



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada



# FISHERIES AND OCEANS CANADA

## Updated Written Submission

Baffinland Iron Mines Corporation  
Mary River “Phase 2 Development” Project Proposal

**Submitted to:** Nunavut Impact Review Board

January 15, 2020

DFO File No.: 07-HCAA-CA7-00050

NIRB File No.: 08MN053

Canada 

## Table of Contents

Acronyms .....	2
Executive Summary.....	3
Inuktitut Translation .....	5
French Translation .....	6
1 Introduction .....	7
2 Mandate, Relevant Legislation and Policy .....	8
3 Technical Review Comments .....	12
3.1 Marine Vessel Traffic .....	12
3.2 Marine Environment: Shipping Season.....	13
3.3 Marine Acoustic Modelling & Disturbances .....	16
3.4 Impacts to Marine Mammals: Shoulder Season Shipping and Ice-breaking .....	21
3.5 Marine Mammal Observation.....	29
3.6 Marine Environment: Ballast Water and Non-indigenous Species.....	36
3.7 Marine Cumulative Effects.....	44
3.8 Freshwater Watercourse Crossings .....	47
3.9 Freshwater Fish Passage .....	48
3.10 Freshwater Water Withdrawal .....	50
3.11 Additional References.....	52
4 English Summary of Recommendations, Commitments and Status .....	54
5 Inuktitut Summary of Recommendations, Commitments and Status.....	70

## Acronyms

AIS.....	Aquatic Invasive Species
AMAR.....	Autonomous Multichannel Acoustic Recorder
CPA.....	Closest Point of Approach
DFO.....	Fisheries and Oceans Canada
ECCC.....	Environment and Climate Change Canada
EWI.....	Early Warning Indicator
FEIS.....	Final Environmental Impact Statement
FFHPP.....	Fish and Fish Habitat Protection Program
HADD.....	Harmful Alteration, Disruption, and Destruction
ICA.....	Inuit Certainty Agreement
IR.....	Information Request
MEWG.....	Marine Environmental Working Group
MMO.....	Marine Mammal Observer
MMP.....	Marine Monitoring Plan
MWO.....	Marine Wildlife Observer
NIRB.....	Nunavut Impact Review Board
NIS.....	Non-Indigenous Species
NMCA.....	National Marine Conservation Area
NWB.....	Nunavut Water Board
OITR's.....	Objectives, Indicators, Thresholds and Responses
QIA.....	Qikiqtani Inuit Association
RSA.....	Regional Study Area
SARA.....	Species At Risk Act
T&C.....	Term & Condition
TC.....	Transport Canada
VEC.....	Valued Ecosystem Component

## Executive Summary

The Mary River “Phase 2 Development” Project application (the Project) proposes a modification to an approved iron ore mine, operated by Baffinland Iron Mines Corporation (Baffinland or the Proponent). The project is located on Baffin Island approximately 100 km south of Pond Inlet, Nunavut within the Qikiqtani Region of Nunavut. The Project is focused on an increase in production to 12 Mpta (Million tonnes per annum), the transportation of ore to Milne Port via the construction of a new railway running largely parallel to the existing Tote Road, and the construction and operation of a second ore dock to support increased shipping activities.

Fisheries and Oceans Canada (DFO) has participated in all phases of the Nunavut Impact Review Board’s review process for the Phase 2 Proposal. DFO participates in the NIRB proceeding by providing scientific and expert advice within its mandate. DFO’s Fish and Fish Habitat Protection Program (FFHPP) role is to ensure that works, undertakings and activities are conducted in compliance with the applicable provisions of the *Fisheries Act* (Sections 34.4(1) and 35(1)) for the continued sustainability of fish and fish habitat, including marine mammals and their habitat, and leads the Department’s input into the NIRB review process.

DFO has met with Baffinland, on many occasions, since the adjournment of the November 2019 Final Public Hearing to develop commitments for outstanding technical comments and recommendations. DFO is providing the following submission as an update to DFO’s updated technical comments submitted to the NIRB on February 6, 2020, and noting additional information and discussions with Baffinland.

### DFO Recommendations:

#### Marine Mammals

DFO acknowledges that the proponent has asserted that icebreaking and shoulder season shipping activities are essential to the economic viability of the Phase 2 Development Proposal.

To this end, DFO has worked directly with Baffinland in the development of mitigation, monitoring and commitments for adaptive management to reduce the impact this project may have on the sustainability of the marine mammal populations within the study area.

We however note that there is uncertainty in both the efficacy of the mitigations proposed and the ability of current monitoring programs to detect project impacts, should they occur.

DFO remains concerned that the impacts to marine mammals from project related shipping activities may not be fully mitigated or avoided. However the extent of these impacts cannot be defined. Thus, robust monitoring and the commitment to adaptive management is crucial to the protection of the marine mammals.

