the HADD. 3. In order to evaluate the success of off-setting options that are implemented DFO recommends that BIM develop a monitoring plan and ensure that sufficient baseline data is collected to determine if the new fish habitat is stable and functioning as intended.	Baffinland will continue to consult with DFO and comply with Fisheries Act requirements, as well as DFO policies and operational statements applicable to the Project.

2.11	1. The proponent should provide information about when their bulk sample shipments occurred, and discuss the possible impact of those shipments on the narwhal entrapment. 2. The proponent should conduct a thorough effects assessment of the ERP on sea ice and its potential to impact marine mammals, especially narwhals and killer whales, through ice entrapments.	1. DFO's suggestion that vessels involved with BIM shipping activities in 2008 as part of the bulk ore sample shipments was potentially linked to the ice entrapment of narwhals in Eclipse Sound in 2008 is completely unfounded. The narwhal ice entrapment referenced by DFO occurred in November 2008 and resulted in the death of at least 629 narwhals. DFO suggests that BIM shipping in 2008 may have resulted in narwhals delaying their fall migration because "the constant breaking of ice by ore carriers might encourage narwhals to stay longer on their summering grounds". There were three ore carrier shipments from Milne Inlet in 2008; the last ore carrier departed Milne Inlet on 2 October 2008. This vessel did not break landfast ice or sail through consolidated sea ice. Also, it is highly unlikely that narwhals would delay their fall migration because a ship opens up a narrow channel (likely temporary) of open-water in their summering area. Regardless, BIM shipping activity along the northern shipping route in 2008 cannot reasonably be linked with the narwhal ice entrapment. Narwhal entrapment in ice occurs regularly in the absence of shipping activity. DFO (2012) notes that "Small to medium entrapments resulting in mortality may be major sources of natural mortality for narwhals (Heide-Jørgensen et al. 2002a) but many of these events probably go undetected due to the vast range of narwhals and the fact that smaller ice entrapments are harder to detect than large ones, especially when they are remotely located. An entrapment event of this magnitude [i.e., November 2008 event] is rarely observed and only one of similar size was reported in Nunavut in the last century (Heide-Jørgensen et al. 2002a)." 2. Baffinland provided information on sea ice conditions in the FEIS (see Volume 3, Appendix 3G Ice and Marine Shipping Assessment). Shipping associated with the ERP will occur during the open-water season.
2.12	1. DFO recommends that the proponent carry out a thorough analysis of of displacement-based impacts. 2. DFO recommends that the proponent develop a monitoring program to assess the impact of displacement on marine mammals.	1. It is BIM's position that a thorough analysis of potential marine mammal avoidance of shipping was conducted in the FEIS Addendum. Marine mammal monitoring programs and an adaptive management approach will be developed in conjunction with the MEWG. 2. An initial study of narwhal behaviour in response to shipping was begun at Bruce Head in Milne Inlet in August 2013 in conjunction with the HTO, QIA and residents of Pond Inlet. Baffinland intends to continue monitoring of the interactions between Project marine traffic and marine mammals.
2.13	1. Prior to commercial shipping of iron ore, the Proponent should develop a monitoring protocol that includes, but is not limited to acoustical monitoring that provides an assessment of the negative effects of vessel noise on marine mammals. Once the protocol has been developed, pre-operation baseline data should be collected. 2. The Proponent should conduct sound verification studies to ground-truth their sound propagation models and estimated zones of impact. These studies should be done with different environmental conditions (wind, waves) and should be based on the real dissipation of sound from the sources (ships and pile driving). 3. The Proponent should monitor the noise produced by their ore carriers at different speeds and from different orientations. They should assess at which speed the cumulative noise exposure is minimized taking into account the risk of ship strikes. Pre-construction deployment of PAM (passive acoustic monitor) sensors in Milne Inlet is recommended so monitoring can occur during the construction and operation phases. 4. The Proponent should follow the Population Consequence of Acoustic Disturbance (PCAD) program (Wartzok and Tyack 2008) in the design of their acoustic monitoring program. 5. The Proponent should also develop an on-shore monitoring program to be conducted both prior to and during Project operations. This program could involve a mix of observations by on-shore observers as well as by camera-traps located at strategic locations. Cameras are a low-cost non-invasive method. If located at strategic points, they could cover the width of Milne Inlet (e.g., Bruce Head in Koluktoo Bay). In addition, they could allow live-monitoring of marine mammals and help to mitigate the impact of shipping traffic. 6. Studies should be done to monitor the effects of shipping noise by various means. For example, narwhals could be equipped with satellite tags to document their movements in response to ship passages. In addition, acoustic tags could be deployed on narwhals to monitor noise levels received by the animals. This acoustic data would also fill important gaps in the knowledge of narwhal acoustics and decrease uncertainty in modeling of the zone of impact.	1. The proponent has, in fact, already developed protocols in concert with the MEWG. Marine mammal effects studies were initiated in 2013, and further studies will be designed with the MEWG. 2. Part of the acoustic monitoring program will be to document sound from ore carriers. 3. Noise monitoring of transiting ships will include collection of data from selected ore carriers, once they commence operations. Details of acoustic monitoring will be developed in conjunction with the MEWG. 4. Details of acoustic monitoring will be developed in conjunction with the MEWG. The PCAD program will be one of the approaches considered. 5. Baffinland, in cooperation with the HTO and QIA has developed and applied a shore-based monitoring program. Results will be shared with the MEWG and input solicited for subsequent efforts. Shore-based monitoring (from Bruce Head) of narwhal response to shipping was started in August 2013 (prior to the ERP) and will continue into 2014 and beyond. The efficacy of camera traps as a monitoring tool will be investigated with the MEWG. 6. Other potential monitoring programs will be discussed with the MEWG and their advice and cooperation considered for EEM planning and execution. Satellite and acoustic tagging of narwhals may be considered as part of the marine mammal monitoring program. Also, under consideration is the use of UAVs to collect data on marine mammal responses to shipping. See Appendix A, Extended Responses to Technical Comments: In Response to DFO Recommendation 2.13.
2.14	BIM should have evaluated the impact of masking more rigorously. A complementary way to estimate the impact of masking in a given habitat is by comparing the range at which a signal reaches its limit of detectability or interpretability under given noise conditions compared to natural noise conditions. Examples of this method are given in Clark et al. (2009). DFO Science recommends that BIM use this approach to evaluate the effect of masking. In addition, BIM should investigate masking of environmental sounds as well as sounds from other species. Prior to the commencement of commercial shipping, BIM should conduct passive acoustic monitoring to document baseline noise levels in the ERP area and the acoustic behaviour of marine mammals present. Passive acoustic monitoring should continue during commercial shipping to measure received sound level and changes in acoustic behaviour.	Baffinland, with input from the MEWG will develop a program of acoustic monitoring to document background and operational (ore shipments) noise levels as a basis for understanding potential masking effects on marine mammals.

2.15	1. The Proponent should evaluate the risk of ship strikes within the context of PBR (i.e., all sources of human-caused mortality), taking into account the ongoing subsistence harvest. Assuming Inuit have first priority for access to wildlife for subsistence harvesting, any additional mortality must fall within the residual (i.e., remaining) allowable harm. 2. The Proponent should optimize the shipping route to reduce the risk using a temporally- and spatially-explicit model. In addition, the Proponent should clearly plan and detail the shipping route. There was no clear description of the Milne Inlet-Eclipse Sound shipping route in the Addendum. 3. The Proponent should immediately report any accidental contact by Project vessels. In addition, BIM should summarize and report annually any accidental contact by Project vessels with marine mammals through the applicable monitoring report. This should be addressed through term and condition 121. 4. The Proponent should provide sufficient marine mammal observers on project vessels to ensure that collisions with marine mammals are observed and reported throughout the ERP. The marine wildlife observer protocol should include, but should not be limited to, protocols for marine mammals, and environmental conditions and immediate reporting of significant observations to the ship masters of other vessels along the shipping route. Ore carriers should be equipped with climate controlled stations and shipboard lighting to permit visual sightings by marine mammal observers during all weather conditions. This should be addressed by Project term and condition 123. 5. The Proponent should ensure that measures to reduce the potential for interaction with marine mammals are identified and implemented prior to commencement of shipping operations. 6. The Proponent should revise their proposed “surveillance monitoring” to improve the likelihood of detecting avoidance behaviours by marine mammal responses that are too far ahead of the ship to be detectable by observers aboard the ore carriers. A baseline study early in the shipping operations could employ additional surveillance to detect potential changes in distribution patterns and behaviour. At an ambitious scope, this might be achieved using unmanned aircraft flown well ahead of ships. Live cameras along the shipping route might also be used to monitor the presence of marine mammals in the track of a ship, at least in narrower parts such as in the entrance of Koluktoo Bay.	The Addendum to the FEIS fully addresses the risk of ship strikes as a result of shipping activity related to the project. The ship strike was fully addressed and thoroughly discussed at the FEIS Final Hearings of the Mary River Project. The effort by DFO to employ a model to estimate ship strikes is not valid. For example, the DFO model predicts 123 ship strikes on narwhals per year by project vessels. This is in spite of the fact there are no recorded cases of ships striking narwhals. The model ignores variables that are known to be important - ability of a whale to avoid an oncoming vessel; and vessel speed. The model used has not been validated in any credible manner. Baffinland examined three available data bases and carried out a "hindcasting " exercise by comparing model results against actual observations. One data source was from DFO (Canadian Coast Guard). The model produced estimates of ship strikes and mortalities that were inconsistent with the actual observational data. The use of this model is not "cautionary"; it produces erroneous and misleading results. 1. The use of PBR as a threshold for effects assessment is relevant only to potential mortality effects. To date, PBR has not been available for many marine mammal species. See , for example, Stewart (CSAS Research Document 2008/025) concluded that a PBR cannot be calculated for any of the walrus populations present in the Eastern Arctic. 2. The shipping route is shown in Figure 3-2.11. The route selection reflects consideration of potential interaction with marine mammals. Adjustments to the route will be made as experience is gained on marine mammal interactions. 3. Baffinland has marine mammal observation and reporting protocols in place in its SMWMP. 4. Baffinland is committed to a ship-based Observer program in it's IIBA with QIA and implemented the program as a pilot program in 2013. 5. The SMWMP addresses measures to reduce the potential for interaction with marine mammals. 6. Baffinland has developed and applied a program of monitoring studies in Milne Inlet and along the Shipping Route. These programs have been developed with input from the MEWG. BIM stands by the analyses contained in the ERP that whale mortality is not expected to occur as a result of ERP activities because of the relatively slow ship speeds and the ability of whales to detect vessels presence and avoid getting hit. Baffinland would like to reiterate that the analysis conducted by DFO is misleading and not valid.
2.16	1. When a decision about ballast water options is made, the Proponent should consider the following: a) Time required for effective treatment and the duration of the voyage from the exchange point to Milne Inlet, b) Source and receiving port characteristics, c) Potential effects of treated ballast on marine organisms and communities in Milne Inlet. 2. A contingency plan should be developed in the event that ballast water exchange or treatment is not effective. 3. Ships should undertake exchange plus treatment to achieve the highest risk reduction possible. 4. A clear standardized approach and methods need to be developed for the collection of baseline information and future monitoring in order to have the ability to detect changes in invertebrate communities that may occur as a result of species introductions or habitat alteration. Ideally methods should be consistent with those used in port surveys elsewhere in Canada by DFO and the Canadian Aquatic Invasive Species Network. Adequate baseline and monitoring of marine invertebrates requires proper coverage of different habitat types and depths and use of different complementary capture methods. 5. Attention to proper coverage is particularly important for benthic communities which can vary substantially by depth and habitat type (Pohle and Thomas [no date]). DFO recommends the use of methods that allow for the collection of infaunal (e.g., coring) as well as epifaunal (e.g., quadrat clearings) organisms in the intertidal and subtidal zones. Offshore areas should also be sampled if effects are expected to extend into greater depths. Ideally benthic surveys should be conducted as late in the season as possible to allow time for intertidal communities to fully establish following ice out. 6. For the establishment of an adequate baseline and monitoring of zooplankton DFO recommends the use of complementary towing methods and mesh sizes, and sampling across seasons. Oblique tows with a larger mesh size (e.g., 250-500 µm) should be done in addition to vertical tows with a smaller mesh size (e.g., 80-160 µm) as these will encounter different species (larger, faster species in oblique versus vertical tows). Under ice sampling should be conducted in addition to open water sampling to characterize these communities which are likely to differ from open water fauna. This is particularly important given the potential environmental changes with ballast discharge that could affect ice conditions in Milne Inlet. In all cases standardization and appropriate replication should be used (consistent with published standards (e.g., see Deibel [no date], Pohle and Thomas [no date]).	1. 2. 3. The use of existing fleet vessels means that ballast water handling options will reflect current approved practice, i.e. mid-ocean exchange. 4. DFO has developed and applied a standard protocol for sampling. Baffinland will cooperate with DFO in collection of the required baseline information and future monitoring. 5. 6. Baffinland has provided support to DFO in collection of this baseline information for Steensby Inlet and will support a similar effort in Milne Inlet. See Appendix A, Extended Responses to Technical Comments: In Response to DFO Recommendation 2.16. The review comments provided by DFO are appreciated however, as noted, the valid revisions do not alter the conclusions of our assessment.

2.17	BIM should monitor killer whales along the shipping route to assess impacts of the Project on killer whales and any concomitant effects on other marine mammals.	Killer whales were not established as a VEC through consultations with communities and regulatory agencies. Shipping associated with the ERP will occur during the open-water season. The ERP does not include breaking of landfast ice or transit through areas of consolidated sea ice in either the spring or fall. Regardless of this fact, because of their large dorsal fins there is little likelihood that killer whales will follow narwhals and bowheads into ice-covered waters by following a vessel. The question of whether ship noise will mask killer whale calls making it more difficult for narwhals and bowheads to detect these predators works both ways. Killer whales probably do not vocalize loudly when they are hunting (as this would alert prey of their presence) and therefore masking may not have an effect on hunting success. In fact, it can be argued that the masking from ship noise will make it harder for killer whales to find narwhals and bowheads and may reduce predation on those species. It is acknowledged that killer whale sightings are increasing; however, a monitoring program designed specifically to investigate potential increases in killer whale predation on cetaceans would be interesting but is not warranted as a project effects study. Monitoring programs conducted during the open-water period will record all sightings (and potential acoustic recordings) of killer whales. These data can be shared with DFO and included in BIM Technical Reports.
2.18	BIM must develop a monitoring plan to verify the accuracy of their conclusion about within-project cumulative effects on marine organisms. DFO recommends the use of PBR to assess the cumulative impact of the proposed Project on marine mammal populations. Assuming Inuit have first priority for access to wildlife for subsistence purposes, any additional mortality must fall within the residual (i.e., remaining) allowable harm.	Baffinland in cooperation with MEWG has identified and implemented a broad program of environmental effects monitoring. As noted elsewhere, the use of PBR as a threshold for environmental effects monitoring is not practical or applicable to the interactions being monitored.
2.19	The Emergency Response and Spill Contingency Plan for marine spills must include spills that may occur along the shipping lane, not just at the port sites. Proposed spill response procedures for wildlife protection must address mitigation for marine mammals including narwhals, bowhead whales, walrus, belugas, and bearded and ringed seals.	Comprehensive spill response procedures are included in the OPEP and SOPEPs. As well, OSRL (Baffinland's contracted response organization) would provide support in addressing any mitigation measures, including for marine mammals.

Environment Canada		Baffinland's Response
Number	**Recommendation**	
EC-1	The AQMP should be updated to be consistent with Project Certificate 005 Condition 7 and the increased activity at Milne Port proposed in the ERP. Project Certificate 005 Condition 7 and Conditon 8 should be expanded to include Milne Port.	Regarding Items 7 and 8 of the suggested rewording of Certificate 005 (monitoring SO2 and NO2 along shipping lanes), the predicted maximum 1-hour NO2 and SO2 levels are low relative to applicable thresholds. For 1-hr NO2, the applicable threshold is 400 ug/m3, and the air quality model indicates the maximum level, under worst-case meteorological conditions, will fall below 125 ug/m3 beyond about 500m away from the shipping lane. Under more normal weather conditions, the levels will be considerably lower. For SO2, the applicable threshold is the WHO's short-term guideline of 500 ug/m3, 10-minute mean. The predicted maximum 1-hr SO2 levels, under worst-case weather conditions, fall below 150 ug/m3 beyond a distance of about 500m, again well below the applicable threshold at only a relatively short distance from the ship. So, once the ship is at a location where the shipping lane is, say a kilometer or more away from the shore, the likelihood that SO2 and NOX could be at levels of concern is nil. Passive monitoring of ship emissions at a remote location will not detect ship emissions. The likelihood that the wind is in the right direction when a ship passes by will be low, and it is likely that the ship will be travelling too far from land for air quality emissions to be detectable. Active monitoring requires an AC power source which is difficult to establish at a remote location and operation of a generator to power the monitor may contaminate the sample. In short, Baffinland does not see any utility in applying the current project certificate condition 7 to the ERP as the monitoring would not generate any useful data. Where ship-based emissions may be of concern would be as an ore carrier leaves the dock under power. At that time, emissions from the ship will be the greatest and the ship will be the closest to shore and receptors at the port. This can be captured by air quality monitoring at the port site. To respond to EC's request for continuous monitoring, Baffinland agrees to carry out continuous monitoring for SO2 and NO2 at Milne Port over one summer shipping season and at Steensby Port over a one year period. If emissions are at acceptable levels (below thresholds), then continuous monitoring can be discontinued. No re-wording of Project Certificate Condition 7 and agrees to EC's recommended re-wording of Project Certificate Condition 8.
EC-2	Expand the geographical extent of Project Certificate 005 10 to include dust deposition from the Tote Road.	The Mary River dustfall monitoring program commenced in the summer of 2013 and currently includes 16 monitoring stations to track levels of dust deposition along the Tote Road, as well as monitoring stations at Milne port, the Mary River mine site, and regional reference sites.. There are several diffferent thresholds relating to dust deposition contained within the ERP. These thresholds relate to either effects on air quality or effects on vegetation health - the threshold for air quality monitoring is 4.6 g/m²/year (Table 6-2 in Appendix 10D-1 of the ERP) and is 50 g/m²/year for effects on vegetation health (Appendix 10D-11 of the ERP). BIM acknowledges some discrepancies and confusion among the various significance thresholds and monitoring thresholds presented. Clarification will be provided in the monitoring plans.
EC-3	EC recomends that: a) Monitoring be implemented for Thick-billed Murres along the Northern shipping route; b) Information gaps regarding feeding and flightless migration aggregation locations be addressed through the Marine Environment Working Group; c) Baffinland be required to develop and implement mitigation and monitoring plans to avoid aggregations of migratory birds; and d) Mitigation measures to reduce the potential for bird-ship collisions be implemented. Refer to recommendations EC-4.1 and EC 4.3 in EC's Final May 2012 Submission.	Baffinland will have a shipboard monitor on a representative number of ships travelling to and from Milne Inlet. This monitor will document marine bird observations along the shipping route as well as any responses to the Project vessel. This work was commenced in 2013 with shipboard monitoring on two of the Project ships: one in late July - early August, and one in late September to early October. Analysis of these data is ongoing, however, preliminary results indicate that during the July/August trip the majority of marine bird observations were of individual birds or small (<10 birds) groups. A few larger groups of marine birds (20-40 individuals) were observed including groups of northern gannet, northern fulmar, black-legged kittiwake, unidentified eider species, and unidentified murre species. During the September/October trip, the majority of marine bird observations were again of individuals or small (<10 birds) group of birds. The only larger (20+ individuals) groups seen were two flocks of Canada geese (50-100 birds in each group). The shipboard monitoring will continue, and should observations indicate consistent high densities of marine birds along particular sections of the shipping route, consideration will be given to altering the route to avoid these areas (subject to safety and other constraints). Baffinland is also currently contributing to research on thick-billed murre, common eider, king eider, ivory gull and glacous gull in Foxe Basin and Hudson Strait. The results of this work will help provide insight into the behaviour of marine birds and the potential impacts of shipping traffic. All data and mitigation measures will be reviewed by the MEWG including EC's proposed mitigations.