Therefore, should icebreaking and shoulder season shipping be approved, DFO recommends that Baffinland: apply spring transit restrictions as long as ice conditions are present, and establish mitigations for the fall shipping season; report on decision-factors and monitoring during the shoulder

seasons; work with Inuit and the Marine Environmental Working Group to develop thresholds, indicators, and adaptive management strategies; and monitor an additional Early Warning Indicator that is indicative of narwhal health and body condition. DFO has made note of certain recommendations for the NIRB to more fully consider as it drafts the project Terms and Conditions, should Phase 2 be approved.

### **Ballast Water**

DFO has proposed, and Baffinland has agreed, to commitments to address outstanding concerns related to ballast water management. Ballast water release and biofouling of vessels has high potential to introduce non-indigenous species and aquatic invasive species. Effective and appropriate monitoring plans are critical to assess the risk of management strategies proposed for ballast water and biofouling management. DFO has also recommended, and Baffinland has agreed, to apply preventative measures when practicable to reduce the risk associated with the spread of aquatic invasive species.

DFO remains concerned that impacts from Ballast water is still possible, thus proposed mitigation and monitoring is crucial to the prevention of an introduction.

DFO has made note of certain recommendations for the NIRB to more fully consider as it drafts the project Terms and Conditions, should Phase 2 be approved.

### **Freshwater**

DFO is of the opinion that impacts on freshwater can be mitigated. Baffinland has made commitments to provide outstanding information to DFO during the regulatory phase, if the project is approved.

## **Inuktitut Translation**

## **French Translation**

# 1 Introduction

Baffinland Iron Mines Corporation's (Baffinland) Phase 2 Proposal (the Project), an expansion of their existing Mary River Project, is currently undergoing a reconsideration process under the Nunavut Impact Review Board (NIRB)'s review process. Fisheries and Oceans Canada (DFO) – Fish and Fish Habitat Protection Program's (FFHPP) has participated in all phases of the reconsideration for Baffinland's Phase 2 Development Proposal. DFO participates in the NIRB process by providing expert science-based advice regarding Baffinland's proposal modifications and identify potential impacts to fish (including marine mammals) and fish habitat associated with the project changes.

The NIRB's reconsideration process was initiated on October 12, 2018 with the submission of Baffinland's Final Environmental Impact Statement (FEIS) Addendum for the Phase 2 Proposal. DFO participated in the Information Request (IR) phase, provided a technical review submission in March 2019, participated in various technical meetings and submitted a final written submission in September 2019. DFO also participated in the adjourned Public Hearing in November 2019. Since the adjournment, DFO submitted Updated Technical Comments in February 2020, and participated in technical sessions, Community Roundtable and Pre-Hearing Conference in September. The Final Public Hearing is currently scheduled to resume January 25<sup>th</sup> to February 6<sup>th</sup> of 2021.

Since the hearing was adjourned, DFO has continued to meet with Baffinland. Over the course of these meetings, DFO has proposed and Baffinland has agreed to commitments that, if fully implemented, have the potential to address outstanding concerns with the impacts from project activities in a number of areas. These commitments involve: additional avoidance or mitigation measures, additional monitoring or adaptive management measures, or a combination of these measures. DFO notes that in this submission, recommendations have differing reference numbers from our September 2019 Final Written Submission (FWS). These reference numbers are different because DFO consolidated remaining outstanding technical comments from the September 2019 FWS into our February 2020 Updated Technical Comments, which resulted in different reference numbers labelled as, e.g., '3.XX NEW'.

In the commitment tables (see Section 3), DFO's recommendations are noted as either "resolved" or "outstanding". It is important to note that a "resolved" recommendation does not necessarily mean that an impact will be completely avoided or mitigated. Given the remote and pristine area where the project is proposed, sufficient information to fully understand and predict the scale of potential impacts from some proposed project activities is not yet available, in particular for impacts to marine mammals. Furthermore, outside of Marine Protected Areas established under the *Oceans Act*, DFO's regulatory authority over many marine activities, including shipping, is limited. In those cases, "resolved" indicates that Baffinland and DFO have agreed upon a commitment that we anticipate will mitigate and/or lessen potential impacts, and will provide information that, over time, should help us understand their efficacy and inform the adaptive management sections of Baffinland's Marine Monitoring Plan. DFO recommends that certain commitments would further benefit from being established as or incorporated into Terms and Conditions within the Project Certificate to ensure that the commitments achieve their



intended purpose. We note those commitments here: DFO 3.2.1 NEW, 3.3.3 NEW, 3.4.3 NEW, 3.4.4 NEW, 3.5 NEW, 3.6.3 NEW, 3.6.4 NEW, 3.6.5 NEW, and 3.6.6 NEW.

An “outstanding” status indicates that DFO still has remaining concerns after further discussions with Baffinland. The outstanding issues presented in this submission are icebreaking and shoulder season shipping. DFO will provide an overview of measures that DFO is recommending be applied to address remaining concerns and uncertainty associated with them. DFO has committed to continue to work with Baffinland to try and resolve outstanding technical comments in advance of the Final Public Hearing.

Many of the established and proposed commitments discussed in this updated submission rely on review and recommendations from the Marine Environmental Working Group (MEWG), of which DFO is a member. The MEWG’s intended purpose is to provide a forum for the development and recommendation of mitigation measures and adaptive management strategies for project effects identified in the marine environment. The successful function of the MEWG is imperative to the proper implementation of Baffinland’s commitments, for both current and reasonably foreseeable future operations; however several parties to the MEWG have noted that it has not met its purpose as currently structured. To that end, members have been negotiating an update to the MEWG Terms of Reference, especially to improve how the MEWG makes recommendations and decisions and how they are implemented. It is, however, unclear how the recent signing of the Inuit Certainty Agreement may influence this initiative.

A detailed description of DFO’s regulatory mandate will be found in the following section. As noted above, however, not all project related marine activities fall under DFO’s regulatory authority. For instance, icebreaking and shipping activities are subject to other legislation and regulations under which DFO does not have authority. DFO defers to the expertise of Transport Canada in regards to matters related to shipping navigation and safety for vessels that support commercial shipping activities.

This submission will address DFO’s remaining outstanding technical comments and recommendations related to icebreaking and shoulder season shipping. This submission will also provide an overview of resolved commitments related to: acoustic monitoring, marine mammal observation, ballast water and aquatic invasive species concerns, combined effects, and impacts to the freshwater environment. DFO presents them to the NIRB for consideration in the development of the Project Terms and Conditions, should Baffinland’s Phase 2 Proposal be approved.

## **2 Mandate, Relevant Legislation and Policy**

The *Constitution Act* (1982) provides the Federal Government with exclusive authority for coastal and inland fisheries within Canada’s territorial boundaries. DFO exercises this power through, the administration of the *Fisheries Act* and some aspects of the *Species at Risk Act*. Under the *Fisheries Act*, DFO is responsible for the management, protection and conservation of fish (which include marine

mammals as defined by the *Fisheries Act*) and their habitats. The Minister of Fisheries, Oceans and the Canadian Coast Guard is one of the competent ministers under the *Species at Risk Act* (SARA).

DFO's Fish and Fish Habitat Protection Program (FFHPP) undertakes the review of project proposals in and around fisheries waters. The FFHPP ensures that works, activities and undertakings are conducted in such a way that the proponents are in compliance with the applicable provisions of the *Fisheries Act* (see below). The FFHPP also serves as the lead and coordinates all of DFO's participation in environmental assessments conducted under the various enabling legislation throughout Canada, including the *Nunavut Planning and Project Assessment Act*.

Additionally, DFO, in partnership with Inuit, Parks Canada, Transport Canada, and the Government of Nunavut is, under Schedule 1 of the *Canada National Marine Conservation Areas Act* (the Act), in the process of establishing Tallurutiup Imanga National Marine Conservation Area (Tallurutiup Imanga NMCA) in Lancaster Sound; the Act, and the Tallurutiup Imanga Inuit Impact and Benefit Agreement, provide the foundation for the framework under which Tallurutiup Imanga NMCA will be managed and add weight to the precautionary recommendations provided by DFO in this submission. Key elements include: Tallurutiup Imanga NMCA must be "protected and conserved" (s. 4(1), CNMCAA; p. 4, IIBA), Tallurutiup Imanga NMCA must be "managed and used in a sustainable manner that meets the needs of present and future generations without compromising the structure and function of the ecosystems" (s. 4(3), CNMCAA; p. 4, IIBA), and the "principles of ecosystem management and the precautionary principle" will be a primary consideration (s. 9(3), CNMCAA; p.4, IIBA). Tallurutiup Imanga NMCA is approximately 108,000 km<sup>2</sup> in size and includes the waters of Eclipse Sound, Milne Inlet (excluding Milne Port), Navy Board Inlet, and Pond Inlet. Parks Canada, Qikiqtani Inuit Association, Fisheries and Oceans/Canadian Coast Guard, Transport Canada, and Environment and Climate Change Canada/Canadian Wildlife Service and other partners will continue to work together to achieve the purpose and management objectives of Tallurutiup Imanga NMCA.

## **Bill C-68**

On February 6, 2018, the Government of Canada introduced in Parliament Bill C-68, *An Act to Amend the Fisheries Act and other Acts in Consequence*. On **June 21, 2019** the new *Fisheries Act* received Royal Assent and became law.