EC-4	EC recommends that the conditions in Project Certificate 005 that currently apply to activities at Steensby Port be applied to the Milne Port during the ERP, specifically: a) Project vessels be restricted to a maximum speed of 14 knots during the open water season in areas where the shipping route is <10km from the nearest shoreline; b) Baffinland conduct shoreline surveys for nesting birds within the areas identified as being potentially affected by ship wake as well as at reference shorelines in Milne Inlet prior to the construction phase and once regular ore shipments commence. Results of nest surveys should be included in wildlife monitoring reports; c) Environmental monitoring include the placement of additional wave sensors within the areas of potential concern identified in Figure 3 of Appendix 8-II of the FEIS to better characterize the natural wave regime and to measure vessel wakes at the shoreline in order to verify model predictions and to determine the efficacy of proposed measures to mitigate vessel wake effects; and d) Baffinland reduce ship speeds if monitoring indicates that ship wake height is exceeding natural mean seasonal wave height or if there is evidence of coastal erosion or damage/destruction of migratory bird nests. Ship speed should be sufficiently reduced to ensure that wakes are equal or less than the mean natural seasonal wave height.	a) Volume 3 of the the FEIS Addendum for the ERP states that Project vessels travelling through Milne Inlet and Eclipse Sound will travel at speeds of 7 to 10 knots (Section 2.4.3). At these speeds, wakes generated by Project ships are not expected to exceed wave heights that can naturally occur in the area — modelling done for shipping through Steenby Inlet indicated that at speeds of 14 knots, wake heights range from 0.2 m within 60 m from the vessel to 0.05 m within 3,865 m of the vessel (FEIS Appendix 8D-2); the smaller vessel sizes, slower speeds, and deeper channels at Milne compared to the modelling from Steensby should result in a smaller wake generated by ships travelling through Milne Inlet. In comparison, the natural wave heights in Milne have been measured at 0.3 to 0.5 m in the narrow sections of the inlet and could theoretically reach 1.3 m (FEIS Appendix 8A-1). To gain a better understanding of the geographical distribution of potential wake effects on shorelines in Milne Inlet and Eclipse Sound, the results of the Steensby modelling were applied to the shipping route through Milne. The resulting map indicates that the potential for ship wakes to interact with Milne and Eclipse Sound shorelines exists mostly in the southern half of Milne Inlet. b) Shoreline surveys for nesting birds were conducted in Milne Inlet from July 8 to 17, 2013. Over 135 km of shoreline were surveyed, however, large sections had to be surveyed aerially since the shoreline along these sections consisted of cliffs or other steep rocky terrain which could not be safely traversed on foot — approximately 65% of the surveyed shoreline was comprised of Rock Cliff, Rock Cliff with Beach, or Eroding Cliff shoreline types. With the exception of a couple of gull colonies located on shoreline cliffs (above the potential wake zone), the density of nesting shorebirds and seabirds along Milne Inlet was very low (results are presented in the 2013 Annual Terrestrial Monitoring Report). A Before-After/Control-Impact study would not be feasible given the observed densities. c) Baffinland does not believe that this recommendation is required given the conservative analysis indicating that wakes will be well below natural variation. Further, nesting bird surveys also indicate that risk to individual bird nests does not exist. d) Vessels will be transiting at a maximum of 7-10 knots, below the 14 knots that was modelled for wakes. In reality, as vessels enter Milne Inlet and approach the port, their speeds will be reduced even further for safety reasons.
EC-5	EC recommends that Baffinland define the terminology used to bound the shipping season, in particular it would be useful to have "open water" and "ice-free" defined. Alternatively, Baffinland could consistently use one term throughout the Addendum.	Open water and ice free are common terms used for northern shipping. There is annual variability in "open water season". Confining the shipping window to specific dates is not practical as the ice free period varies annually.
EC-6	EC recommends that: a) The maximum number of ship transits along the northern shipping route to Milne Inlet Port be defined in the Project Certificate as it is for Steensby Inlet in condition 179. b) Condition 179 be updated to reflect the shipping activity proposed during the ERP.	As stated by Baffinland, the number of ore shipment depends on the availability of market vessels which may range in capacity from 55,000 DWT to 110,000 DWT. There is a possibility that smaller vessels that 55,000 DWT may be used due to unavailability of larger ships. For this reason, establishing a limit on number of transits is not practical. Condition 179 should not be applicable to the Project. Eventual limitation on shipping should be based on environmenttal effects monitoring and required adaptive management throughout the life of the Project.
EC-7	a) EC recommends that Condition 106 be amended to: i) provide more detail regarding the required frequency of the use of Shipboard Observers during the open water season. Ii) include a requirement for marine monitors to watch for impacts to marine birds in addition to impacts to marine mammals. b) EC recommends that Conditions 107 and 108 be amended to require that the duties of the marine mammal monitors be extended to include monitoring responses from and impacts to migratory birds.	Baffinland does not agree that the proposed amendments to Condition 106 are necessary, and instead proposes the following changes in relation to the ERP, "The Proponent shall ensure that shipboard observers are employed [remove reference to "through all seasons"] and provided with the means to effectively carry out assigned duties. [Remove -The role of shipboard observers in shipping operations should be taken into consideration during the design of ore carriers, with climate controlled stations and shipboard lighting incorporated to permit visual sightings by shipboard observers during all seasons and conditions.]" As per the Shipping and Marine Wildlife Management Plan (SMWMP), the ship-based Observers are responsible for collecting observation data for marine mammals as well as seabirds. Shipboard observers are an IIBA requirement and Baffinland does not believe that changes to the Project Conditions 107 and 108 are necessary.

EC-8	Further information on wastewater management is requested to inform environmental assessment conclusions.	a) Noted. Should there be a runoff from the ore stockpile, toxicity testing will be undertaken when runoff occurs to confirm the discharge of this runoff will be compliant with the Fisheries Act. However, as observed with the stockpiles of ore that remained at Milne Inlet and the Mine Site after the completion of the Bulk Sampling campaign of 2008, there is minimal or no runoff occurring from the ore stockpile. This is likely to be the case for the commercial operation. b) Water used in maintenance facilities or for vehicle washing will be captured, treated and reused within the facility. Baffinland expects only occasional discharges. When discharges occur, these discharges will be directed to the ditch upstream of the pond and the discharge will be compliant with the Type A Water Licence. c) Experience gained during and after the Bulk sampling campaign of 2008 has shown that runoff from ore stockpile is minimal or non existent. Furthermore, the geochemical characterization of the ore (FEIS, Volume 7, Table 7-3.20) shows that the ore is very stable and non reactive. Therefore, should there be any runoff, Baffinland expects that suspended solids will be the parameter of concern. Hence a perimeter ditch and a sedimentation pond will be constructed around the ore stockpile. No additional treatment of the runoff will be required. As stated above, should a runoff occur, toxicity testing of the runoff will be undertaken in accordance with the Fisheries Act. d) Treated effluent will be discharged directly to a permanent dedicated discharge ditch year round when effluent meets discharge criteria via hard line piping. Only off-spec treated effluent will be discharged to one of the PWSPs. This approach will preserve the capacity of the PWSPs. Ramp-ups (increases) in the camp population is likely to create temporary upset conditions. However, it is expected that the sewage plant will in most instances be below the discharge criteria such that off-spec treated sewage may not necessarily be out of compliance. Off-spec effluent stored in the PWSPs will then be held until treatment capacity is available to re-treat off-spec effluent until discharge criteria are met. Treated effluent will then be discharged as in the normal operating scenario by dedicated pipe. Effluent will be moved to and from the PWSP by mobile equipment. e) It is expected that the dredged material will be used for infill of the ore dock causeway. Land disposal of dredge material would be a second but not preffered alternative. The provision for land disposal is accounted for in the Type A Water Licence and the necessary steps would be taken with QIA, EC and NWB if this alternative was pursued.
EC-9	a) EC requests that Baffinland clarify the model predictions presented in Table 7-3.24 "Resulting Water Quality in Mary River." b) EC has concerns that the increased nutrient inputs to Mary River may change the trophic status, and recommends that monitoring of the receiving environment include productivity metrics such as chlorophyll a and nutrients.	Baffinland wishes to update the model predictions in Table 7-3.24. Revised water quality in the Mary River includes pH at 7.89 (not 8.04); TSS at 2.66 mg/L (not 2.86 mg/L), BOD at 0.03 mg/L (not 0.22 mg/L) and faecal coliforms at 0.55 CFU/100mL (not 4.40 CFU/100mL). Chlorophyll A and nutrients will be monitored in the Mary River as part of the AEMP.
EC-10	EC requests that Baffinland clarify how contaminated water from the airstrip would be collected and treated. EC also requests that Baffinland identify the discharge location and provide characterization of the effluent.	De-icing of planes occurs in a dedicated area of the airstrip. The runoff from the de-icing operation is directed to a collection area with setbacks from water bodies.Refuelling also takes place in a dedicated area where spillage can be contained. Refer to the Mine Site drainage plan approved under the Type A water Licence.
EC-11	Air traffic - EC requests that Baffinland update the table to include an estimate of the number of flights per year for Milne Inlet in 2014 to confirm that there is no proposed increase in air traffic at the Milne Site during the ERP	The current Milne airstrip will be abandoned after the ERP is approved. The ore stockpile pad will be constructed on the site of the current air strip. Baffinland does not expect to rebuild an airstrip at Milne Inlet until construction of the larger Project begins.
EC-12	EC recommends that: a) Water flows from the Milne Port site be monitored and reported b) Shoreline surveys be carried out at Milne Port Site. Additionally, Baffinland should be aware that both ruga (Endangered) and islandica (Special Concern) subspecies of Red Knot have been added to Schedule 1 of the Species at Risk Act.	a) The FEIS presented a daily water take at Phillip's Creek during summer of 67.5 m3/day and the FEIS Addendum revised this upward to 82.7 m3/day. The average discharge during the month of August (the lowest flow month of June, July and August – the breeding season) at the mouth of Phillip's Creek is 13.5 m3/s (drainage area of 920 km2). which is equal to an average daily flow of 1.16 Mm3. Both water takes represent an immeasurable proportion of the total flow of Phillip's Creek. There will not be a discernible change in the wetted area available as red knot habitat, and therefore no benefit to monitoring water flows. b) Although three years of bird reconnaissance surveys throughout the RSA (2006-2008), two years of PRISM (93 plots, 2012-2013), 45 1.5 km of encounter transects along the road (2013), and shoreline surveys along the Steensby Inlet and Milne Inlet shorelines (2012-2013) have yet to identify red knot as present in the study area, Baffinland concurs with EC that they could potentially occur in the area. BIM will also conduct surveys in 2014 for REKN within 500 metres of any wetland habitat expected to be influenced by Milne Camp water requirements. All REKN nests found will be carefully monitored for reproductive success.
EC-13	The Terrestrial Wildlife Management and Monitoring Plan should include setback distances for migratory bird species. Additionally, the plan should also discuss alternative mitigation measures that will be implemented to protect the birds if setback distances are not possible due to existing Tote road alignment or due to construction and operation activities at the Milne Port site. Milne Port activities proposed under the ERP should be included in the plan as it is developed by the Terrestrial Environment Working Group.	Project Condition #75 (which Baffinland anticipates would apply to the ERP activities) requires that Baffinland, on an annual basis, assess and report on the extent of terrestrial habitat loss due to the Project footprint to verify impact predictions. This requirement is incorporated into the Terrestrial Environment Management and Monitoring Plan (TEMMP). The TEMMP also includes the requirement for pre-clearing nest searches prior to any clearing of land during the breeding season and setback distances for any known nests or nests located during surveys. If setback distances are not possible to implement, nest-specific guidelines and procedures will be developed to minimize disturbance to the nesting birds. During 2013, pre-clearing surveys were conducted at both Mary River and Milne Port; the results of these surveys are presented in the 2013 Annual Terrestrial Monitoring Report.
EC-14	EC recommends that Baffinland amend Section 5.11.2.3 "Planned Mitigation" to include: "Where possible, problem bears that are not responding to deterrents will be immobilized, removed from operational facilities and transported to a location that inhibits their return."	Baffinland's mitigation efforts for polar bears focus on preventing conflicts with polar bears through employee education, minimizing bear attractants (e.g. garbage), bear monitors, and non-lethal deterence measures (e.g. bear bangers, rubber bullets, air horns etc.). Lethal measures are considered only as a last resort, in which case, it is anticipated that the mortality will be deducted from the local harvest quota and appropriate compensation will be provided to hunters. Baffinland agrees with EC's recommendation.

EC-15	EC recommends that further spill modelling be done along the northern shipping route, specifically spill trajectories through Eclipse Sound and in the vicinity of Cape Graham Moore.	Modelling is a tool that assists in establishing priority for response. Baffinland acknowledges EC's expertise and essential role in coordinating efficient response to spills. Discussions are being pursued with EC to define additional modelling requirements that will be useful in establishing priority response.
EC-16	EC recommends that Baffinland update their plans to reflect the new EC Emergencies delivery format.	Discussions are being pursued with EC with regard to this recommendation.

Parks Canada		Baffinland's Response
Number	**Recommendation**	
PCA-1	Flight and shipping schedules: While the proponent expressed the intention of providing Parks Canada with shipping and flight schedules in the Final Environmental Impact Statement, the proponent has not followed up on this commitment. To date Parks Canada has not received any scheduling information. As the project certificate condition only encourages the proponent to keep Parks Canada informed of the schedules, technically they are not in violation of the project certificate. With an increase in the number of ships passing Sirmilik National Park over the length of the project, Parks Canada recommends term and condition 150 be modified so that the proponent is required to provide Parks Canada with regular flight and shipping schedules. Parks Canada should also be advised of any changes to the schedule.	Shipping - Ships are scheduled to travel through Eclipse Sound on a daily basis during the ice-free period (estimated as being between July 15 to October 15). Visitors should expect one ship to pass by per day. A more detailed schedule for ships is not possible as these vessels will be travelling long distances at sea, encountering varying weather and ocean conditions, thus resulting in uncertain travel times. However, visitors and Parks Canada staff can receive up-to-date information at the Baffinland website — a webpage has been developed that tracks the ships traveling to Milne Port on a map, available at: http://www.baffinland.com/mary-river-project/logistics/location/. In addition, Parks Canada will be able to communicate with ships via Marine Radio on Channel 16 as the vessels approach Eclipse Sound from Baffin Bay. Flight schedules can be provided to PCA once ERP is underway.
PCA-2	To ensure Parks Canada's continued involvement in advising on the protection of the marine environment of the proposed national marine conservation area (NMCA) in the Lancaster Sound, Parks Canada is requesting membership on the Marine Environment Working Group through a change to Condition 77 of the Project Certificate.	PCA's participation in the MEWG will be discussed with the MEWG as per the terms of reference of the MEWG.

Transport Canada		Baffinland's Response
Number	Recommendation	
3.1.1	The Proponent should include the 2013 Milne Inlet OPEP as part of the overall ERP proposal.	The OPEP is being updated to reflect activities that will occur in 2014.
3.1.2	The Proponent is required to comply with the Cargo Fumigation and Tackle Regulations (CFTR) and the International Maritime Solid Bulk Cargoes Code (IMSBC).	Noted.
3.1.3	Vessels transiting to/from Milne Inlet and employed within the port are to comply with the Arctic Waters Pollution Prevention Act (AWPPA) and the Canada Shipping Act, 2001 (CSA 2001), and their associated regulations. The AWPPA prohibits discharges of oil, chemicals, garbage and other wastes generated onboard vessels.	There will be no bilge water discharges in Milne Inlet from vessels chartered for the Mary River Project.
3.1.4	As per the new energy efficiency standards, vessels are required to carry Ship Energy Efficiency Management Plans (SEEMPs) and International Energy Efficiency Certificate.	Noted.
3.1.5	N/A	Not applicable to ERP
3.1.6	Term and Condition No. 177 should be amended as there may not be any foreign programs equivalent to Transport Canada's Marine Safety Delegated Statutory Inspection Program.	Baffinland agrees.
3.2.1	Removal of the Proponent's reference to the "Port Securities Transportation Act" and replace with Canada's Regulatory Marine Security Legislation; the MTSA and MTSR. The Proponent is required to comply with the MTSA and MTSR, and submit security assessment information and a marine facility security plan to the Minister for approval, and meet all other applicable requirements prior to SOLAS and non-SOLAS vessel interfaces.	The SMWMP will be revised to cite the correct legislation and regulations.
3.2.2	The Proponent include a contingency plan for handling ecoterrorism and cyber threats in Section 3.3 and incorporate the MTSR requirements. The Proponent include in the Operational Incidents, a plan for pandemic and public health hazards.	Noted. This work is in progress. The finalized plan will be circulated to TC and other regulators for review/comments.
3.2.3	The Proponent must make application to be classified as an occasional use marine facility as soon as a bulk sample work plan is known to be scheduled and if the date is prior to 2015/16. A security assessment must be conducted for the Milne Inlet marine facility, before any SOLAS or non-SOLAS vessel interface occurs. The Proponent must complete the necessary security procedures and designate a Marine Facility Security Officer along with other stipulated requirements, such as communications, security exercises and drills. This only applies to international voyages.	Noted.
3.3.1	Once the airstrip is relocated the new site should be constructed as close as possible to TP 312 standards and registered with Transport Canada. This service will allow its location and information to be published in the CFS. Only after a site is registered and/or certified can instrument approach procedures be developed to its runways, if required.	Noted.