The Fish and Fish Habitat Protection Provisions, of the new Act, did not come into force until **August 28<sup>th</sup>, 2019**. As such this project assessment began under the older *Fisheries Act* (2012) but will be assessed in the regulatory phase under the new *Fisheries Act* (2019).

**The new *Fisheries Act* (2019):** As of **August 28<sup>th</sup>, 2019**, new Fish and Fish Habitat Protection Provisions of the *Fisheries Act* came into force. From the provisions, there are two key prohibitions:

- **Subsection 34.4(1)** of the *Fisheries Act* (2019) prohibits the carrying on of any work, undertaking or activity, other than fishing, that results in the death of fish, and

- **Subsection 35(1)** of the *Fisheries Act* (2019) prohibits the carrying on of any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat.

The new *Fisheries Act* (2019) includes the following definitions:

- *“fish” includes (a) parts of fish, (b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.*
- *“fish habitat” means water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas.*
- *“Death of Fish” means any action that results in the end of life of fish. Furthermore, No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.*
  - *“Work” means a physical thing that has been created through labour or the exercise of creative process that has some degree of permanency or lasting quality;*
  - *“Undertaking” means to take upon oneself a task;*
  - *“Activity” means physical task incidental to a work or undertaking as well as physical tasks that may not qualify as works or undertakings.*
- *“Harmful Alteration, Disruption and Destruction of fish habitat” is defined as follows:*
  - *Harmful alteration of fish habitat is any permanent change to fish habitat that reduces its capacity to support one or more life processes of fish but does not permanently eliminate the fish habitat.*
  - *Disruption of fish habitat is any change to fish habitat occurring for a limited period that reduces its capacity to support one or more life processes of fish for a limited period.*
  - *Destruction of fish habitat is any permanent change to fish habitat that completely eliminates its capacity to support one or more life processes of fish.*

Under paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*, the Minister of Fisheries, Oceans and the Canadian Coast Guard (the Minister) may issue an authorization with terms and conditions in relation to a proposed work, undertaking or activity that may result in death of fish or harmful alteration, disruption or destruction of fish habitat. Factors that the Minister must consider prior to recommending to the Governor-in-Council regulations or the Minister exercising powers related to authorizations, permits, orders or Ministerial regulations include:

- (a) the contribution to the productivity of relevant fisheries;
- (b) fisheries management objectives;
- (c) whether there are measures and standards;

- (d) the cumulative effects;
- (e) any fish habitat banks;
- (f) whether any measures and standards to offset the harmful alteration, disruption or destruction of fish habitat give priority to the restoration of degraded fish habitat;
- (g) Indigenous knowledge of the Indigenous peoples of Canada that has been provided to the Minister; and
- (h) any other factor that the Minister considers relevant.

The FFHPP is guided by the new “Fish and Fish Habitat Protection Program Policy Statement (2019)”. This Policy provides guidance on undertaking effective measures to offset death of fish and the harmful alteration, disruption or destruction of fish habitat, consistent with the fish and fish habitat protection provisions of Canada’s *Fisheries Act*.

The “Policy for Applying Measures and Standards to Offset Impacts to Fish and Fish Habitat Under the Fisheries Act (2019)” was prepared by DFO to provide an overview of how to apply measures and standards to offset for impacts to fish and fish habitat. Furthermore this policy is intended to support the conservation and protection of fish and fish habitat, including objectives, guiding principles and types of measures; and describes step-by-step procedures for developing an offsetting plan.

The *Species at Risk Act* (SARA) is intended to prevent Canadian indigenous species, subspecies and distinct populations of wildlife from being extirpated or becoming extinct. SARA facilitates the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and manage species of special concern (to prevent them from becoming endangered or threatened). The Minister is the competent minister for listed aquatic species that are fish as defined in the *Fisheries Act* Section (2) and for marine plants as defined in the *Fisheries Act*, Section 47.

Environmental and Climate Change Canada (ECCC) is responsible for the administration and enforcement of the pollution prevention provisions of the *Fisheries Act*, Sections 34 and 36-42 on behalf of DFO.

For more information, see: <http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html>

### 3 Technical Review Comments

#### 3.1 Marine Vessel Traffic

<b>Review Comment Number</b>	3.1 Vessel Traffic	
<b>Subject/Topic</b>	Proposed cumulative vessel traffic and marine operations	
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• Marine Mammal Effects Assessment (TSD 24): Appendix B, Underwater Acoustic Modelling Report (entire document)</li> <li>• IR Responses Phase 2 Proposal – Mary River Project: DFO 3.2.1 (p. 59); Appendix 12, Overview of Marine Operations, page 4</li> <li>• Draft Revised Project Certificate No. 005 for Phase 2, August 23, 2019, Project Certificate Condition No. 179a, page 87</li> <li>• Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland Iron Mines Corporation, October 15, 2019, page 39</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, page 16</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, page 3</li> <li>• Operational Flexibility Assessment, Phase 2 Proposal – Baffinland Iron Mines Corporation, September 30, 2020, pages 4-5</li> </ul>	
<b>Summary</b>	<b>DFO Updated Technical Comment Recommendations (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.1.1 NEW:</b> DFO recommends Baffinland provide a brief review and assessment of how changing the limitation from the amount of ore to number of voyages will alter any of the provided assessments and models provided to this point in the assessment process.	<b>Status: Resolved</b>  No commitment proposed  Baffinland’s Phase 2 Comment Response to DFO 3.1.1 NEW addressed the request.

	<p><b>3.1.2 NEW:</b> DFO recommends Baffinland provide consideration for vessels, in addition to ore carriers, in determining the potential for impacts due to increased production.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland can confirm that it will not surpass the number of vessels described and assessed in the Phase 2 FEIS Addendum to ship an additional 20% of ore over 12 Mtpa in the maximum operational flexibility scenario. For clarity, this is a limit of 176 ore carriers, 12 freight vessels and 12 fuel vessels.</p>
<b>Importance of issue to the impact assessment</b>	<p>Increased shipping has the potential to cause negative impacts to marine mammals and the marine environment. It's important to fully understand the proposed vessel traffic at Milne Port, throughout Milne Inlet and along the shipping route, in order to adequately evaluate impacts associated with the project.</p>	
<b>Detailed Review Comment Gap/Issue Disagreement with Addendum/TSD conclusion Reasons for disagreement with Addendum conclusion</b>	<p>DFO notes that Baffinland had provided a 'Revised Project Certificate No. 005 for Phase 2' document on August 23, 2019, proposing a modification to Term and Condition 179a. Based on the information provided, DFO agrees that modification of Term and Condition 179a to a transportation limit related to the number of ships, rather than a production limit related to the amount of ore, is likely a more effective way to track the limits and potential effects of Baffinland's marine shipping activities.</p> <p>DFO also acknowledges Baffinland's commitment to not exceed 176 ore carriers (or 352 transits) in any given year, including under an operational flexibility scenario, and will provide further review on any additional Project Certificate revisions to Term and Condition 179a.</p>	
<b>Recommendation / Request</b>	<p><b>Recommendation 3.1 NEW:</b> Based on the information received and Baffinland's subsequent commitment, DFO considers recommendations 3.1.1 NEW and 3.1.2 NEW resolved.</p>	

## 3.2 Marine Environment: Shipping Season

<b>Review Comment Number</b>	3.2 Shipping Season
<b>Subject/Topic</b>	Timing of shipping in the shoulder seasons and associated assessments
<b>References considered throughout Phase 2</b>	<ul style="list-style-type: none"> <li>Ice Conditions Report (TSD 16), Appendix I: Ice navigation in the Canadian Arctic, p.1</li> </ul>

<b>Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• IR Responses Phase 2 Proposal – Mary River Project: Appendix 11, Commitment Register, Commitment 156 (p. 24 of 27); Appendix 12 (p.3, Section 4,)</li> <li>• DFO Technical Review Comments to the NIRB, March 2019, Technical Comment 3.3, Recommendation 3.3.1</li> <li>• Baffinland Iron Mines Corporation. March 26, 2019. Technical Comment Responses, Phase 2 Proposal – Mary River Project: page 17</li> <li>• Golder Associates Ltd. May 17, 2019, Assessment of Icebreaking Operations during Shipping Shoulder Seasons on Marine Biophysical Valued Ecosystem Components (VECs), page 4 &amp; 49</li> <li>• Knight-Piésold Consulting. May 17, 2019. Socio-economic Assessment of Icebreaking Operations during Shipping Shoulder Seasons: Table 2.2: Timing of Ice Events on the Northern Shipping Route</li> <li>• Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, October 15, 2019, page 41</li> <li>• Baffinland Iron Mines Corporation, DFO Final Written Submission Disposition Table, received by DFO on October 31, 2019.</li> <li>• Baffinland Iron Mines Corporation, Phase 2 Proposal Updated Information Package, Attachment 2 – Commitments and terms and condition following the Public Hearings, January 6, 2020</li> <li>• In-person meeting between Baffinland and DFO on January 23, 2020.</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, page 19</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 3-4</li> <li>• Phase 2 Shipping Season Description Table – Baffinland Iron Mines Corporation, May 6, 2020</li> <li>• Updated Phase 2 Commitment Table – DRAFT – Baffinland Iron Mines Corporation, September 29, 2020, page 6</li> </ul>	
<b>Summary</b>	<b>DFO Updated Technical Comment Recommendations (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.2.1 NEW:</b> DFO recommends Baffinland provide a summary of monitoring conducted during the opening and closing of the shipping season.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland commits to provide a summary of the following information as part of its annual reporting requirements, and in preliminary field reports within 35 days of Spring shoulder season shipping activities commencing