Aboriginal Affairs and Northern Development Canada		Baffinland's Response
Number	Recommendation	
1	The Proponent is requested to justify extending the ERP throughout the life of the project and outline the criteria that will be used to decide when the road haul option will be discontinued.	It is expected that the ERP will be operational for the duration of the Project and the effects assessment presented in the Addendum to the FEIS was written with this assumption. The ERP is required to support the project economics and the effects assessment confirms that the ERP can proceed without any adverse significant effects. Comprehensive monitoring and reporting programs are applicable to the project and would identify any such effects if they occur. If needed, mitigation measures will be applied.
2	The Proponent is requested to clearly outline how they intend to meet the current restrictions of their Water Licence given the changes introduced in the 'Early Revenue Phase' and include a consideration of the implications on the project and scheduling of activities if an amendment is required. The Proponent is strongly encouraged to open a dialogue with the Nunavut Water Board to determine if a Type A Water Licence amendment is required.	For construction, the peak manpower is expected to increase to 225 persons from 170 persons for two years (2013 and 2014). This amounts to an increase in water volume of 82.7 m3/d (Appendix 3B) for the construction period of the ERP. The Type A Licence imposes a limit of 68.5m3/day from Philips Creek or km 32 (daily limit of 67.5 m3). To make up for the difference in water demand, Baffinland will draw the additional water required at Milne Port from Camp Lake, where the Type A Licence authorizes up to 657.3 m3/d water draw for the construction period. During operation, water demand at Milne is expected to drop to approximately 33 m3/day since the manpower residing at the camp will be in the range of 110 persons. Similarly for the Mine Site, once the "Operational Phase" is achieved (21.5 MTPA), water demand will increase. As a requirement of the Type A Licence, the Waste Management Plan and the Surface Water and Aquatic Ecosystems Management Plan will be updated on a regular basis. An update will be submitted if the ERP is approved. For Milne Port, the revision to the Surface Water Management Plan will incorporate the details of the runoff management for the ore stockpile. Runoff from the ore stockpile will be channeled to a sedimentation pond and discharged to Milne Inlet. The water quality of the runoff will comply with the requirements of the Fisheries Act. Baffinland has defined its "Operation Phase" as the full scale production of the Project, that is, 21.5 MTPA. The ERP is a transition period that will enable Baffinland to eventually reach the production level of 21.5 MTPA. Baffinland will continue to engage the NWB regarding the ERP.
3	The Proponent should provide pollution prevention measures in the dredging procedure, including how the dredged material will be handled and disposed, and how the treated (settled) supernatant will be discharged to the environment.	The Type A authorizes disposal of dredge material on land (Part D item 26) and details of this land disposal will be provided to the NWB should Baffinland proceed with this option. Dredging procedures are under development and Baffinland has been in discussion with Environment Canada and DFO regarding the implementation of appropriate mitigation measures for use during the dredging operation and the disposal of the dredged material. The alternative preferred by Baffinland is the use of the dredged sediment as fill for the construction of the causeway of the ore dock.
4	The Proponent is asked to provide information on the predicted water quality of the runoff from the Milne Port Ore Stockpile, how large runoff volumes will be stored for eventual treatment and what additional treatment will be utilized if discharge limits are not met.	Geochemical testing of the ore indicates that the ore is not acid generating (FEIS Volume 7 - Section 3 Table 7-3.20). Runoff from the Milne Port ore stockpile may contain elevated TSS resulting from extreme precipitation/freshet events. The runoff will be channelled to a sedimentation pond prior to discharge of water to Milne Inlet. No additional treatment is anticipated.
5	The Proponent is requested to confirm whether i) the proposed refuge stations along the Milne Inlet Tote Road will remain beyond the construction phase, and ii) will emergency shelters be provided and available for employee and public use during the operations phase.	Yes the shelters will remain in place for the Operation Phase and will be maintained and available for anyone requiring refuge during an emergency.
6	Proponent to provide clarification as to whether refueling by fuel trucks in the field is a new approach and if it is, provide appropriate procedures and mitigation measures for accidental releases to protect the environment.	This is not a new approach and Baffinland has been refuling by fuel truck in the field for some time. Fueling procedures are in place which mitigate against the risk of accidental release and address spill contianment and clean up should an incident occur.
7	The Proponent is requested to provide a preliminary estimate of increased closure costs associated with ERP and justify whether an increase in the security bonding is required for the 2014 Work Plan to reflect the ERP (even though ERP approval may not have been granted yet).	This issue is fully addressed in the materials submitted to AANDC, QIA and NWB on October 31st.

Natural Resources Canada		Baffinland's Response
Number	Recommendation	
	NRCan generally agrees that with adequate engineering design for facilities required for the ERP (road upgrades and additional Milne Port facilities) environmental effects will be minimized. The Proponent has acknowledged that plans for Tote Road upgrades have the potential to disrupt sensitive landforms and sections of the route where ice-rich soils and potential instabilities have been identified that will require remedial measures (Addendum to FEIS, Vol. 3 Sec 2.3.1, Vol. 6. Sec. 2.3, p. 5-7, Table 6-2.3; App. 10D). The addition of the ERP will likely result in extraction of an increased quantity of sand and gravel from borrow areas (FEIS Addendum Vol. 7). For example, additional borrow material may be required for road upgrade and maintenance given the proposed increase in use of the road. This could potentially result in an increase in the area disturbed to meet borrow resource needs. Potential borrow sites have been identified along the road and remedial measures will be required where there is a potential for instabilities and erosion (FEIS Addendum Vol. 3 Sec 2.2; Vol. 6 p. 5-6). The Proponent indicates that the ERP will result in a marginal increase in the amount of ground disturbance and this will occur mainly at the Milne Port site (e.g., FEIS Addendum Vol. 7). The Proponent acknowledges that ground clearing for additional facilities may disturb ice-rich or saline permafrost and sensitive ground. Measures have been proposed to mitigate impacts (FEIS Addendum Vol. 6, p. 4). Only minor and localized effects on water quality due to erosion are expected due to diversion of surface flows and water collection associated with the ore stockpile (FEIS Vol. 7 Sec. 2.3.2.3, 3.0). Additional site specific geotechnical investigations will be required to identify sensitive terrain and support final design of the Tote Road and the Milne Port facilities. Commitments were made by the Proponent during the initial review of the EIS to conduct additional geotechnical investigations. NRCan notes that Condition 25 of the Project Certificate requires the Proponent to conduct additional geotechnical investigations to identify sensitive landforms, modify project infrastructure and develop mitigation and monitoring measures to minimize the impacts of the Project on sensitive landforms. NRCan suggests that this condition should be applied to Milne Port and Tote Road. Condition 26 is also relevant to the ERP and requires implementation of a comprehensive erosion management plan to minimize the effects of destabilization and erosion that may occur due to the Project's construction and operation. NRCan would suggest that this condition is also applicable to the Milne Port and Tote Road. Condition 28 requires monitoring of effects of the Project on permafrost along the railway and all other Project areas and implementation of effective preventive measures to ensure that the integrity of the permafrost is maintained. Condition 28 should therefore be applied to Tote Road and Milne Port.	Baffinland agrees with NRCan's assessment.
	NRCan recommends that the proponent conduct analyses to determine the wakes generated from the range of vessels that will be transiting Milne Inlet and also to conduct analyses of the effects of the cumulative wakes on the wave energy climate in Milne Inlet.	The wake analysis that was done for Steensby Inlet (FEIS Appendix 8A-1) looked at larger ships (160,000 to 190,000 DWT) than those proposed for use in Milne. This analysis indicated that at speeds of 14 knots, wake heights should range from 0.2 m within 60 m from the vessel to 0.05 m within 3,865 m of the vessel. Natural wave heights in Milne have been measured at 0.3 to 0.5 m in the narrow sections of the inlet and could theoretically reach 1.3 m (FEIS Appendix 8A-1), so the wake heights from the larger vessels being used in Milne Inlet are still expected to be within the natural range of wave heights in this area. Additionally, the modelling for Steenby assumed a water depth of 25 m and a vessel draft of 20 m; bathymetric data from Milne Inlet indicates that water depth generally range from 100 to 400 m. And Volume 3 of the FEIS Addendum for the ERP states that Project vessels travelling through Milne Inlet and Eclipse Sound will travel at speeds of 7 to 10 knots (Section 2.4.3). Therefore, based on smaller vessel sizes, slower speeds, and deeper channels at Milne compared to the modelling from Steensby, the wave heights modelled for Steensby are likely an over-estimation of what would be expected in Milne Inlet. Although ship wakes should not exceed natural wave heights in Milne Inlet, Baffinland concurs with NRCAN that ship wakes may increase the occurence of moderate to large waves. To gain a better understanding of the geographical distribution of potential wake effects on shorelines in Milne Inlet and Eclipse Sound, the results of the Steensby modelling were applied to the shipping route through Milne. The resulting map indicates that the potential for ship wakes to interact with Project shorelines exists mostly in the southern half of Milne Inlet . In July 2013, shoreline surveys for nesting seabirds were conducted along most of this area (over 135 km of shoreline surveyed)— these surveys found that much of the shoreline in this area is dominated by rocky cliffs or other habitats assessed in the FEIS to have a Low sensitivity to ship wakes (FEIS Appendix 8D-2). Of the area surveyed in 2013, 33% was Rock Cliff, 16% was Rock Cliff with Beach, and 33% was Wide Flats — all of which were assessed as having a low sensitivity to ship wakes in the FEIS. Shoreline types assessed to have a Moderate sensitivity to ship wakes in the FEIS included Eroding Cliffs and Delta Flats; the 2013 surveys found that these types together comprised approximately 16% of the Milne Inlet shoreline that was surveyed (15% and 1% respectively).

	NRCan recommends that the proponent conduct hydrodynamic modelling in the vicinity of Milne Port to confirm that there will be no significant impacts to sediment transport and understand the fate of re-suspended sediment.	Baffinland will engage NRCan on further discussion related to this topic.
General Comment	Air strip relocation	The new airstip will be constructed within the PDA as shown on the Milne Port layout.
General Comment	Diesel consumption	Fuel consumption is required for quantifying emissions which is used for air quality modelling. Modelling has been done for a typical year.

Pond Inlet Hunters and Trappers Organization			Baffinland's Response
Number	Comment	Recommendation	
	The MHTO Board of Directors believe this project will grealy impact the animals surrounding Pond Inlet and at Milne Inlet. Of particular concern is the increase number of ships that will be passing through Pond Inlet to get to Milne Inlet. MHTO understands, through presentations made by NIRB adn the information shared by Baffinland, that the proposed new shipping routing will result in approximately 55 ships travelling in and out of Pond INlet to Milne Inlet between July and October. This equals to 110 individual trips past the community of Pond Inlet in a three-month period. When you also considering teh number of sealift vessels and tanker ships that will also be required annually, the sum results is SIGNIFICANT marine traffic within reach and view of the community.	None.	Baffinland appreciated this comment. As described in the FEIS Addendum, the issue of potential for impacts of the ERP on animals surrounding Pond Inlet and at Milne Inlet was specifically considered in relation to each of the key species in these areas. This analysis predicted that no signficant adverse effects will occur in relation to any of these species. Detailed monitoring programs will confirm these predictions, and if any observable effects are noted appropriate mitigation measures would be implemented.
	When BIMC start their Early Revenue Phase, they requested that shipping routes to Milne Inlet go through Pond Inlet. [...] MHTO is concern about the heigh and intensity of waves these ships will create. Faster moving boats create waves that reach the beac, and the boats stored there. MHTO makes this statement as community members have already voiced their observations of the impact these passing vessels make. A community member has stated that while these waves do take time to reach the community shores, when they do, they do disrupt boats docked at the shore. As our community emmbers have had their boats damaged at the shore, due to naturally occuring strong waves, we at the MHTO are concerned aout the impcat of multiple vessel passing our community.	MHTO argues that when the ships reach Pond Inlet, they should down their sail speeds to 8-10 knots, at least.	The vessel speed is stated in the EIS Addendum (ERP) is 7-10 knots (Volume 3, Section 2.4.3). Volume 3 of the the FEIS Addendum for the ERP states that Project vessels travelling through Milne Inlet and Eclipse Sound will travel at speeds of 7 to 10 knots (Section 2.4.3). At these speeds, wakes generated by Project ships are not expected to exceed wave heights that can naturally occur in the area — modelling done for shipping through Steenby Inlet indicated that at speeds of 14 knots, wake heights range from 0.2 m within 60 m from the vessel to 0.05 m within 3,865 m of the vessel (FEIS Appendix 8D-2) and the smaller vessel sizes, slower speeds, and deeper channels at Milne compared to the modelling from Steensby should result in a smaller wake generated by ships travelling through Milne Inlet. In comparison, the natural wave heights in Milne have been measured at 0.3 to 0.5 m in the narrow sections of the inlet and could theoretically reach 1.3 m (FEIS Appendix 8A-1). Ships are scheduled to travel through Eclipse Sound on a daily basis during the ice-free period (estimated as being between July 15 to October 15), and boaters should expect approximately one ship to pass by per day. Ultimately, the presence of large ships should not prevent hunters from travelling by boat towards Milne Inlet. Ship wakes may increase the occurence of moderate to large waves but should not exceed natural wave height in the area.The effect of the wake will require added diligence by boaters, as do any large waves. Boaters can minimize risks by travelling in areas outside of the main channel (such as shallower areas near the shoreline and in smaller protected channels), maintaining distance from large ships, and carrying a VHF radio. A general brochure has been developed for sea kayakers, describing where to go to learn more about shipping in the area, and precautions one can take to ensure your safety around these large vessels — many of these guidelines apply to other boaters as well.
	MHTO is also concern about the impact these waves will have to the hunters of our community. Specifically, we are concern that the increase marine traffic will negatively impact hunters travelling towards Milne Inlet. Milne Inlet is an important hunting site for our community, as it is the calving ground for narwhals. Narwals is not only a vital source of food for the community; the narwhal is an important economic support for our community. Not only do people sell narwhal tusks, but MHTO also sells narwhal muktaq witihin the territory and beyond. As MHTO is totally aware of the traffic to Milne Inlet from Pond INlet, we make the argument that if ships sail slower, the wave height and their impact will be lower.		

	We understand that Narwhal studies will be conducted each nyear near Milne Inlet, and the MGTO board would also like to see this happen for Arctic Char.	The MHTO would also like to see there be an investment on research, particularly research that seeks to understand the impact the mine and its increased marine traffic has on marine wildlife.	In August 2013, Baffinland in collaboration with the HTO and QIA conducted a Narwhal Observation Study at Bruce Head to observe Narwhal response to shipping activities for the approved Project. Baffinland is greatful for the HTO suggesting this study and for the observers from Pond Inlet who participated in the study. Baffinland certainly intends to continue this study into the future if the ERP were to be approved and constructed.
		The board would like BIMC to start an Arctic Char study in or near Milne Inlet, one which monitors the health of the Arctic Char. A similar study on Arctic Char is conducted each year near Pond Inlet and at the mouth of Salmon Creek.	Baffinland has collected baseline information on fish species (including Arctic char) present in Milne Inlet. Monitoring of potential interactions between Arctic char and features of the ERP Project will be part of the overall Project EEM program. Baffinland appreciates the help from Inuarak Outfitters in Pond Inlet for help in conducting the Marine Baseline Studies in Milne Inlet in 2013.
	None.	The MHTO board also discussed the ships coming in through Button Point, if they would be going to Milne Inlet, the board would not like to go out through Navy Board Inlet. In fact, they board does not wany any ships to go in or out through Navy Board Inlet except for sealift vessels and the Coast Guard in case of any emergency in that are. We feel strongly about this, as water currents moves from Navy Board Inlet out through Button Point. According to Inuit Qaujimajatuqangit, animals follow this same movement; therefore, it is important to maintain the integrity of this water current.	The vessel route to Milne Inlet has been shown in the FEIS as well as in the EIS Addendum (Volume 3, Figure 3-2.11), and is consistent with traffic routes followed in the past. This routing minimizes the travel distance and hence potential interaction with environment features (ice, marine mammals).
	Last but not lease is the protection of our environment and the surrounding animals and marine mammals that will be greatly affected. This is also a significant concern from the MHTO Board of Directors. The community believes that our environment and its surroundings should be respected.	None.	Baffinland remains confident that our shipping activities will not result in significant impacts to marine mammals as assessed in the Addendum. We would also agree that the environment should be respected.

World Wildlife Fund			Baffinland's Response
Number	**Comment**	**Recommendation**	
3.1	WWF assumes that the activities proposed in the ERP FEIS Addendum are subject to all of the Terms and Conditions set forth in the NIRB Final Hearing Report for the Mary River Project because this is not a new project but a modification to an existing approved project. However, the above-noted Terms and Conditions refer to specific geographical locations (e.g. Steensby Inlet, Hudson Strait, Igloolik), and therefore may not adequately address environmental impacts that arise as a result of the activities proposed in the ERP FEIS Addendum (affecting Milne Inlet, Eclipse Sound and Pond Inlet).	The Terms and Conditions from the NIRB Final Hearing Report for the Mary River Project that specifically reference particular geographic regions and locations should be reviewed and re-considered for their application in new regions of activity under the Early Revenue Phase. At a minimum, the following Terms and Conditions should be reviewed: 1, 7, 8, 9, 83, 86, 87, 94, 95, 96, 97, 99, 100, 101, 104, 105, 109, 176 and 181.	
3.2	See submission due to length.	NIRB should explicitly define the ongoing roles and responsibilities of the Proponent, the Marine Environment Working Group, NIRB‟s Monitoring Officer and NIRB itself to define a process whereby existing and new information (including baseline research, monitoring data and IQ) is made available, is carefully reviewed and assessed (including by third parties), produces recommendations for adaptive measures, and ensures that recommendations and corrective actions are appropriately acted upon in a timely fashion.	
3.3	See submission due to length.	Charter vessels should adhere to restrictions limiting where and when they operate, in accordance with their particular ice class designation and according to the following ice management regimes: a) the Zone/Date system used by Transport Canada, which sets „opening‟ and „closing‟ dates for various classes of ships throughout the Canadian Arctic; b) the Arctic Ice Regime Shipping System (AIRSS), which is geared to the ice conditions forecast to be encountered during the projected period of the voyage; c) observed actual ice conditions, as determined from the bridge by a qualified ice navigator; and d) any other provisions that may be established in the Polar Waters Operating Manual, currently under development by the International Maritime Organization (IMO) as a key component of a new Polar Code for Arctic shipping.	Baffinland appreciates the comments provided by WWF, however, would point out that the material presented contains incorrect assumptions and inappropriate analyses. For example, volume of shipping as described appears to combine construction and operational marine traffic to produce an unrealistic quantity of Project related traffic. As well, we challenge the information and analyses presented with respect to narwhal. See Appendix A, Extended Responses to Technical Comments: In Response to WWF Recommendation 3.2.
		No vessels servicing the project through Eclipse Sound and Milne Inlet should carry or use Heavy Fuel Oil; they should be powered by diesel or, if feasible, Liquefied Natural Gas.	