		<p>and 30 days of Fall shoulder season activities ending:</p> <ul style="list-style-type: none"> <li>i. marine monitoring programs,</li> <li>ii. determinants for opening and closing the shipping season,</li> <li>iii. ecological and cultural (or “Inuit use”) factors that influence shipping activities</li> <li>iiii. other information, as requested by DFO and other regulators and key stakeholders, relevant to the marine environment</li> </ul> <p>The requirement for, and format of, these reports will be included in the final Marine Monitoring Plan, should Phase 2 be approved. Additional information requested after submission of the preliminary field report is to be provided by Baffinland as a memo within 35 days and will be included in Annual Reporting.</p>
	<p><b>3.2.2 NEW:</b> DFO recommends Baffinland provide consideration for marine mammal behaviours or additional ecological factors in their determination of shipping season opening and closing, such as the mentioned outmigration of narwhal, and a commitment to reporting annually on the determination of the opening and closing of the shipping season.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland commits to updating the Draft Early Shipping Season-Operational Guide, to better characterize considerations used in determining the nominal shipping season. See response to DFO 3.1.2 for the commitment to report on determinants of opening and closing the shipping season.</p>
<b>Importance of issue to the impact assessment</b>	<p>Shipping during the shoulder seasons, including ice breaking activities, has the potential to cause negative impacts to marine mammals. It’s important to fully understand when and how activities will occur over the shoulder seasons in order to adequately review impacts.</p>	
<b>Detailed Review Comment Gap/Issue Disagreement with Addendum/TSD conclusion</b>	<p>DFO notes it’s important to understand the specific criteria that will be used to inform Baffinland’s decision to open or close the shipping season. Baffinland provided DFO with a visual representation of the current shipping season, the proposed shipping season, and historic ice conditions data in a Phase 2 Shipping Season Description Table on May 6, 2020. DFO appreciates the additional information Baffinland has provided in order to provide further clarity on the</p>	



<b>Reasons for disagreement with Addendum conclusion</b>	<p>variable nature of ice conditions within the shoulder seasons and, subsequently, the proposed shipping season.</p> <p>Noting that ice conditions within the shoulder seasons are variable, DFO reiterates the importance of consideration of ecological factors in the decision to open or close the shipping season and properly documenting and reporting how these decisions are made. Ideally, the decision would take into consideration ecological factors, such as key life cycle stages for marine mammals that utilize the ice habitat and consideration of the risk of entrapment during the freeze-up period.</p> <p>DFO has met with Baffinland since the adjournment of the November 2019 Final Hearing to further develop commitments to resolve outstanding technical comments. DFO acknowledges Baffinland's updated commitments for DFO technical comments 3.2.1 NEW and 3.2.2 NEW. These commitments satisfy DFO's requests for annual monitoring and reporting of shoulder season shipping activities and consideration of ecological and land use factors.</p>
<b>Recommendation / Request</b>	<p><b>Recommendation 3.2 NEW:</b> Based on the information received and Baffinland's subsequent commitments, DFO considers recommendation 3.2.2 NEW resolved. DFO also considers 3.2.1 NEW to be resolved, and recommends to the NIRB that a T&amp;C be established in the Project Certificate that includes clear due dates and information requirements for the field reports and any supplemental reports.</p>

### 3.3 Marine Acoustic Modelling & Disturbances

<b>Review Comment Number</b>	3.3 Acoustic Modelling & Disturbances
<b>Subject/Topic</b>	Acoustic modelling and impacts due to acoustic disturbance
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• Marine Mammal Effects Assessment (TSD 24): Appendix B, Underwater Acoustic Modelling Report (entire document);</li> <li>• Cumulative and Transboundary Assessment (TSD 27): Section 1.4.14 (p. 42), Section 1.4.14.3 (p.44-45)</li> <li>• IR Responses Phase 2 Proposal – Mary River Project: DFO 3.2.1 (p. 59-60); Appendix 12, Overview of Marine Operations (entire document)</li> <li>• Advance Technical Comment Responses Phase 2 Proposal – Mary River Project: 3.2.2 (p. 6-7)</li> <li>• Golder Associates Ltd. May 17, 2019, Assessment of Icebreaking Operations during Shipping Shoulder Seasons on Marine Biophysical Valued Ecosystem</li> </ul>