3.4	We remain skeptical that it is possible to mitigate the anticipated major impacts of the proposed Early Revenue Phase, even if all of our recommendations – and the recommendations of other stakeholders and management agencies – are fully implemented. The very real possibility exists that, over time, narwhal will be largely extirpated from Milne Inlet, and significantly impacted in Eclipse Sound.	The shipping of iron ore through Milne Inlet and Eclipse Sound should be limited to a true „early revenue phase," and should only be allowed for eight consecutive summer seasons, after which time Steensby Inlet should be used for all ore shipments, with a formal review required for any extension beyond this period.	

Zacharias Kunuk and Lloyd Lipsett			Baffinland's Response
Number	Comment	Recommendation	
	BIMC has committed in the initial FEIS to continue to strengthen its sustainable development and corporate social responsibility policies and procedures as it develops the Mary River mine—including in relation to ISO 26000. As this international standard includes explicit requirements on human rights due diligence, this commitment is to be commended. At this stage, we highlight that this reconsideration process provides an opportunity for BIMC to voluntarily clarify its plans for the future integration of human rights into its corporate policies and the management and monitoring systems at Mary River. In other words, what might be the next steps for implementing the ArcelorMittal Human Rights Policy and ISO 26000 at Mary River? The preliminary summary of the HRIA provides some reflections on these issues; and, we would be pleased to share further ideas with BIMC and other interested parties.	N/A	Noted.
	N/A	[A]s mentioned in previous written and oral submissions, we recommend that the NIRB encourage and/or require future proponents of major projects in Nunavut to explicitly address human rights in the preparation and review of their EIS.	Not directed at Baffinland.
	Given the real challenges for informing and consulting with remote Inuit communities on an on-going basis, we once again encourage BIMC and other parties to think about how to use 21st century multimedia options to complement and strengthen other means of communications. As highlighted in other submissions, we believe that the use of audio and video provides opportunities to respect and preserve the use of oral Inuktitut as the primary language of consultation. We also hope that the development of communications infrastructure in the north Baffin region for the needs of the mine will also benefit workers and local communities in terms of accessibility and cost.	N/A	Noted.
	N/A	[W]e would like to propose that NIRB and the other parties collaborate with IsumaTV to promote and broadcast the final hearings on community radio, television and Internet. Using the community media players that IsumaTV has installed in local communities, it would be possible to improve the accessibility and reach of the public hearings.	Not directed at Baffinland.

	N/A	[W]e recommend that the NIRB and other parties organize an evaluation of the consultation and information processes that have been undertaken throughout the Mary River impact review. This could be a very useful learning exercise to identify best practices for on-going consultation for Mary River (and for future review processes related to other projects).	Noted. Baffinland's complete public consultation record and community based research activites are provided in Appendix 2A through 2B of the FEIS and Addendum to FEIS.

Hamlet of Pond Inlet			Baffinland's Response
Number	Comment	Recommendation	
1	The plan to continue to use Milne Inlet for ore shipment for the life of the project was not obvious in the Early Revenue Phase, nor was it made clear by Baffinland representatives on their community visits. We were under the assumption that this was a short-term phase of the operation. It has very different ramifications for the community and for the environment if it is intended to be used for the life of the project.	N/A	Baffinland is pleased that the Hamlet has provided comments on its EIS Addendum, and assures the Hamlet that their concerns have been considered in the past, and will be addressed in plans for the future. Specific responses are provided below to the points raised. Baffinland has attempted to provide a full description of the ERP in the EIS Addendum. The Project Description (Volume 3 Section 1.2) addresses the duration of the ERP. Baffinland would like to refer the Hamlet of Pond Inlet to section 2.3 of Volume 1 in the Addendum. In this section it is clearly stated that the ERP was assessed for the life of the project. Additionally, the Hamlet is referred to figure 1-2.6 in Volume 1.
2	The cumulative effects of using both the Milne and Steensby ports are high, and would result in negative impacts to both Fox Basin communities and to Pond Inlet. This plans to have both ports operating for ore shipment during operations results in too many communities being adversely affected.	N/A	With respect, Baffinland would point out that the two shipping ports, and the two shipping routes are considerable distances apart, and the interactions are with different communities of people and different populations of marine species. The Project has gone through a full environmental impact assessment process. The conclusion reached by the Nunavut Impact Review Board was that "the Mary River Project is not likely to cause significant adverse ecosystematic and socio-economic effects." (NIRB Project Certificate #005, sec. 1.0). The Early Revenue Phase is currently undergoing a supplemental assessment based on the submitted EIS Addendum. The conclusion of this assessment document, including a consideration of cumulative effects, is that the ERP is not likely to cause significant adverse environmental effects. The ERP will bring forth positive effects on socioeconomic VSECs in the North Baffin communities.
3	N/A	It is not acceptable to release ballast water in a relatively enclosed environment such as Milne Inlet. A different solution would need to be found.	Baffinland has carried out dispersion modelling and this has illustrated that more than adequate dispersion is available within Milne Inlet, given the water depths of the area, the volumes of water to be released, and the small differences in water temperature and salinity associated with the ballast water.
4	N/A	The case studies for noise impacts on marine mammals are all based on southern species (seal lions, dolphins) or are based on belugas living in areas habituated to noise such as the St. Lawrence Seaway. These case studies are not applicable to the Arctic. More research needs to be done by objective researchers.	Baffinland has based its effects assessment on the best available information and accessed results for northern populations and the same species wherever such information is available. Additionally Baffinland has committed to extensive effects monitoring and an adaptive management approach that will provide for changes in operating procedures where results indicate a potential issue may arise. Note, for some parameters (e.g. hearing range) it is appropriate to extrapolate from closely related species.
5	Baffinland's theory that marine mammals will exhibit an avoidance response to noise potentially means abandonment of key areas and harmful impacts on Inuit hunting. Baffinland may believe that avoidance responses may be acceptable from a biological point of view, but from a social and cultural point of view this would be devastating to the community of Pond Inlet. Additionally, avoidance behaviour would mean that marine mammals are forced out of what we believe to be key habitat areas, such as Milne Inlet for Narwhal. This is unacceptable, and may have long-term impacts on breeding and population.	N/A	Baffinland understands and respects the social and cultural importance of these issues to the community of Pond Inlet. Baffinland expects that animals will exhibit short term avoidance response to vessel traffic and over time will acclimate to sound and movement of vessels. This prediction is based on experience elsewhere with shipping activities. Baffinland is committed to extensive effects monitoring and an adaptive management approach that will provide for changes in operating procedures where results indicate a potential issue may arise. Baffinland would be pleased to keep the HTO updated on monitoring results and the ongoing activities of the Marine Environment Working Group.

6	We do not believe that enough information has been provided about noise reflection and amplification in the enclosed waters of Milne Inlet.	N/A	Baffinland refers the Hamlet to the FEIS material and notes that acoustic studies of Milne Inlet are planned. Please see Addendum to EIS, Vol. 8, specifically sections 1.5 (particularly Table 8_1.2), 4.5.3 (particularly pages 42-43 and Table *-4.8), 4.5.4 (particularly Table 8-4.12), 5.4.1, 5.5, 5.6 ringed seals (particularly 5.6.2.2, 5.6.2.3, 5.6.3.6), 5.7 walrus (particularly 5.7.2.2, 5.7.2.4, 5.7.3.6, 5.7.5), 5.8 beluga (particularly 5.8.1.2, 5.8.1.3, 5.8.2.2, 5.8.2.3, 5.8.2.4, 5.8.3.6), 5.9 narwhal (particularly 5.9.1.2, 5.9.1.3, 5.9.2.2, 5.9.2.3, 5.9.2.4, 5.9.3.6), 5.10 bowhead whale (particularly 5.10.1.2, 5.10.1.3, 5.10.2.2, 5.10.2.3, 5.10.2.4, 5.10.3.6), 5.11.2.2 polar bear, 5.12 bearded seals (particularly 5.12.2.2, 5.12.2.3, 5.12.2.4, 5.12.3.5), and Appendix 8C (Underwater Noise Modelling) of the FEIS, as updated by Appendix 8C-3 of the Addendum to the EIS.
7	N/A	There needs to be meaningful financial and in-kind support of community-based monitoring initiatives, both social and environmental. This should be a condition of any move forward by the proponent	Baffinland has made extensive commitments to support community based initiatives, both in its EIS as well as through the IIBA. Baffinland will continue to liaise with the community of Pond Inlet to identify appropriate future initiatives. The Hamlet of Pond Inlet is encouraged to work with QIA to access the benefits they are entitled to through the IIBA.
8	Dust modelling for the tote road and Milne Inlet port – we are not confident in the data presented related to the impacts of dust and want more information about how they came to the conclusions that they did. We are concerned about the impact of dust to vegetation, which will affect caribou and other land animals, and also the impact of dust into creeks which could affect char spawning.	N/A	Baffinland has used an accepted method to model dust deposition associated with the tote road and Milne Port, and the model predictions match well with measured dust emissions at other northern mine sites. Additionally, Baffinland has developed a program to monitor dust deposition along the tote road, port and mine site. This monitoring program is intended to verify air quality modelling and potential effects on the terrestrial environment. Baffinland would be pleased to share the details of this monitoring program and its findings. is committed to extensive effects monitoring and an adaptive management approach that will provide for changes in operating procedures where results indicate a potential issue may arise.
9	Ship wakes – we believe that the number of ships, combined with the size and speed of these ships, will create wakes that will be harmful to the land (erosion) animals (shorebirds nesting and other species) and to Inuit subsistence hunting. We believe that the frequency of ships should be reduced, as well as the speed that they will be travelling through Eclipse Sound and Milne Inlet	N/A	Baffinland has committed to a vessel speed limited to 10 knots during passage through Eclipse Sound and Milne Inlet. Monitoring will confirm wake predictions to ensure they are within acceptable limits. Surveys have been conducted to identify any sensitive shoreline habitat usage. Frequency of ships will be a function of the vessel size, but Baffinland notes that its assessment has predicted that there will be no significant adverse environmental effects relating to land. shorebirds nesting or other species, or to Inuit subsistence hunting. The wakes that will be created are well within the existing natural variability along the shipping route (eg weather, winds, tides).
10	N/A	Arctic Char – the community is not happy that Arctic Char seem to be treated as unimportant by Baffinland, and want more information collected about this resource and potential impacts specific to the Early Revenue Phase. We are especially concern about fish-bearing streams in the area of the Mine and running into Milne Inlet. We need more information, especially about Philips Creek, Tugaat and Qurluktuk.	Baffinland appreciates the importance of Arctic Char to the community. Baffinland assessed Arctic Char as a Valued Ecosystem Component. Ongoing baseline monitoring has continued in 2013 with collection of information on the biology of char and their marine habitat. As noted in the FEIS and the Addendum to the EIS, the interactions between the ERP and Arctic Char will be limited in time and space, and so are not predected to cause any significant environmental effects on Arctic Char. See the FEIS for further details regarding these conclusions. Please see Addendum to EIS, Vol. 8, at sections 1.5 (table 8-1.2), 4.2.1 (particularly pp. 32-33), 4.4, 4.5.3, 4.6 (particularly table 8-4.15), 4.7; and Vol. 7 at sections 4.0, 4.5.3 (particularly 4.5.3.1, 4.5.3.2, 4.5.3.7, 4.5.3.8,), 4.5.4, 4.5.5, 4.5.9 (particularly tables 7-4.13, 7-4.14, 7-4.15, 7-4.18, and 7-4.19,). Specific references to Phillips Creek are at Vol. 7 s. 4.5.3.1, 4.5.3.2, 4.5.3.4, 4.5.3.5, 4.5.3.7, 4.5.3.8). Specific reference to Tuggat is made at Vol. 8 at p. 33.
11	We are very concerned about air pollution created by ships, and how carbon from ship exhaust may collect on glaciers. This dark soot will add to the problem of glacier melt and recession through the albedo effect. This issue was brought to our attention by other researchers, not by Baffinland and we wonder if Baffinland is even aware of this potential impact.	N/A	Baffinland considered this comment in its effects assessment. Baffinland does not expect that exhaust from vessels will create any measurable quantity of deposition that could collect on glaciers, given the quantity of emissions and the distances from shorelines.

12	Impact on Hamlet services – we do not feel that the hiring of current Hamlet staff by Baffinland, thus leaving the Hamlet less able to provide municipal services, has been properly addressed. In particular, hiring our water and sewage truck drivers, heavy equipment operators and anyone capable of performing maintenance and repair is putting our community in jeopardy.	N/A	Baffinland appreciates the comment and recognizes this issue as a concern for the community. The FEIS identified this as a potential effect on the community in the short-term. Baffinland will continue to liase with the Hamlet to address these important issues and come up with mechanisms to mitigate this effect. Going forward, it wil be important to balance community service needs with the important objective of supporting increased local and Inuit employment at site. In the long term, Baffinland notes that people trained by the Company may benefit Pond Inlet in the future. It should be noted, there's an opportunity for employees of Baffinland from the community to assist the Hamlet in training, mentoring and/or working on their off-rotation.
13	Impact on renters – people hired by Baffinland are getting sudden and large rental increases for public housing, which is having bad consequences for the entire household. We need to work together with the GN to figure this out.	N/A	Baffinland agrees that this is an issue that requires urgent attention by the GN. The Socio Economic Monitoring Committee is an excellent vehicle to discuss these concerns and identify practical strategies that will support renters in public housing. Baffinland will collaborate on these initiatives.
14	N/A	There have not been enough opportunities for the people of Pond Inlet to learn about the impacts of mining on communities. |We have been encouraged by the people of Baker Lake to come learn about this, and we would like to hear from other Inuit how mining has impacted them. We could use help to make this happen.	Baffinland has carried out extensive programs of consultation to inform Pond Inlet and other communities potentially impacted of mining on the community (ie work ready program). The recently signed IIBA includes mechanisms for North Baffin communities to access funding for initiatives such as this. This funding will be administered by the QIA, and specific funding requests should be directed to them.
15	Increased ship traffic in Pond Inlet's waters will likely create an increased strain on our local Search and Rescue. Hunter's boats may be flipped by ship wakes, and if the ships themselves are in peril we would give assistance. Also, there may be issues with Baffinland's planes or trucks being lost which would also require assistance for out Search and Rescue. Increased air traffic into the communities also could create disasters, and our fire fighting ability needs to be improved for this, so that we may be able to save lives. We will need additional training and funding in order to deal with potential large scale disasters and emergencies. As far as we can see, the possibility of a disaster relating to Baffinland's planes, ships and trucks in the area of Pond Inlet has not been discussed.	N/A	Baffinland's air and shippng contractors are required to operate in accordance with Transport Canada's stringent legal requirements, which are designed to prevent such incidents from occuring. In terms of response capabilities, Baffinland will complement emergency response capability in the region. The company will be self-reliant in terms of emergency response capability, and has retained Oil Spill Response Ltd. in order to coordinate responses and provide on the ground support to any significant spills, as well as to provide Baffinland with additional specialized marine spill response training. Baffinland will continue to work with the Hamlet on matters of common concern related to emergency response planning. Baffinland has implemented an Emergency Response Plan which would be updated to address the ERP and provides a detailed emergency response framework for Baffinland to follow in the event of a incident relating to Baffinland's planes, ships and trucks in the area. As communicated to Pond HTO, ship wakes may increase the occurence of waves but should not exceed natural wave height in the area.The effect of the wake will require added diligence by boaters, as do any waves. Boaters can minimize risks by maintaining distance from ships, and carrying a VHF radio. A general brochure has been developed for sea kayakers, describing where to go to learn more about shipping in the area, and precautions one can take to ensure your safety around these large vessels — many of these guidelines apply to other boaters as well.
16	N/A	Education – current education system is preventing Inuit from achieving higher positions within Baffinland. Both the public school system and adult education system must be revised so that Inuit achieve higher level jobs. Baffinland needs to continue the work they did with Arctic College to make sure higher level training programs are offered in the community.	Baffinland has addressed this issue extensively in the FEIS and, through the Socio-Economic Committee will work as one participant in the process of providing education and training to Inuit.

17	N/A	Baffinland must offer and support entrepreneur and business training programs in Pond Inlet. The IIBA promises opportunities, but the reality is that the people of Pond Inlet do not have the business skills necessary to get these contracts. This part of the IIBA is meaningless unless Baffinland helps the community to understand the processes and learn business skill.	Baffinland supports QIA in the process of explaining the IIBA to involved communities. As noted above, funding for this type of initiative is available from QIA via existing IIBA committments.
18	In the early years, Baffinland promised assistance to the community as they acknowledged that drug and alcohol use can increase with more wages in the community. We want to see this result in a real plan for assistance.	N/A	Baffinland is eager to work with the Hamlet and other responsible agencies in tackling this challenge. The company would be pleased to meet with the Alcohol Education Committee on an annual basis to receive feedback on this issue and discuss efforts to address this issue. The company can in turn bring this to the Qikiqtaaluk Socio-Economic Committee. It is the committee`s mandate to work together on social issues such as this and others. is a potential vehicle to adress and support these important matters. Baffinland will support these inititatives.
19	In all the years that Baffinland has come to Pond Inlet, we have never seen meeting minutes or resolutions to the questions that we have asked. We do not feel that they have really listened to our issues, or have taken our concerns seriously, because we don't see any proof that they even took the time to record what we had to say.	N/A	Baffinland has worked to meet regularly with residents of Pond Inlet. All community consultations have been described in Volume 2, Appendix 2A of the FEIS Addendum and the FEIS.
20	N/A	IQ collected by Baffinland MUST be returned to the communities where it was collected. The Elders were promised this when they agreed to be interviewed. This was a condition of the IQ study, and now somehow QIA has decided that they get to keep it. We object to this because it was the intention of the communities to have free and unrestricted access to the IQ so that it could be used and understand by everyone. NIRB needs to help us to ensure that this happens.	The QIA was provided with digital copies of the study materials including GIS files and digital scans of the maps. If the Hamlet of Pond Inlet did not receive these materials, Baffinland will endeavour to provide the hamlet with the study materials by March 31, 2014, as originally agreed upon.
21	N/A	The community of Pond Inlet must be meaningfully involved in all monitoring (socio-economic and environmental), and monitoring must be done over a long period of time.	Baffinland agrees.
22	N/A	The final hearing for the Early Revenue Phase MUST be held in Pond Inlet as this represents that only opportunity for the most affected community to be meaningfully involved in the process.	NIRB has set final hearingson ERP in Pond Inlet to be held the week of January 27.

23	N/A	Representatives from Pond Inlet must be included in the technical hearings in Iqaluit. Please contact the Hamlet to discuss.	It is understood community representatives will be attending.