	<p>Components (VECs), Figures D-31 &amp; D-38; Appendix D, section D.2, Figures D-39 – D-76; pg. 49, p. i–ii , page 45-46, 51, 53, 71</p> <ul style="list-style-type: none"> <li>• DFO Technical Review Comments to the NIRB, March 2019</li> <li>• JASCO Applied Sciences. May 10, 2019. Technical Memorandum: Baffinland Phase 2 Acoustic Modelling: Responses to Technical Comment DFO 3.5.4; page 1.</li> <li>• Knight Piésold Consulting Memorandum TSD27 – Cumulative Effects Assessment: sections 4.3.2, 4.3.3 &amp; 4.3.4, pg. 20-23.</li> <li>• Hemmera Envirochem Inc. (Hemmera). 2019. Review of the Mary River Phase 2 Assessment Conclusions on the Effects of Icebreaking to Narwhal. Project No. 103182-01. October 11, 2019.</li> <li>• Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019, Technical Review Comment 3.7 (recommendations 3.7.2 and 3.7.4); Technical Review Comment 3.8 (recommendation 3.8.3)</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, October 15, 2019, pages 49-52</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, Appendix N, Attachment 2: Technical Memo Analysis of 2018 Narwhal Tagging Data during Fall Shoulder Season, October 15, 2019</li> <li>• Baffinland Iron Mines Corporation, Phase 2 Proposal Updated Information Package, Attachment 2 – Commitments and terms and condition following the Public Hearings, January 6, 2020</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 26-27</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, page 5</li> <li>• Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020, pages 27, 40, 57</li> <li>• Summary of Results for the 2019 Marine Mammal Monitoring Programs Technical Memorandum – Golder, May 15, 2020, page 67</li> <li>• Updated Phase 2 Commitment Table – DRAFT – Baffinland Iron Mines Corporation, September 29, 2020, page 6</li> <li>• Operational Flexibility Assessment, Phase 2 Proposal – Baffinland Iron Mines Corporation, September 30, 2020, page 5</li> </ul> <p><u>Publications:</u></p> <p>DFO. 2019a. Science Review of the Phase 2 Addendum to the Final Environmental Impact Statement for the Baffinland Mary River Project. DFO Can. Sci. Adv. Sec. Sci. Resp. 2019/015.</p>
--	---

	<p>Gervaise, C., Simard, Y., Roy, N., Kinda, B., and Ménard, N. 2012. Shipping noise in whale habitat: Characteristics, sources, budget, and impact on belugas in Saguenay-St. Lawrence Marine Park hub. <i>J. Acoust. Soc. Am.</i> 132(1): 76–89.</p> <p>Elliott, R.E., Raborn, S., Smith, H.R., and Moulton, V.D. 2015. Marine mammal aerial surveys in Eclipse Sound, Milne Inlet, Navy Board Inlet, and Pond Inlet, 31 August – 18 October 2013. Final LGL Report No. TA8357-3. Prepared by LGL Limited, King City, ON for Baffinland Iron Mines Corporation, Oakville, ON. 61 p.</p> <p>Lesage, V., Barrette, C., Kingsley, M.C.S., and Sjare, B. 1999. The effect of noise on the vocal behavior of Belugas in the St. Lawrence River Estuary, Canada. <i>Mar. Mamm. Sci.</i> 15(1): 65–84.</p> <p>NAMMCO (North Atlantic Marine Mammal Commission). 2010. Report on the Joint NAMMCO/JCNB Scientific Working Group – narwhal. In: NAMMCO Annual Report 2009. NAMMCO. Tromsø, Norway. 291–296</p> <p>NRC (National Research Council). 2003. <i>Ocean Noise and Marine Mammals</i>. National Academies Press, Washington, DC. 220 p. <a href="https://doi.org/10.17226/10564">https://doi.org/10.17226/10564</a>.</p> <p>Pine, M.K., Hannay, D.E., Insley, S.J., Halliday, W.D., and Juanes, F. 2018. Assessing vessel slowdown for reducing auditory masking for marine mammals and fish of the western Canadian Arctic. <i>Mar. Pollut. Bull.</i> 135: 290–302. doi:10.1016/j.marpolbul.2018.07.031</p> <p>Radford, A.N., Kerridge, E., and Simpson, S.D. 2014. Acoustic communication in a noisy world: can fish compete with anthropogenic noise? <i>Behav. Ecol.</i> 25(5): 1022–1030. doi:10.1093/beheco/aru029</p> <p>Thomas, T.A., Raborn, S., Elliott, R.E., and Moulton, V.D. 2015. Marine mammal aerial surveys in Eclipse Sound, Milne Inlet, Navy Board Inlet, and Pond Inlet, 1 August – 22 October 2014. Final LGL Report No. FA0024-2. Prepared by LGL Limited, King City, ON for Baffinland Iron Mines Corporation, Oakville, ON. 70</p>	
Summary	<b>DFO Updated Technical Comment Recommendations (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.3.1 NEW:</b> DFO recommends Baffinland provide the committed to technical memorandum which include calculations for the LSR associated with the proposed increased transits and modelling in other parts of the RSA including Milne Inlet, Eclipse Sound and Koluktoo Bay, for DFO's review.	<p><b>Status: Resolved</b></p> <p>No commitment proposed</p> <p>Requested information provided in Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020</p>