APPENDIX A

EXTENDED RESPONSES TO TECHNICAL COMMENTS

November 15, 2013

In Response to QIA Recommendation FM-06

QIA Comment FM-06 Shipping Impacts to Marine Mammals—Noise and Disturbance

QIA's interpretation of BIM's conclusion about effects of shipping on marine mammals during the ERP does not accurately reflect the contents of the FEIS Addendum. Firstly, BIM assessed five types of potential effects of ERP activities on marine mammals: habitat change, hearing impairment, disturbance, masking, and mortality—not just two stated by QIA. QIA states that BIM's assessment had "medium to high level of confidence for narwhal, high level of confidence for all other marine mammal VECs"; this is not accurate. Confidence levels for disturbance and masking impact predictions for narwhals (Table 8-5.15) and bowhead whales (Table 8-5.18) were rated as Low. Confidence levels for disturbance and masking impact predictions for beluga whales (Table 8-5.15) were rated as Low to Medium and masking impact predictions for bearded seal were ranked as having a Medium Level of Confidence (Table 8-5.25). The FEIS Addendum acknowledges that there is a paucity of data, particularly on narwhal response to shipping and that this contributes uncertainty regarding responses of narwhals to ore carriers transiting Milne Inlet and Eclipse Sound during the open-water period.

QIA contends that BIM's conclusions are "based on incomplete baseline data and improper methodologies (e.g., design of aerial surveys that produced density estimates, noise modelling of vessels that are not applicable to the ERP, failure to assess cumulative effects)." BIM strongly disagrees with this statement.

- *Baseline Data*: The aerial survey data for marine mammals along the northern shipping route in conjunction with IQ and other published and unpublished research is adequate to serve as the basis of impact predictions. In fact, the survey effort exceeds that collected for many other EISs for major industrial projects. To summarize, aerial survey effort conducted along the northern shipping route and Milne Inlet port area during the open-water season entailed:
    - 16, 135 km survey effort in late July, August and September 2007
    - 12, 370 km survey effort in August and September 2008

  Surveys involved repeat coverage of Eclipse Sound and Milne Inlet as well as adjacent fiords including Trembley Sound, Eskimo Inlet, White Bay, and Tay Sound. To put things in perspective, DFO's recent (2013) open-water survey of the Eclipse Sound area collected data along 1,390 km of transects (S. Ferguson, DFO, pers. comm., November 2013). Fixed-wing aircraft (primarily a Twin Otter but also a Shorts Skyvan) were used during BIM surveys and survey methods were consistent and appropriate for collecting relative abundance/density data for cetaceans. In addition, marine mammal densities were corrected for availability and detection

biases to allow for more reliable predictions of the number of animals that may be exposed to shipping and construction sounds during the ERP.

- *Noise Modelling of Vessels*: QIA correctly notes (in QIA Comment FM-02) that the maximum tonnage of Post-Panamax ore carriers stated in Volume 3 of the FEIS Addendum (110,000 DWT) is larger than the Post-Panamax (90,000 DWT) vessel that was used in acoustic modelling. BIM would like to clarify that the maximum ore carrier under consideration for shipping during the ERP is a Post-Panamax vessel with 90,000 DWT (± 3,000 DWT). Therefore, acoustic modelling of the ore carriers is considered appropriate for the FEIS Addendum. It should be noted that vessel weight and vessel length are not the primary determinants of ship noise.
- *Cumulative Effects*: Effects from multiple ERP Project activities were assessed for each marine mammal VEC in the FEIS Addendum (Volume 8, Section 5) and for ERP Project activities as well as other potential sources of impact in Volume 9. Further discussion on specific QIA comments on cumulative noise modelling and effects assessment are provided below.

QIA identified several gap/issues in their review comments. QIA cites a review paper by Erbe (2012) and states that ship noise can have population-level impacts—there is no evidence in Erbe (2012) or any other studies to support the QIA statement. QIA states that without specific details on a nominal shipping route—it is difficult to evaluate shipping impacts on marine mammals. The rationale for this statement was not provided. Based on available information and baseline data gathered for the EIS, there are no known haul-outs for pinnipeds (like those for walrus in Foxe Basin) or specific concentration areas for marine mammals along the northern shipping route. If specific marine mammal concentration areas are identified during subsequent monitoring programs, appropriate adaptive management measures will be undertaken to minimize effects of ERP shipping.

QIA summarizes a study that modelled sound levels from shipping traffic in the fiord system near Kitimat, BC (Erbe et al. 2012) and a study that measured shipping sound in Admiralty Inlet, Puget Sound, WA (Bassett et al. 2012) in their review section, “Reasons for disagreement with FEIS/Addendum conclusion”. BIM does not dispute that ERP shipping will increase noise levels along the northern shipping route and acknowledges that a contributing factor to uncertainty in impact predictions for cetaceans is the narrow inlets of Milne Inlet and Eclipse Sound (see page 101 of the FEIS Addendum). BIM disagrees with QIA on a couple of points. Firstly, in reference to shipping, QIA states that “...associated increases in noise were biologically significant (Bassett et al. 2012).” Although Bassett et al. state this in the conclusion of their paper—they provide no rationale or evidence to support this rather broad statement. Secondly, QIA’s reference

to 120 dB re 1 µPa (presumably referring to root mean square sound pressure level) as "the currently accepted criterion for behavioural harassment of marine mammals for continuous sound types (Southall et al. 2007)" is incorrect. Southall et al. (2007; page 449) state that "The behavioral data on marine mammal behavior on responses to multiple pulse and non-pulse sounds are simply too variable and context-specific to justify proposing a single disturbance criterion for broad categories of taxa and sound". It is not appropriate to assume cetaceans will exhibit minor to strong avoidance at the120 dB received sound level. Considering relevant literature for low-frequency cetaceans (like bowhead whales) exposed to non-pulse sounds, Southall et al. (2007) note that there has been "no (or very limited) responses at received levels of 90 to 120 dB re 1 µPa and an increasing probability of avoidance and other behavioural effects in the 120 to 160 dB re 1 µPa range". For mid-frequency cetaceans like belugas and presumably narwhals, Southall et al. (2007) determine that there is no "clear conclusion about received levels coincident with various behavioural responses". Overall, Southall et al. acknowledge that there are no suitable thresholds that can be applied across species and situations; they recommend "a context based approach to deriving noise exposure criteria for behavioral responses". This was the basis for selecting the "disturbance onset" and "avoidance" thresholds used for the Key Indicators used in the FEIS Addendum.

QIA raises some valid points about the potential for project activities to mask important sounds for marine mammals. The conclusions of the FEIS Addendum were that masking effects were reversible and likely to be not significant. However, the FEIS addendum acknowledged that there is "low confidence" in the predictions. The role of masking is not well understood and presumably is more important for some species than it is for others. For example, many of the calls of narwhals and belugas are at high frequencies and will not be affected by the low frequency ship noise which is likely to be more problematic for bowheads. The topic is complicated. For example, marine mammals have already adapted to noisy environments where natural noise levels can be very high on occasion. Some species can change the frequencies and intensities of their calls to counteract masking.

QIA's point that multiple sound sources increase sound exposure for marine mammals is acknowledged. Given the complexity of trying to predict the relatively small increases in received noise levels and the lack of information on the precise levels that are significant to marine mammals, BIM believes that the approach in the ERP Addendum coupled with monitoring and adaptive management is the best approach for this issue.

In Response to QIA Recommendation B1

COMMENT:

The ERP describes for a large increase in truck transits on the Tote Road between the mine site and the port at Milne Inlet over what was proposed in the FEIS, from limited use for oversize equipment and construction shipping, to 160-200 truck transits/day (including 152 ore trucks/day) until the end of mine life. This level of traffic is unprecedented from previous experience about mine traffic and caribou, and could result in the Tote Road become a significant partial barrier or filter to movement.

The Proponent concluded: “For a conservative approach in this assessment, it was estimated that traffic along the roadway during a normal day of mine operation would result in 200 passes at any point along the road. Assuming that trucks are an average of 35m long and travel 50 km/h, then a caribou standing beside the road will be blocked from crossing by trucks for a total of 8 minutes 59 seconds. This corresponds to approximately 0.6 % of a normal operation day. If caribou will not cross the roadway 100 m before and after a truck passes, then the barrier affect increases to 4.2 % of a normal operation day. Other road maintenance and snow removal vehicles will also travel the route occasionally, but will not substantially increase the barrier” (ERP Vol. 6, Sect. 5.2.2, pg 49).

RECOMMENDATION:

The Proponent must re-evaluate the potential impact on caribou movement of upwards of 200 trucks per day, the majority of them haul trucks, travelling along the Tote Road for the life of the mine. This re-evaluation should include revisions to the mitigation and adaptive monitoring plans and an assessment of residual impacts after mitigation.

The Roads Management Plan should specify how caribou presence on and in the vicinity will be monitored and what thresholds (other than the tracks) will be used to trigger specific levels of traffic management. Baffinland should investigate dash camera technology and wildlife road surveillance systems to prevent collisions and use remote camera monitoring to describe caribou use of the road corridor.

RESPONSE:

The Approved Project’s effects assessment was conservative enough to account for projected traffic levels of the ERP. BIM is increasing its monitoring efforts and mitigation actions along the Tote Road to account for the increased traffic levels. There is no benefit to reassessing the effects on movement in the ERP’s FEIS.

The calculation of a potential moving barrier posed by Tote Road traffic was presented for demonstrative purposes only, in an effort to characterize an otherwise unquantifiable effect. This calculation does not represent the breadth of potential impacts to caribou movement near the Tote Road, and is only a representation of the physical barrier traffic may present to caribou. This value was used simply to characterize the road traffic as a physical barrier to caribou movement and was one factor in considering potential Project effects. The characterization of the traffic barrier effect had little influence on the outcome of the effects assessment. The road

is a physical barrier for 0.6% of a given day. The QIA comments have not suggested an alternative approach to Project effects on movement.

The QIA is concerned that literature used to characterize effects to caribou is not always applicable to Baffin caribou. BIM acknowledges behavioural responses vary across individuals and herds. There is no information on Baffin Island caribou response to disturbance. Therefore, we used the best available information to predict the potential effects of road traffic on Baffin caribou. We acknowledge that there may be differences from that suggested in the literature, but not enough to suggest a change in impact significance.

Caribou crossing areas along the Tote Road were mapped and identified in the Approved Project's FEIS. These areas are now considered caribou crossing zones for road construction purposes. BIM acknowledges that updated mitigation and monitoring is necessary given the increase in traffic estimates on the Tote Road. These could include:

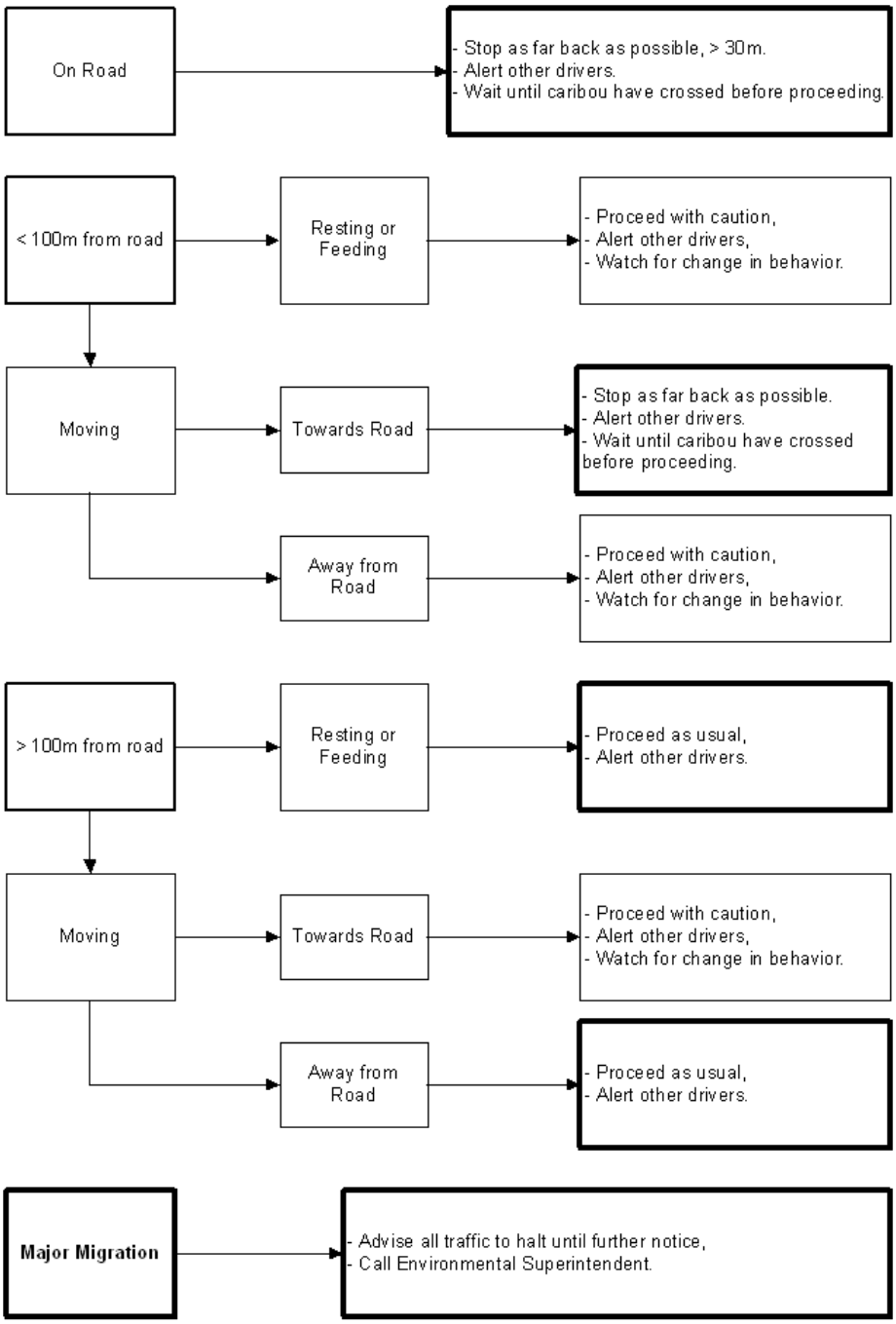
- Modified embankment heights and finer fill material at trails that cross the road (e.g., caribou crossings);
- Snow bank height maintained at less than 1 m;
- Operator radio communication as an early warning of caribou to approaching vehicles;
- Road signage identifying known crossing areas;
- Wildlife right-of-way policy; and
- Implementation of the caribou decision tree (see attachment).

Monitoring actions focused on the road could include:

- Snow track surveys along the Milne Inlet Tote Road;
- Monitoring of snow bank heights;
- Check-in/check-out procedure at gates at start and end of Tote Road that includes wildlife reporting;
- Installing cameras at known trail crossings along the road;
- Height of land surveys; and
- On-site wildlife monitor.

QIA's suggestion for dash-mount cameras is not being considered as a monitoring tool. Communication among drivers, check-in at gates for wildlife observations, height-of-land surveys and follow-up investigations of all mortality events are sufficient to monitor and mitigate potential effects on caribou movement.

Figure 1: Caribou decision tree



In Response to QIA Recommendation B4

Table 1: Comparison of RWDI Predictions to Data from Diavik

Diavik Diamond Mine (2002-2007)*		RWDI Analysis, Mary River Mine Site**	
Distance from Mining Operations (m)	Annual Dust Deposition ($g/m^2/yr$)	Distance from Disturbed Area (m)	Annual Dust Deposition ($g/m^2/yr$)
0 – 100	49 – 181	Inside disturbed area	120 – over 480
101 – 250	24 – 89	320	60
250 – 1000	12 – 27	1100	30
1001 – 2500	7.3 – 19	2100	15
Control	4 – 26	3300	7.5

*Diavik Diamond Mines Inc., 2008: Dust Deposition Monitoring Report 2007
**based on a worst-case transect, south of the operations.

Table 2: Comparison of RWDI Predictions to Data for the Dalton Highway, Alaska

Dalton Highway (1977-1978)*		RWDI Analysis, Tote Road**	
Distance from Highway (m)	Annual Dust Deposition (g/m^2/3 months)	Distance from Road (m)	Annual Dust Deposition ($g/m^2/yr$)
8	133 – 700		
30	19 – 151		
125	1.3 – 37	~ 100	60
312	1.7 – 14	~ 200	10
500	1.0 – 6.3	~ 450	5
1000	0.8 – 7.6	~ 1000	1

*Walker, D.A. and K.R. Everett, 1987: Road Dust and Its Environmental Impact on Alaskan Taiga and Tundra, Arctic and Alpine Res., Vol. 19, No. 4, pp. 479-489**.**
** Transect at approx. 3 km southeast of Milne Inlet

Table 3: Comparison of RWDI Predictions to Data for Ekati Haul Roads

Ekati (2006-2008)*		RWDI Analysis, Tote Road	
Distance from Highway (m)	Annual Dust Deposition ($g/m^2/yr$)	Distance from Road (m)	Annual Dust Deposition ($g/m^2/yr$)
30	1.8 – 16		
90	0.9 – 3.7	100	60
300	0.4 – 1.8	300	5

*EKATI Air Quality Monitoring Program, Bhpbilliton (powerpoint presentation). Dust suppression was used

In Response to DFO Recommendation 2.2

VEC - Key Indicator	Measurable Parameter for Determining Magnitude of Effect	Threshold for Magnitude of Effect		Precedent
		Level Set	Basis for Level Set	
Sea Ice - Landfast Ice	Surface Area - described as a percentage of LSA landfast ice per season	10%	A habitat disruption of 10% or less represents a low magnitude effect	Voisey's Bay Mine/Mill EIS (1997) describes a major residual effect on ice as one where vessel operations through fast ice are judged to alter the regional timing of freeze-up or break-up or the location of the fast ice edge such that the disturbance to the regional ice regime fall outside of the normal year-to-year variability in natural conditions. In the Canadian Coast Guard's (CCG) environmental evaluation of the Polar 8 Icebreaker (1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment (e.g. fast ice habitat). It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. While there are not many EA's that need to include landfast ice VEC, the magnitude of effect thresholds for other physical VECs (e.g. air or water quality) include: >25% (Long Harbour EIS, 2008), >25% (Lower Churchill EIS, 2008), as examples.
Water and Sediment Quality	Arsenic Cadmium Chromium Copper Lead Mercury Zinc Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Naphthalene Phenanthrene Pyrene	Exceedance of Canadian Council of Ministers of the Environment Protection of Marine Aquatic Life Guidelines (CCME-PMAL) Values for CCME-PMAL guidelines can be found in Volume 8, Table 8-3.8	Regulatory Guidelines Canadian Council of Ministers of the Environment Protection of Marine Aquatic Life (CCME-PMAL) Includes Canadian Council of Ministers of the Environment Interim Sediment Quality Guidelines (CCME ISQG) and Canadian Council of Ministers of the Environment Probably Effects Levels (CCME-PEL)	Part of Canadian Council of Ministers of the Environment (CCME) revised and integrated Canadian Environmental Quality Guidelines. These guidelines are widely accepted across Canada. The Canadian Environmental Quality Guidelines are also widely respected outside of Canada - United Nations Environment Program and the World Health Organization have distributed them around the world.
Marine Fish Habitat	Productive Capacity - The maximum natural capability of habitats to produce healthy fish, safe for human consumption, or to support or produce aquatic organisms upon which fish depend. (Policy for the Management of Fish Habitat, DFO)	10%	A habitat disruption of 10% or less represents a low magnitude effect	Wolfden High Lake EIS (2006, active NIRB review) uses a threshold value of >10% for fish species population or habitat for its high magnitude. Long Harbour EIS (2006) uses a threshold value of >25% for its high magnitude. Lower Churchill EIS (2009) uses a threshold value of >25% for its high magnitude. Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold value of >10% for its high magnitude. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment or size of a resource harvest. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies.. These values in other EAs are in line with the values used by Baffinland
Marine Habitat and Biota-Arctic Char	Arctic Char Health and Condition represented by water quality changes relative to CCME-PAL guidelines	1-10 times	Regulatory Guidelines Canadian Council of Ministers of the Environment Protection of Aquatic Life (CCME-PAL) Water quality change within 1-10 times the CCME PAL guidelines is considered a low magnitude of effect	Guidelines are widely accepted across Canada. Ecological factors and professional judgment will be used to determine exact magnitude of effect changes in water quality will have on Arctic Char. As well Wolfden High Lake EIS (2006, active NIRB review) has used a similar set of thresholds for its freshwater component (threshold value of >10% for high magnitude) and Doris North Gold Mine (2004, NIRB approved) uses a threshold value of >10% for high magnitude).

Ringed Seal	Habitat: Decrease in suitable pupping habitat in as a percentage of landfast ice area in the LSA per year	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including decreases in habitat, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including loss of habitat. Wolfden High Lake EIS (2006, active NIRB review) uses a >30% decrease in air holes used by ringed seals near the dock site. Wolfden High Lake EIS also uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Disturbance by airborne and/or underwater noise: Change in occupancy of an area that has been identified as important for feeding, nursing, breeding, and hauling out as a percentage of ringed seals in the RSA per year	10%	A strong avoidance reaction and abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. Wolfden High Lake EIS (2006, active NIRB review) uses a >30% decrease in air holes used by ringed seals near the dock site. Wolfden High Lake EIS also uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, pulsed sound: Ringed Seals exposed as a percentage present in the LSA per year to sound levels from blasting exceeding 180-190 dB re 1 uPa (rms) in water In water, "continuous" sound: Ringed Seals exposed as a percentage present in the LSA per year to sound levels from shipping, vibratory pile driving, or dredging where the sensation level exceeds 100 dB re 1 µPa	10%	10% or less exposed to these sounds represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including noise and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including noise. Wolfden High Lake EIS (2006, active NIRB review) discusses the effects of noise on marine mammals but it does not contain a threshold for any effects. While Labrador Island Transmission Link EIS does not have specific threshold values for marine mammals, it uses a threshold level of >25% for high magnitude for a caribou which includes effects of noise. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Mortality: increase above natural mortality per annum in Steensby Inlet (including pups)	1%	An increase in natural mortality of 1% or less represents a low magnitude effect and is not anticipated to impact ringed seal population within Steensby Inlet.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for marine mammals, Long Harbour EIS (2008) uses a threshold level of >25% for marine mammals. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna) While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year . In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Habitat: a) decrease in suitable overwintering habitat as a percentage of area in Hudson Strait and Foxe Basin b) decrease in suitable feeding and haul-out habitat as a percentage of area in Steensby Inlet	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different parameters (including disturbances)for various VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was >10% change in carrying capacity of the environment (e.g. fast ice habitat). It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

Walrus	Disturbance by airborne, underwater noise and/or wave height generated by an ore carrier: change in occupancy of areas identified as important feeding, nursing, breeding or haul-out habitat as a percentage of walrus in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different parameters (including disturbances)for various VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, pulsed sound: Walrus exposed as a percentage present in the LSA per year to sound levels from blasting exceeding 180-190 dB re 1 uPa (rms) in water. In water, "continuous" sound: Walrus exposed as a percentage present in the LSA to sound levels from shipping, vibratory pile driving, or dredging where the sensation level exceeds 100 dB re 1 µPa	10%	10% or less exposed to these sound levels represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including noise and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including noise. Wolfden High Lake EIS (2006, active NIRB review) discusses the effects of noise on marine mammals but it does not contain a threshold for any effects. While Labrador Island Transmission Link EIS does not have specific threshold values for marine mammals, it uses a threshold level of >25% for high magnitude for a caribou which includes effects of noise. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Mortality: increase above natural mortality per annum in the LSA	Any project-caused mortality	No significant walrus/vessel and walrus/aircraft interaction are anticipated to occur therefore any increase above natural mortality would be a significant effect.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year . In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
Beluga	Habitat: a) decrease in suitable overwintering habitat as a percentage of area in Hudson Strait per year b) decrease in suitable summering habitat as a percentage of area in Milne and Steensby Inlets per year	10%	A habitat disruption of 10% or less represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for marine mammals, Long Harbour EIS (2008) uses a threshold level of >25% for marine mammals, Wolfden High Lake EIS (2006, active NIRB review) uses a >50% increase in avoidance reactions by beluga. Wolfden High Lake EIS also uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Disturbance by pulsed or continuous underwater noise: change in occupancy of areas identified as important feeding, nursing, calving, breeding, wintering and summering habitat as a percentage of belugas in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. Wolfden High Lake EIS (2006, active NIRB review) discusses the effects of noise on marine mammals but it does not contain a threshold for any effects however it does use a >50% increase in avoidance reactions by beluga. Wolfden High Lake EIS also uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, "continuous" sound: Beluga exposed as a percentage of population in the LSA per year to sound levels from shipping, vibratory pile driving, or dredging where the received levels exceeds 175 dB re 1 µPa over a duration of 100s	10%	Less than 10% exposed to continuous sound levels represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for marine mammals, Long Harbour EIS (2008) uses a threshold level of >25% for marine mammals, Wolfden High Lake EIS (2006, active NIRB review) uses a >50% increase in avoidance reactions by beluga. Wolfden High Lake EIS also uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

	Mortality: increase above natural mortality per annum in the LSA	Any project-caused mortality	No significant beluga/vessel interaction is anticipated to occur therefore any increase above natural mortality would be a significant effect.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
Narwhal	Habitat: a) decrease in suitable wintering habitat as a percentage of area in Hudson Strait per year b) decrease in suitable summering habitat as a percentage of area in Milne and Steensby Inlets per year	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including decreases in habitat, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including loss of habitat. Wolfden High Lake EIS (2006, active NIRB review) did evaluate disturbance of marine mammals however it did not include narwhal. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga as well as a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different parameters (including disturbances)for various VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Disturbance caused by pulsed or continuous underwater noise: change in occupancy of areas identified as important feeding, nursing, calving, breeding, wintering and summering habitat as a percentage of narwhals in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. Wolfden High Lake EIS (2006, active NIRB review) did evaluate noise effects on marine mammals however it did not include narwhal. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga as well as a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different parameters (including disturbances)for various VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, "continuous" sound: Narwhals exposed as a percentage of the population in the LSA per year to sound levels from shipping, vibratory pile driving, or dredging where the sensation level exceeds 175 dB re 1 µPa over a duration of 100s	10%	10% or less exposed to continuous sound levels represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including noise and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including noise. Wolfden High Lake EIS (2006, active NIRB review) did evaluate noise effects on marine mammals however it did not include narwhal. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga. While Labrador Island Transmission Link EIS does not have specific threshold values for marine mammals, it uses a threshold level of >25% for high magnitude for a caribou which includes effects of noise. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Mortality: increase above natural mortality per annum in the LSA	Any project-caused mortality	No significant narwhal/vessel interaction is anticipated to occur therefore any increase above natural mortality would be a significant effect.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

Bowhead	Habitat: a) decrease in suitable overwintering habitat as a percentage of area in Hudson Strait per year b) decrease in suitable summering habitat as a percentage of area in Milne and Steensby Inlets per year	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including decreases in habitat, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including loss of habitat. Wolfden High Lake EIS (2006, active NIRB review) did evaluate disturbance of marine mammals however it did not include bowhead. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga as well as a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Disturbance: change in occupancy of areas identified as important feeding, nursing, calving, breeding, wintering and summering habitat as a percentage of bowhead whales in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. Wolfden High Lake EIS (2006, active NIRB review) did evaluate noise effects on marine mammals however it did not include bowhead. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga as well as a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, pulsed sound: Bowhead exposed as a percentage of the population in the LSA per year to sound levels from blasting exceeding 180 dB re 1 uPa (rms) in any single event per year In water, "continuous" sound: Bowhead exposed as a percentage of the population in the LSA per year to sound levels from shipping, vibratory pile driving, or dredging where the sensation level exceeds 175 dB re 1 µPa over a duration of 100s	10%	Pulse sound: any single event where a bowhead whale enters the safety zone during blasting. Continuous sound: Less than 10% exposed to continuous sound levels represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including noise and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including noise. Wolfden High Lake EIS (2006, active NIRB review) did evaluate noise effects on marine mammals however it did not include bowhead. Wolfden High Lake EIS does use a threshold a >50% increase in avoidance reactions by beluga . While Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, it uses a threshold level of >25% for high magnitude for a caribou which includes effects of noise. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Mortality: increase above natural mortality per annum in the LSA	Any project-caused mortality	No significant bowhead/vessel interaction is anticipated to occur therefore any increase above natural mortality would be a significant effect.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Habitat: decrease in suitable foraging habitat as a percentage of area in Steensby Inlet and pack ice habitat in Foxe Basin and Hudson Strait per year	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including decreases in habitat, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including loss of habitat. Wolfden High Lake EIS (2006, active NIRB review) uses a threshold of 10% for change in distribution or change in abundance for caribou, 20% for grizzly bears and 15% for habitat lost for all VECs. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

Polar Bear	Disturbance caused by noise: change in occupancy of areas identified as important feeding or denning habitat as a percentage of polar bears in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for marine mammals, Long Harbour EIS (2008) uses a threshold level of >25% for marine mammals. Wolfden High Lake EIS (2006, active NIRB review) uses a threshold of 10% for change in distribution or change in abundance for caribou. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Mortality: increase above natural mortality per annum in the LSA	Any project-caused mortality	Any project-caused mortality will be deducted from the harvest quota. This ensures that polar bear mortality per year does not exceed allowable quotas for sustainable populations.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was >10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
Bearded Seal	Habitat: a) decrease in suitable pupping habitat in as percentage of pack ice and edge of landfast ice in the LSA per year b) decrease in suitable foraging habitat as percentage of area in Steensby Inlet per year	10%	A habitat disruption of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including decreases in habitat, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including loss of habitat. Wolfden High Lake EIS (2006, active NIRB review) uses a >30% decrease in air holes used by ringed seals near the dock site. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of parameters (including loss of habitat) for various VECs (fish and fish habitat, furbearers, terrestrial mammals). In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was ≥10% change in carrying capacity of the environment. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Disturbance caused by airborne and/or underwater noise: change in occupancy of areas identified as important feeding, nursing, breeding and hauling out as a percentage of bearded seals in the RSA per year	10%	A strong disturbance and avoidance reaction that lead to (seasonal) abandonment of important habitat of less than 10% represents a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including disturbances, and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including disturbances. Wolfden High Lake EIS (2006, active NIRB review) uses a >30% decrease in air holes used by ringed seals near the dock site. While Lower Churchill EIS (2009) and Labrador Island Transmission Link EIS do not have specific threshold values for marine mammals, they use a threshold level of >25% for high magnitude for a variety of different parameters (including disturbances) for various VECs (fish and fish habitat, furbearers, terrestrial mammals, avifauna). The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.
	Hearing Impairment: In water, pulsed sound: Bearded Seals exposed as a percentage present in the LSA per year to sound levels from blasting exceeding 180-190 dB re 1 uPa (rms) in water In water, "continuous" sound: Bearded Seals exposed as a percentage present in the LSA per year to sound levels from shipping, vibratory pile driving, or dredging where the sensation level exceeds 100 dB re 1 µPa	10%	10% or less exposed to these sounds represent a low magnitude effect	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including noise and the Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including noise. Wolfden High Lake EIS (2006, active NIRB review) discusses the effects of noise on marine mammals but it does not contain a threshold for any effects. While Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, it uses a threshold level of >25% for high magnitude for a caribou which includes effects of noise. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

	Mortality: increase above natural mortality per annum in Hudson Strait and Foxe Basin (including pups)	1%	An increase in natural mortality of 1% or less represents a low magnitude effect and is not anticipated to impact bearded seal population within the in Foxe Basin and Hudson Strait.	Doris North Gold Mine EIS (2004, NIRB approved) uses a threshold level of >10% for high magnitude for all marine mammals parameters including mortality. Long Harbour EIS (2008) uses a threshold level of >25% for all marine mammals parameters including mortality. While the Labrador Island Transmission Link EIS (2012) does not have specific threshold values for marine mammals, when discussing caribou mortality it describes a threshold where it is "Predicted to have a measurable change in Caribou populations relative to baseline conditions that does cause management concern". Lower Churchill EIS uses the number of fatalities as a proportion to the population for all terrestrial VECs for mortality. While Wolfden High Lake Project EIS (2006, active NIRB review) does not have a mortality threshold for marine mammals it does have a mortality threshold of 1 caribou per year, 0.25 grizzly bear per year, and 0.5 wolverine per year. In the environmental evaluation of the Polar 8 Icebreaker (CCG, 1990) a high magnitude of effect was $\geq$10% change in size of a population. It should be noted that this study area comprised the entire Canadian arctic so that lower thresholds for magnitude of effect were more appropriate on this scale, compared to other studies. The threshold levels selected by Baffinland are in line with those stated above and are accepted as legitimate threshold levels in EAs.

CCME-ISQG = CCME INTERIM SEDIMENT QUALITY GUIDELINE

CCME-PEL = CCME PROBABLE EFFECTS LEVEL.

In Response to DFO Recommendation 2.5

DFO Comment 2.5 Baseline Studies—Marine Mammals

It is important to recognize the distinction between baseline data for the purposes of EIS predictions versus data collected for monitoring programs. The DFO reviewer(s) is confusing the two and implies that Baffinland has concluded that enough data are available for monitoring effects of the Project on marine mammals. Baffinland acknowledges that additional baseline data on marine mammals will be required for monitoring programs. However, the aerial survey data for marine mammals along the northern shipping route in conjunction with IQ and other published and unpublished research is adequate to serve as the basis of impact predictions. In fact, the survey effort exceeds that collected for many other EISs for major industrial projects. To summarize, aerial survey effort conducted along the northern shipping route and Milne Inlet port area during the open-water season entailed:

- 16, 135 km survey effort in late July, August and September 2007
- 12, 370 km survey effort in August and September 2008

Surveys involved repeat coverage of Eclipse Sound and Milne Inlet as well as adjacent fiords including Trembley Sound, Eskimo Inlet, White Bay, and Tay Sound. To put things in perspective, DFO's recent open-water survey of the Eclipse Sound area collected data along 1390 km of transects (S. Ferguson, DFO, pers. comm., November 2013). Fixed-wing aircraft (primarily a Twin Otter but also a Shorts Skyvan) were used during BIM surveys and survey methods were consistent and appropriate for collecting relative abundance/density data for cetaceans.

Marine mammal densities were corrected for availability and detection biases to allow for more reliable (and precautionary) predictions of the number of animals that may be exposed to shipping and construction sounds during the ERP. The sources of the correction factors are provided in the FEIS (Volume 8, Section 5) and the corresponding ERP Addendum. Details relevant to the ERP addendum are repeated below.

Ringed Seals (page 160 in Volume 8 of FEIS): "These areas and aerial survey data were used to estimate the numbers of ringed seals that would be exposed to shipping noise and were adjusted to allow for seals hauled out but not sighted by observers (x 1.22, based on Frost *et al.*1988) and for the proportion of ringed seals not hauled out during the survey coverage (x 2.33, based on Kelly and Quakenbush, 1990). Data acquired during the June aerial surveys were the basis for estimating the numbers of ringed seals exposed to sensation levels ≥ 80 dB because it is likely that seals are more abundant in the LSA during the ice-cover period than during the open water, when they are known to disperse."

Beluga Whales (page 78 in Volume 8 FEIS Addendum): "The estimated numbers of belugas exposed to sound levels that exceeded the assumed thresholds for disturbance

onset and avoidance were calculated for months with available aerial survey data (August and September). A correction factor of 2.26 was applied to density estimates for availability bias in summer (Martin and Smith, 1992; Harwood *et al*., 1996); and a correction factor of 2.84 was applied for detection bias (Harwood *et al*., 1996).

Narwhals (page 95 in Volume 8 FEIS Addendum): "The estimated numbers of narwhals exposed to sound levels that exceeded these thresholds for disturbance onset and avoidance were calculated for months with available aerial survey data (August and September). Correction factors of 1.11 and 2.91 were applied to narwhal density estimates for availability and detection biases, respectively (Richard *et al*., 2010)."

Bowhead Whales (page 106 in Volume 8 FEIS Addendum): "The estimated numbers of bowhead whales exposed to sound levels that exceeded the thresholds were calculated for months with available aerial survey data (August and September). Correction factors of 6.94 and 2.07 were applied to density estimates for availability and detection biases, respectively (Thomas *et al*., 2002)."

Literature Cited:

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Kelly, B.P. and L.T. Quakenbush. 1990. Spatiotemporal use of lairs by ringed seals (*Phoca hispida*). *Canadian Journal of Zoology* 68(12):2503-2512.

Martin, A.R. and T.G. Smith. 1992. Deep diving in wild, free-ranging beluga whales, *Delphinapterus leucas*. Can. J. Fish. Aquat. Sci. 49:462-466.

Richard, P., J.L. Laake, R.C. Hobbs, M.P. Heide-Jørgensen, N.C. Asselin, and H. Cleator. 2010. Baffin Bay narwhal population distribution and numbers: aerial surveys in the Canadian High Arctic, 2002-04. *Arctic* 63(1):85-99.

Thomas, T.A., W.R. Koski, and W.J. Richardson. 2002. *Correction factors to calculate bowhead whale numbers form aerial surveys of the Beaufort Sea.* Chapter 15. In: W.J. Richardson and D.H. Thomson, eds. Bowhead whale feeding in the eastern Alaskan Beaufort Sea: Update of Scientific and Traditional Information. 28pp. OCS Study MMS 2002-012; LGL Rep. TA2196-7. Rep. from LGL Ltd., King City, Ontario, for US Minerals Management Service, Anchorage, Alaska and Herndon Virginia, USA. xliv+420pp. [Available from National Technical Information Service, Springfield, Virginia, USA, Rep. No. NTIS PB2004-101568].

DFO's Recommendations, Comment 2.5:

1. *BIM should re-analyse the data from their surveys using Distance sampling methods (Buckland et al. 2001).*

The use of Distance sampling methods for aerial survey data collected for the purposes of impact assessment of marine mammals is not required for the FEIS or its addendum. Distance sampling methods will be used (where appropriate) in future technical reports prepared in support of BIM monitoring programs. For example, Distance sampling was employed for the technical report "Elliott, R.E., V.D. Moulton, S.W. Raborn and R.A. Davis. 2013. Hudson Strait Marine Mammal Surveys, 10 March – 2 April 2012. LGL Report No. TA8129-2. Prepared by LGL Limited, King City, ON for Baffinland Iron Mines Corporation, Toronto, ON. 87 p."

2. *BIM does not correct for availability and perception bias in Appendix 8A-2. However, in App. 8C, the densities in tables 8C 3.6, 3.7 and 3.9 are corrected but there is no indication where the values came from. BIM should use correction factors and provide a scientific justification for the values chosen.*

Marine mammal densities were corrected for availability and detection biases to allow for more reliable (and precautionary) predictions of the number of animals that may be exposed to shipping and construction sounds during the ERP. The sources of the correction factors are provided in the FEIS (Volume 8, Section 5) and the corresponding ERP Addendum.

3. *BIM should improve the precision of their baseline data, assess the species regularly, and/or re-design their monitoring in ways that would allow for rapid detection of changes in marine mammal habitat use or population dynamics, and minimize such impacts. For example improvements to the methodology for subsequent surveys should include the systematic use of double observers for mark–recapture Distance sampling (Innes et al. 2002, Richard et al. 2010).*

It is important to recognize the distinction between baseline data for the purposes of EIS predictions versus data collected for monitoring programs. BIM acknowledges that more rigorous quantitative baseline data will be needed for monitoring programs. BIM is committed to conducting appropriate monitoring programs, with the technical input of the MEWG. Input from DFO will be sought via the MEWG for technical input on study design and techniques.

4. *The monitoring program should be carried out in a scientifically defensible way, and with sufficient precision to ensure that potential effects at or above carefully-*

chosen threshold levels can be identified. In instances when sufficient precision cannot be assured without extraordinary logistical limitations, the Proponent should adopt precautionary approaches such as diverting ships away from known or newly-discovered whale aggregations or pinniped haulout areas.

There is an important distinction to be made between threshold values used to make effects prediction statements, versus threshold values assigned to detect measurable changes through EEM programs. All marine mammal monitoring programs will be conducted in a scientifically defensible manner and with the input of the MEWG.

In Response to DFO Recommendation 2.8

Response to DFO 2.8: Impact of Port Construction—Pile Driving:

The acoustic modelling of pile driving was based on available project construction details and precautionary measures were employed (e.g., using sound speed profile for a time period that results in maximum sound propagation; using maximum predicted distances for sound levels used to make impact predictions). DFO states that 30 m steel piles will be impact pile-driven into place. This is not accurate.

From Appendix 3D of the FEIS Addendum:

"The fixed dock is comprised of three large (two approximately 30 m in diameter and one approximately 18.5 m in diameter) circular cells consisting of a shell of steel sheet piles driven into the sea floor and filled with crushed rock."

A circular cell is made up of interlocking sheet piles each 50 cm wide and up to 30 m long (12 mm thick steel). These sheet piles would be vibrated into place—impact pile driving would not be used with this type of interlocking sheet piles (John Binns, Senior Consultant, HATCH; pers. comm., October 2013). As discussed in Appendix 8C-2, Underwater Noise Modelling for Milne Inlet and Eclipse Sound, the source level of vibratory pile driving is much reduced relative to the source level of impact pile driving—reduction in source levels (broadband) can range from 10 dB to 25 dB (see page 2 of Appendix 8C-2). The sound pressure levels used for impact prediction in the FEIS Addendum are considered precautionary. Note that current dock construction plan does not involve pile driving during the ice-covered season (John Binns, Senior Consultant, HATCH; pers. comm., October 2013).

Although not relevant in light of the current dock construction plan, the FEIS Addendum did estimate the number of ringed seals that might be exposed to impact pile driving noise in June during ice-covered conditions—the month with available aerial survey data (see pages 60-61 of the FEIS Addendum). DFO requested density information used in the FEIS Addendum for ringed and bearded seals. The observed density estimate used to estimate the number of ringed seals potentially exposed to pile driving noise during the ice-covered season was 1.271 seals/km^2 (from June 2008 aerial survey—see Table 4.8 in FEIS Appendix 8A-2); this density estimate was adjusted to allow for seals hauled out but not sighted by observers (x 1.22, based on Frost et al.1988) and for the proportion of ringed seals not hauled out during the survey coverage (x 2.33, based on Kelly and Quakenbush, 1990). Bearded seals do not typically occur in areas of landfast ice. No bearded seals were observed in Milne Inlet during June aerial surveys conducted in 2006 and 2007. Four bearded seals were observed in Milne Inlet during June 2008 aerial surveys, but none of these sightings occurred in or near the Milne Inlet port site.

In Response to DFO Recommendation 2.13

Response to DFO 2.13: Impacts of Shipping—Noise (Disturbance)

The following response to DFO's review is based on the numerical points in the DFO review. Table 8C-3.6, 8C-3.7, 8C-3.8, and 8C-3.9a are provided for DFO's convenience.

In a general introduction, DFO contends that the noise assessment conducted in the FEIS Addendum is not valid for the ERP because acoustic modelling in Appendix 8C-2 does not adequately represent Project shipping and pile driving. BIM disagrees. The acoustic modelling results used to predict numbers of narwhals that may be exposed to shipping noise was based on the larger ore carrier proposed for shipping during the ERP—the Post-Panamax vessel (90,000 DWT) and for maximum vessel speed (10 knots) along the northern shipping route. As discussed in Response to DFO Comment 2.8: Impact of Port Construction—Pile Driving, vibratory versus impact pile driving will be used at the Milne Port site. Acoustic modelling results from the much noisier impact pile driving were used in making impact predictions for marine mammals. As a general comment, the construction of the port at the south end of Milne Inlet will take only a few months and introduce noise into the south end of the inlet where relatively few marine mammals are present. Therefore, potential impacts related to port construction are relatively minor compared to possible shipping effects that last for the length of the project.

In the first point of their review DFO disagrees with the approach taken by the proponent. BIM estimated that ~200-500 narwhals in Milne Inlet and Eclipse Sound will avoid an ore carrier during each vessel transit[1]. This estimate is based on a review of available literature on odontocete response to shipping, acoustic modelling of a Post-Panamax ore carrier traveling at the maximum transit speed of 10 knots, and density estimates (corrected) of narwhals. It is an estimate of how many narwhals will occur within 0.7 km (corresponding to sound levels that exceed 135 dB re 1 µPa rms) of a ship's track. BIM acknowledges that there is uncertainty in the numbers of narwhals that may avoid a single vessel passage and that it is not known how many different narwhals would be exposed to noise levels above the 135 dB sound level over the course of an entire open-water period (see page 101 of the FEIS Addendum). As noted earlier, it is BIM's position that these uncertainties, as well as those noted for bowhead whale disturbance predictions (Low Level of Confidence), can be addressed and accounted for with well-designed monitoring programs and an adaptive management approach.

[1] DFO is correct in that the numbers of beluga whales, narwhals, and bowhead whales presented in Tables 8C-3.6, 8C-3.7, and 8C-3.8 do not match the numbers presented in the FEIS Addendum, Volume 8, Section 5. Revised versions of these tables are included at the end of this Appendix.

In DFO's analysis of number of narwhal, beluga, and bowhead exposures to shipping noise they state "A criterion for avoidance of continuous sound of 120 dB re 1 µPa was chosen based on a review of marine mammal behavioural responses to noise (Southall et al. 2007)." This was the same approach DFO used during their review of the FEIS. However, the DFO approach actually misquotes the Southall et al. committee. Southall et al. (2007; page 449) state that "The behavioral data on marine mammal behavior on responses to multiple pulse and nonpulse sounds are simply too variable and context-specific to justify proposing single disturbance criterion for broad categories of taxa and sound". It is not appropriate to assume cetaceans will exhibit minor to strong avoidance at this sound level. Considering relevant literature for low-frequency cetaceans (like bowhead whales) exposed to non-pulse sounds, Southall et al. (2007) note that there has been "no (or very limited) responses at received levels of 90 to 120 dB re 1 µPa and an increasing probability of avoidance and other behavioural effects in the 120 to 160 dB re 1 µPa range". For mid-frequency cetaceans like belugas and presumably narwhals, Southall et al. (2007) determine that there is no "clear conclusion about received levels coincident with various behavioural responses". Overall, Southall et al. acknowledge that there are no suitable thresholds that can be applied across species and situations; they recommend "a context based approach to deriving noise exposure criteria for behavioral responses". This was the basis for selecting the "disturbance onset" and "avoidance" thresholds used for the Key Indicators used in the FEIS Addendum. It is unclear why DFO in their review of the FEIS Addendum did not consider the best scientifically available information. The use of the 120 dB as a sole criterion for predicting disturbance effects from shipping is not appropriate for cetaceans. Also, DFO used the wrong numbers (based on those in Appendix 8C) in calculating numbers of cetacean exposures per vessel transit presented in Table 1. In short, DFO's conclusion that the narwhal population summering in Eclipse Sound, Milne Inlet and adjacent fiords will experience 390,000 individual-exposures to ore carriers that will result in avoidance is seriously flawed and consequently, not valid.

In Point 2, DFO's point that multiple sound sources increase sound exposure for marine mammals is acknowledged. Given the complexity of trying to predict the relatively small increases in received noise levels and the lack of information on the precise levels that are significant to marine mammals, BIM believes that the approach in the ERP Addendum coupled with a sophisticated monitoring program and adaptive management is the best approach for this issue.

In their third point, DFO correctly notes that the maximum tonnage of Post-Panamax ore carriers stated in Volume 3 of the FEIS Addendum (110,000 DWT) is larger than the Post-Panamax (90,000 DWT) vessel that was used in acoustic modelling. BIM would like to clarify that the maximum ore carrier under consideration for shipping during the ERP is a Post-Panamax vessel with 90,000 DWT (± 3,000 DWT). Therefore, acoustic

modelling of the ore carriers is considered appropriate for the FEIS Addendum. It should be noted that vessel weight and vessel length are not the primary determinants of ship noise.

In point 4, BIM agrees with DFO that reducing ship speed is an appropriate mitigation measure for reducing sound levels from ships. BIM has committed to minimizing ore carrier speed along the northern shipping route to 7-10 knots. In all likelihood, ship speed will be further reduced (as will sound output) as ore carriers transit through the southern portion of Milne Inlet on approach the Milne Port site. An appropriate monitoring program and adaptive management plan for marine mammals and shipping will be developed in conjunction with the MEWG.

DFO's Point 5 states that the aerial survey data collected in 2007 and 2008 in Milne Inlet and Eclipse Sound relative to shipping activity are not sufficient to draw conclusions about narwhal response to shipping—BIM agrees and acknowledges this in the FEIS Addendum. For example, as noted in the FEIS Addendum (page 100), "To assess potential changes in narwhal numbers, observed densities were compared during aerial surveys prior to the ship's arrival and after its departure. It should be noted that this is not an ideal method to examine narwhal response to shipping, but it does provide some valuable observations. As noted in FEIS Appendix 8A-2, there is much fine-scale movement by large groups of narwhals among various areas of Eclipse Sound and the fjords around it, both from day to day and over a longer time interval. This natural variation in abundance complicates the examination of density estimates during a study not specifically designed to address potential response to ship transits." The aerial survey data do suggest that there was no wide-scale, long-term displacement of narwhals from Eclipse Sound and Milne Inlet in response to vessel transits (sealift, tanker, and ore carrier).

BIM strongly disagrees with DFO's position in Point 6.1 that the FEIS Addendum "ignores a large body of research" and that "the review of the literature on the impact of acoustic disturbance omits several key elements". To support their argument that BIM has "ignored a large body of research", DFO cites three publications dealing with stress— Sapolskey et al. (2000; overview of how glucocorticoids influence stress response—no direct reference to marine mammals), Romero and Butler (2007; endocrinology of stress in animals—no direct reference to marine mammals), and Rolland et al. (2012: stress-related faecal hormone metabolites (glucocorticoids) in North Atlantic right whales relative to shipping). BIM does acknowledge in Section 5.4.1 of the FEIS that another aspect of marine mammal response to noise may include stress. BIM did not include a review of the relative limited literature on stress in marine mammals because it was not considered one of the key interactions in the impact assessment.

In Point 6.2, DFO notes there are very few examples where cetaceans reportedly did habituate to industrial activity. The classic example provided by DFO is “gray whales deserted Laguna Guerrero Negro for more than a decade when commercial shipping and dredging activity took place in the lagoon (Bryant et al. 1984)”. BIM reviewed this paper in the FEIS (Volume 8, Section 5.10.2.2) and follow-up publications not mentioned by DFO: “Gray whales in Laguna Guerrero Negro, Mexico, provide one of the few documented cases of a long-term change in baleen whale distribution as a result of industrial activities. It is thought that constant dredging operations needed to keep a channel open for shipping salt (from 1957 to 1967) may have been the main source of disturbance to the whales and cause of a decline of whale numbers from 1964 to 1970; gray whales re-occupied the lagoon after salt shipping subsided (Bryant *et al*., 1984). However, subsequent surveys suggested that the seasonal abundance of gray whales in the lagoon had decreased 90% since the 1980s (Jones *et al*., 1994). Fishermen in the area have suggested that the decline of whales may be caused by the accumulation of sand at the entrance of the lagoon because of the lack of dredging (Urbán et al., 2003).” Urbán et al. (2003) noted that there is no conclusive evidence as to the cause of the variations in gray whale abundance in the lagoon. The other examples of “non-habituation” provided by DFO deal with bottlenose dolphin response to dredging in Aberdeen (Scotland) harbour (Pirotta et al. 2013) and killer whale response to Acoustic Harassment Devices in British Columbia (Morton and Symonds 2002). These studies noted that the marine mammals returned to previous areas after dredging and AHD use had ceased. It should be noted that BIM presented at the earlier NIRB Hearings, the overwhelming evidence that marine mammals have habituated to high levels of underwater noise and disturbance when there is no direct threat to the safety of the animals.

DFO states that “BIM should have been more cautious in their interpretation of the study by Finley et al. (1990)”. BIM’s review of Finley et al. represents the publication accurately, including our statement that the duration of avoidance for narwhals was less than that for belugas—Finley et al. (1990) state that “Narwhals returned to disturbance areas much faster than belugas and resumed normal activities when received noise levels from ice-breaking operations were as high as 120 dB.” The consultants to BIM actually conducted the studies reported by Finley et al. and have accurately presented those results.

TABLE 8C-3.6

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

Estimated numbers of beluga whales potentially affected by Project activities during the ice-covered (Apr, Jun) and open-water periods (Aug, Sep, Oct).

		Beluga Avg. Density (individuals/100 km^2)					Estimated No. of Beluga (Disturbance "On-set")					Estimated No. of Beluga (Avoidance)				
Project Activity	Area	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct
A. Steensby Port and Shipping Route																
Blasting; no bubble curtain	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	0	0	0	0	0	0	0
Blasting; with bubble curtain	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	0	0	0	0	0	0	0
Drilling through ice	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	0	0	0	0	0	0	0
Drilling through seabed	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	0	0	0	0	0	0	0
Dredging bucket	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	0	0	0	0	0	0	0
Dredging cutter	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	7	1	0	0	0	3	1
Tug	Steensby Port	0.00	0.00	0.00	0.53	0.10	0	0	0	2	0	0	0	0	0	0
Ore Carrier (Cape-size)	Steensby Inlet	0.00	0.00	0.00	0.53	0.10	0	0	0	74	14	0	0	0	26	5
Ore Carrier (Cape-size)	Foxe Basin	0.15	0.25	0.25	0.36	0.10	757	2083	790	617	127	255	588	209	165	35
Ore Carrier (Cape-size)	Hudson Strait	3.00	2.00	0.60	0.30	0.00	27238	13433	1558	779	0	10125	4796	459	230	0
B. Milne Port and Shipping Route																
Tug	Milne Port			0.08	0.12				0	0				0	0	
Dredging cutter suction	Milne Port			0.08	0.12				0	0				0	0	
Pile driving; no bubble curtain	Milne Port			0.08	0.12				0	0				0	0	
Pile driving; with bubble curtain	Milne Port			0.08	0.12				0	0				0	0	
Ore Carrier (Handymax-size)	Eclipse Sound			0.00	0.02				0	0				0	0	
Ore Carrier (Handymax-size)	Koluktoo Bay			0.08	0.12				1	1				0	0	
Ore Carrier (Handymax-size)	Milne Inlet			0.19	0.00				2	0				1	0	
Ore Carrier (Handymax-size)	Other bays/inlets			0.71	0.04				0	0				0	0	
Ore Carrier (Post-Panamax-size)	Eclipse Sound			0.00	0.02				0	1				0	0	
Ore Carrier (Post-Panamax-size)	Koluktoo Bay			0.08	0.12				1	1				0	0	
Ore Carrier (Post-Panamax-size)	Milne Inlet			0.19	0.00				2	0				1	0	
Ore Carrier (Post-Panamax-size)	Other bays/inlets			0.71	0.04				0	0				0	0	

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NOTES:

1. CORRECTION FACTORS OF 5.0 AND 2.26 WERE APPLIED FOR AVAILABILITY BIAS IN WINTER AND SUMMER, RESPECTIVELY; AND 2.841 FOR DETECTION BIAS.
2. DISTURBANCE "ON-SET" SOUND LEVELS OF 120 dB (rms) AND 145 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUND, RESPECTIVELY.
3. AVOIDANCE SOUND LEVELS OF 135 dB (rms) AND 155 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUNDS, RESPECTIVELY.
4. HEARING IMPAIRMENT (TTS) SOUND LEVELS OF 175 dB (rms), 100 sec EXPOSURE FOR CONTINUOUS SOUND AND 180 dB (rms) FOR PULSED SOUND WERE ASSUMED.
5. 2-3 BELUGA WHALES IN FOXE BASIN ARE PREDICTED TO BE EXPOSED TO SOUND LEVELS FROM CAPE-SIZED ORE CARRIERS WHICH EXCEED ASSUMED TTS LEVEL DURING THE THICK-ICE SEASON .

TABLE 8C-3.7

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

Estimated numbers of narwhals potentially affected by Project activities during the ice-covered (Apr, Jun) and open-water periods (Aug, Sep, Oct).

		Narwhal Avg. Density (individuals/100 km^2)					Estimated No. of Narwhal (Disturbance "On-set")					Estimated No. of Narwhal (Avoidance)				
Project Activity	Area	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct
A. Steensby Port and Shipping Route																
Blasting; no bubble curtain	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Blasting; with bubble curtain	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Drilling through ice	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Drilling through seabed	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Dredging bucket	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Dredging cutter	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Tug	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ore Carrier (Cape-size)	Steensby Inlet	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ore Carrier (Cape-size)	Foxe Basin	0.20	0.20	0.00	0.00	0.00	200	341	0	0	0	58	92	0	0	0
Ore Carrier (Cape-size)	Hudson Strait	0.60	0.80	0.00	0.60	0.00	1009	1039	0	646	0	460	436	0	231	0
B. Milne Port and Shipping Route																
Tug	Milne Port			193.89	20.17				387	40				16	2	
Dredging cutter suction	Milne Port			193.89	20.17				260	27				11	1	
Pile driving; no bubble curtain	Milne Port			193.89	20.17				177	18				90	9	
Pile driving; with bubble curtain	Milne Port			193.89	20.17				47	5				5	1	
Ore Carrier (Handymax-size)	Eclipse Sound			11.91	50.43				110	466				33	140	
Ore Carrier (Handymax-size)	Koluktoo Bay			193.89	20.17				662	69				169	18	
Ore Carrier (Handymax-size)	Milne Inlet			106.07	22.14				707	148				182	38	
Ore Carrier (Handymax-size)	Other bays/inlets			93.83	21.79				0	0				0	0	
Ore Carrier (Post-Panamax-size)	Eclipse Sound			11.91	50.43				220	931				33	140	
Ore Carrier (Post-Panamax-size)	Koluktoo Bay			193.89	20.17				662	69				238	25	
Ore Carrier (Post-Panamax-size)	Milne Inlet			106.07	22.14				707	148				219	46	
Ore Carrier (Post-Panamax-size)	Other bays/inlets			93.83	21.79				1	0				0	0	

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NOTES:

1. CORRECTION FACTORS OF 1.111 AND 2.905 WERE APPLIED FOR AVAILABILITY AND DETECTION BIASES , RESPECTIVELY.
2. DISTURBANCE "ON-SET" SOUND LEVEL OF 120 dB (rms) AND 145 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUNDS, RESPECTIVELY.
3. AVOIDANCE SOUND LEVEL OF 135 dB (rms) AND 155 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUNDS , RESPECTIVELY.
4. HEARING IMPAIRMENT (TTS) SOUND LEVELS OF 175 dB (rms), 100 sec EXPOSURE FOR CONTINUOUS SOUND AND 180 dB (rms) FOR PULSED SOUND WERE ASSUMED.
5. ONE NARWHAL IN EACH OF FOXE BASIN AND HUDSON STRAIT IS PREDICTED TO BE EXPOSED TO SOUND LEVELS FROM CAPE-SIZE ORE CARRIERS WHICH EXCEED ASSUMED TTS LEVELS DURING THE THICK-ICE PERIOD.

TABLE 8C-3.9

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

Estimated numbers of bowhead whales potentially affected by Project activities during the ice-covered (Apr, Jun) and open-water periods (Aug, Sep, Oct).

		Bowhead Avg. Density (individuals/100 km^2)					Estimated No. of Bowheads (Disturbance "On-set")					Estimated No. of Bowheads (Avoidance)				
Project Activity	Area	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct	Apr	Jun	Aug	Sep	Oct
A. Steensby Port and Shipping Route																
Blasting; no bubble curtain	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Blasting; with bubble curtain	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Drilling through ice	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Drilling through seabed	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Dredging bucket	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Dredging cutter	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Tug	Steensby Port	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ore Carrier (Cape-size)	Steensby Inlet	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0
Ore Carrier (Cape-size)	Foxe Basin	0.00	0.00	0.00	0.03	0.00	0	0	2	71	1	0	0	0	23	0
Ore Carrier (Cape-size)	Hudson Strait	0.10	0.00	0.10	0.00	0.00	748	0	479	0	0	342	0	171	0	0
B. Milne Port and Shipping Route																
Tug	Milne Port			0.33	0.06				2	0				0	0	
Dredging cutter suction	Milne Port			0.33	0.06				3	0				0	0	
Pile driving; no bubble curtain	Milne Port			0.33	0.06				1	0				0	0	
Pile driving; with bubble curtain	Milne Port			0.33	0.06				0	0				0	0	
Ore Carrier (Handymax-size)	Eclipse Sound			0.10	0.02				35	6				1	0	
Ore Carrier (Handymax-size)	Koluktoo Bay			0.33	0.06				5	1				2	0	
Ore Carrier (Handymax-size)	Milne Inlet			0.15	0.11				16	12				1	1	
Ore Carrier (Handymax-size)	Other bays/inlets			0.02	0.03				0	0				0	0	
Ore Carrier (Post-Panamax-size)	Eclipse Sound			0.10	0.02				43	7				1	0	
Ore Carrier (Post-Panamax-size)	Koluktoo Bay			0.33	0.06				6	1				2	0	
Ore Carrier (Post-Panamax-size)	Milne Inlet			0.15	0.11				16	12				1	1	
Ore Carrier (Post-Panamax-size)	Other bays/inlets			0.02	0.03				0	1				0	0	

C:\Users\Ted\Desktop\MapInfo\[ShipRoute_iceconc_rev5.xls]8C-3.9 Bowhead Estimates

NOTES:

1. CORRECTION FACTORS OF 6.94 AND 2.07 WERE APPLIED FOR AVAILABILITY AND DETECTION BIASES, RESPECTIVELY.
2. DISTURBANCE "ON-SET" SOUND LEVELS OF 120 dB (rms) AND 145 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUNDS, RESPECTIVELY.
3. AVOIDANCE SOUND LEVELS OF 135 dB (rms) AND 160 dB (rms) WERE ASSUMED FOR CONTINUOUS AND PULSED SOUNDS, RESPECTIVELY.
4. HEARING IMPAIRMENT (TTS) SOUND LEVELS OF 175 dB (rms), 100 sec EXPOSURE FOR CONTINUOUS SOUND AND 180 dB (rms) FOR PULSED SOUND WERE ASSUMED.
5. NO BOWHEADS ARE PREDICTED TO BE EXPOSED TO SOUND LEVELS WHICH MAY CAUSE TTS.

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In Response to DFO Recommendation 2.16

Response to DFO 2.16: Impacts of Shipping — Ballast Water

DFO Comment

"It is unclear why two different upper ranges for total ballast water are given: 27,000 tonnes for 70,000 DWT vessels, and 21,600 for maximum discharge at dock (Appendix 8B-4 p. 2)."

Response

There is a difference due to the fact that 20% of the ballast water (5,400 tonnes) will be discharged prior to reaching the dock site.

DFO Comment

"It is also unclear why BIM uses an average value to calculate total vessel discharge (Appendix 8B-4 p. 2). More precise estimates of total discharge should have been included. The actual amount of ballast discharge could be substantially higher (or lower) depending on proportions of transits with different vessel types. "

Response

An average value for ballast water tonnage was used as a conservative estimate based on the estimated number of voyages for a fleet of that composition. The fleet for the ERP has also yet to be finalized. As well given the ice conditions of Milne Inlet there is the possibility that shipping may commence later than July 15th and may end earlier than October 15th. As such the total volume of ballast water discharged could potentially change from year to year. BIM agrees that ballast water discharges could be higher or lower than the volume used in the risk assessment.

DFO Comment

In Appendix 8B-4 (p. 6) BIM has used Bailey et al 2011 to substantiate that mid-ocean exchange drastically reduces propagule supply. However, it has been shown that this is mainly the case for ships entering freshwater such as in the Great Lakes. Other studies, not mentioned by BIM (e.g., Carver and Mallet 2002, Cordell et al. 2009, Roy et al. 2012) have shown that in some cases mid-ocean exchange can actually increases nonindigenous species propagule supply for marine ports (such as Milne Inlet) because the environmental conditions of exchanged water and the destination port can be similar (i.e., marine-marine transfer as opposed to marine-freshwater or freshwater-marine). Thus, until effective ballast treatment systems are in use, transoceanic vessels may still play a role in the introduction of aquatic nonindigenous species, particularly in the case

of transiting vessels picking up water in cold Atlantic waters which have high environmental similarity to Arctic waters such as those found in Milne Inlet (DFO 2013).

Response

It is not the purpose of the risk assessment to state that transoceanic vessels do or do not play a role in the introduction of aquatic nonindigenous species (NIS). Mid-ocean ballast water exchanges were implemented on the theory that open-ocean organisms would have a difficult time surviving in both freshwater and costal environments (Chan *et al*. 2012). BIM would like to reiterate that it was citing a DFO report in saying that "Therefore, ballast water discharged by international merchant vessels may no longer play a prominent role in introducing NIS from foreign sources." (Chan *et al*. 2012).

It should also be noted that in Chan *et al.* (2012) which the risk assessment was based upon, did not take mid-ocean exchange similarity into consideration as part of this methodology, nor does the DFO Science report (2012) as both reports looked at species coming only from the destination source. DFO Science (2012) also states that studies have shown that ballast water exchange physically removes 80-100% of the organisms present in the ballast water.

DFO Comment:

"However, it is unclear why the risk assessment considers the ballast discharged in the port separate from that discharged while on approach to the port. The 20% ballast water discharged prior to tying up at port would still be close enough to shore to be considered in the calculation. There also seems to be some discrepancies between the numbers of ship arrivals in the introduction to the addendum and that used in the calculation. The risk assessment estimates 662,000 tonnes per year, but this could be as high as 812,625 tonnes per year depending on the assumptions used. This does not change the results, as both of these values are ranked *Highest* probability of arrival."

Response

Discharge of ballast water will commence prior to entering into Milne Inlet and as such was not considered in the volume calculations. While some residual ballast water of the 20% may enter into Milne Inlet, its volume is significantly smaller than that which will be discharged at the port. Any additional volume added to the risk assessment would not change its ranking. As well the oceanographic data (salinity, temperature) may vary from the port site which may result in a different value for environmental distance.

The value used for total ballast water discharged was an average based on an estimated fleet and estimated number of voyages during the shipping season. At the time of the report these two parameters were not finalized and as such a conservative

method (i.e. using average ballast water tonnage for the vessels) was used to calculating the volume of ballast water discharged at the port site was used.

DFO Comment

"Use of surface values would also provide a more appropriate comparison to the Chan et al. 2012 results. If one uses the same environmental data utilized by Chan et al. (2012) to calculate environmental distance between Milne Inlet and Rotterdam, the value is 3.87, which results in an Intermediate ranking for survival potential, which does not match the value in the BIM risk assessment (5.39, Lower)."

Response

The value from Chan et al (2012) should be used in order to be consistent.

DFO Comment

"DFO Science has recently undertaken a national ballast water risk assessment, which incorporates ballast water exchange into the calculation for environmental similarity - International transoceanic ships arriving to Arctic ports were ranked Highest survival in that assessment (DFO 2013). The national risk assessment also indicates that survival potential may increase under climate change."

Response

This DFO report was not in existence at the time the risk assessment was created. The impact of climate change is outside the scope of the risk assessment.

DFO Comment

"There also appears to be an error in the calculation of consequences. Chan et al. (2012) use a cumulative measure to calculate the number of high impact NIS potentially transported per year; in the case of Rotterdam to Milne Inlet, the calculation is 51 NIS multiplied by 55 transits (2,805; *Highest* ranking). Arctic international transoceanic shipping also received a *Highest* ranking for consequences using the refined methods of the national risk assessment. "

Response

Chan *et al*. (2012) uses a cumulative method for calculating the number of NIS from the ecoregion of each source port. Nowhere in Chan *et al.* (2012) does it state that the cumulative total of NIS are calculated based on cumulative voyages from a single

source point. The methodology in Chan *et al* (2012) for estimating the magnitude of consequences is cumulative due to the fact that each connected port has the potential to be a donor of all NIS currently existing within that ecoregion, which, can therefore result in a cumulative tally of a single NIS species if it found over various connected ports. It does not state that that multiple transits from a single source port results in a cumulative effect. Given that for the purpose of the risk assessment there is only one connected port to Milne Inlet, the value of 51 NIS remains unchanged.

DFO Comment

"Further, BIM included only ballast water exchange to mitigate invasion risk. Vessels will have to install ballast water management systems when the International Convention enters into force and due diligence must be taken to ensure that selected systems will meet discharge standards under the environmental conditions and timeframe of Arctic voyages, and that discharged ballast water will not negatively impact the receiving waters."

Response

BIM is committed to using ballast water treatment systems once International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) comes into force. Baffinland understands that regulations are to be followed.

Conclusion

Comments received from the DFO show that they are concerned with the volume calculation for total volume of ballast water to be discharged at the port site. An average value was used based on an estimated fleet composition, estimate number of vessels per vessel type and an estimated number of voyages within the July 15th to October 15th shipping season. The exact composition and number of vessels to be used is still to be finalized as well as the exact number of transits per shipping season. As well there is the potential for ice conditions to limit shipping specifically around the start and end of the ice free period.

DFO is also concerned with the lack of incorporating the 20% ballast water discharge on the way to the port site. Such discharges would commence outside Milne Inlet. Any ballast water that would enter into Milne Inlet would be significantly smaller than the volume to be discharged at the port site.

Overall these concerns do not change the risk ranking of "Highest" for the Probability of Arrival on the risk assessment due to the large volume of ballast water proposed to be discharged at the port site (Table 1).

Based on DFO's comments, the environmental distance value for Milne Inlet from Rotterdam should be changed to 3.87. This moves the Probability of Survival from "Lower" to "Intermediate". This change also causes the Probability of Introduction to change from "Lower" to "Intermediate" (see Table 1 below).

DFO also commented on the number of NIS connected to Milne Inlet. It is DFO position that the value of NIS should be corrected from 51 to 2,805 as they state that the 51 NIS should be multiplied by 55 transits, and this in turn would change the Magnitude of Consequences from "Lowest" to "Highest". This comment is rejected based on a review of Chan *et al.* (2012) where cumulative NIS are calculated based on connected source ports and not voyages. Given that there is only one source port, the value of 51 should remain, and therefore the risk ranking of "Lowest" for the Magnitude of Consequences remains unchanged (Table 1).

While there was a change to the Probability of Survival and Probability of Introduction, these changes did not result in a change in the final invasion risk. The level of invasion risk remains at "Lower" with a high level of uncertainty (Table 1).

Table 1 Revised Relative Invasion Risk of Top Arctic Ports (as determined in Chan et al. 2012) and Milne Port by Ballast-mediated Nonindigenous Species for International Merchant Vessels Ballast Water Discharges.

Port	P(Arrival)		P(Survival)		P(Introduction)		Magnitude of consequences		Invasion Risk	
	Ranking	Level of Uncertainty	Ranking	Level of Uncertainty	Ranking	Level of Uncertainty	Ranking	Level of Uncertainty	Ranking	Level of Uncertainty
Milne Port, NU	Highest	Moderate	Intermediate	High	Intermediate	High	Lowest	High	Lower	High

References

Chan, F.T., Bronnenhuber, J.E., Bradie, J.N., Howland, K., Simard, N. and Bailey, S.A. 2012. Risk assessment for ship-mediated introductions of aquatic nonindigenous species to the Canadian Arctic. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/105. Vi + 93 p.

Fisheries and Oceans Canada (DFO). 2012. Science advice from the risk assessment for ship-mediated introductions of aquatic nonindigenous species to the Canadian Arctic. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2011/067.

In Response to WWF Recommendation 3.2

WWF Comment 3.2 Impacts of Ship Noise on Marine Mammals

WWF states that they believe "there is evidence that narwhal have been displaced from their natural summer habitat in Milne Inlet (including Koluktoo Bay) by shipping activity…" and in part, based on this belief conclude that "the proposed shipping activities are likely to have a significant impact" on narwhals.

WWF uses BIM aerial survey data collected in 2007 and 2008 relative to ship transits (tanker, sealift, and ore carrier) as their primary source of evidence of narwhal displacement from Milne Inlet. The use of those data as definitive evidence of narwhal displacement is at odds with DFO, QIA, and BIM's position on this dataset:

- From DFO Comment 2.13 on the FEIS Addendum: "the data presented in the Addendum from the aerial surveys are not sufficient to draw any conclusions" on narwhal response to shipping.
- From QIA Comment FM-05 on the FEIS Addendum: "The data presented (Appendix 8A-2) from the aerial surveys are not sufficient to draw conclusions, however." QIA also notes that the variability in narwhal abundance and distribution complicates monitoring and analyses of trends, and increases the monitoring and survey coverage required.
- From page 100 of the FEIS Addendum: "To assess potential changes in narwhal numbers, observed densities were compared during aerial surveys prior to the ship's arrival and after its departure. It should be noted that this is not an ideal method to examine narwhal response to shipping, but it does provide some valuable observations. As noted in FEIS Appendix 8A-2, there is much fine-scale movement by large groups of narwhals among various areas of Eclipse Sound and the fjords around it, both from day to day and over a longer time interval. This natural variation in abundance complicates the examination of density estimates during a study not specifically designed to address potential response to ship transits."

To reiterate, the aerial surveys conducted in 2007 and 2008 by BIM were not designed to address narwhal response to shipping—the data were collected as baseline information on cetacean abundance and distribution to be used for impact predictions. The WWF analysis of the aerial survey data for Milne Inlet and their corresponding conclusions on duration of effects and a major redistribution of narwhals in response to shipping, is most certainly overstating what this limited dataset is capable of showing. This is not just for the aforementioned reason but also because of the very small number of vessel transits (five in total over two years that overlapped with aerial surveys) and the large natural variation of narwhal numbers in Eclipse Sound, Milne Inlet, and adjacent fiords. For example, narwhal abundance in a given area (in the absence of shipping) can range from a density of ~10 narwhals/100 km^2 on one day to several hundreds of narwhals/100 km^2 the following day (see Table 4.4 in Appendix 8A-

2 of the FEIS). The specific conclusions by WWF on duration of effects and the major redistribution of narwhals in response to shipping in 2007 and 2008 lack credibility.

The FEIS Addendum acknowledges that there is a paucity of data on narwhal response to shipping and that this contributes much uncertainty regarding responses of narwhals to frequent ore carriers transiting Milne Inlet and Eclipse Sound during the open-water period. The sources of uncertainty are described on page 101 of the FEIS Addendum and a Low Level of Confidence rating (see Table 8.5-15 of the FEIS Addendum) was assigned to the prediction of narwhal disturbance associated with ERP activities.

It is BIM's position that these uncertainties, as well as those noted for bowhead whale disturbance predictions (Low Level of Confidence), can be accounted for with well-designed monitoring programs and an adaptive management approach. Additional mitigation measures will be implemented as needed should monitoring programs for marine mammals reveal the need for such measures. Monitoring programs and an adaptive management approach will be developed in conjunction with the MEWG.

WWF Recommendation:

NIRB should explicitly define the ongoing roles and responsibilities of the Proponent, the Marine Environment Working Group, NIRB"s Monitoring Officer and NIRB itself to define a process whereby existing and new information (including baseline research, monitoring data and IQ) is made available, is carefully reviewed and assessed (including by third parties), produces recommendations for adaptive measures, and ensures that recommendations and corrective actions are appropriately acted upon in a timely fashion.

BIM supports defining the roles and responsibilities of groups involved with monitoring and mitigation effects of ERP activities on marine mammals.