	<p><b>3.3.2 NEW:</b> DFO recommends that, before the Project is approved, Baffinland re-evaluate the impact of masking on narwhal to a magnitude of 2.</p>	<p><b>Status: Resolved</b></p> <p>No commitment proposed</p> <p>Update to Table 23 in Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020</p>
	<p><b>3.3.3 NEW:</b> DFO recommends Baffinland commit to collect data with Autonomous Multichannel Acoustic Recorders (AMARs) at an appropriate frequency (eg. yearly) and develop a long term monitoring plan, which is provided to MEWG members and approved by DFO, prior to the start of the Phase 2 increased shipping season.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland commits to collecting acoustic data in the RSA using AMARs to characterize the degree of conservatism in the sound propagation modelling, at an appropriate frequency for the duration of the Phase 2 construction and operation periods. Baffinland will collaborate with Inuit and DFO on the development of the draft program prior to submission to the MEWG for additional advice and recommendations. Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference. Baffinland commits to updating the marine monitoring plan (MMP) with this long-term monitoring plan, should Phase 2 be approved.</p>
<b>Importance of issue to the impact assessment</b>	<p>Increased shipping activities, including those occurring during ice conditions, may increase acoustic disturbances and negative impacts to marine mammals. Adequate modelling must be provided in order to fully assess these impacts.</p>	
<b>Detailed Review Comment Gap/Issue Disagreement with Addendum/TSD conclusion Reasons for disagreement with Addendum conclusion</b>	<p>In Golder’s February 21, 2020 Marine Mammal Monitoring Technical Memo in Appendix B of the Phase 2 Comment Responses, Table 23 (p.57) demonstrates that Magnitude for residual acoustic masking effects on narwhal has been re-evaluated at Level-II. The table also indicates that significance of this potential residual effects is determined to be “non-significant”, and the qualifier columns of probability (of effect) and certainty (of effect prediction) have no rating.</p> <p>Following a request from DFO to update the table to adequately and transparently address uncertainty, Baffinland provided an update to the Marine Mammal Monitoring Technical Memo on May 15, 2020. In this update, Table 22 (p.67) demonstrates that the probability of residual acoustic masking effects occurring is characterized as ‘moderate’, and the certainty of the effects prediction is characterized as ‘medium’.</p>	

DFO acknowledges the underwater acoustic modelling and assessments Baffinland has completed throughout the Phase 2 environmental assessment, and that Baffinland has satisfied DFO's requests associated with the provision of the Marine Mammal Monitoring Technical Memorandum and re-evaluation of the magnitude of masking effects for narwhal. DFO notes there still remains concern that noise disturbance has not been appropriately monitored, and that noise disturbance associated with increased Phase 2 shipping activities has not been adequately characterized. In DFO's opinion, there is still a high degree of uncertainty that exists in the assessment.

DFO does not agree with Baffinland's assessment that effects to marine mammals due to noise will be 'not significant', as stated previously (DFO 2019a). DFO is still unclear what information exists to suggest potential noise effects are fully reversible, and notes that Baffinland determined the probability of residual acoustic masking effects to be 'moderate'.

DFO acknowledges the amount of work that Baffinland and Golder have completed in support of this assessment, noting that the existing monitoring programs have increased data collection and will further improve the global understanding of underwater acoustic impacts as monitoring continues. However, DFO notes that narwhal are long-lived species and reiterates that long-term monitoring throughout the life of the project is essential to ensure that any potential impacts are appropriately detected, documented, and managed.

DFO agrees with Baffinland that more research needs to be done to adequately determine the risk of underwater acoustic impacts on marine mammals, and recommends that this can be best accomplished through increased and improved monitoring. It's important, with the current level of uncertainty, to adequately monitor the soundscape through the shipping route in the Regional Study Area.

DFO has met with Baffinland since the adjournment of the November 2019 Final Hearing to further develop commitments to resolve outstanding technical comments and remaining uncertainty. DFO acknowledges Baffinland's updated commitment for DFO technical comment 3.3.3 NEW, and is of the opinion that implementation of this commitment will satisfy DFO's concerns. DFO looks forward to further collaboration with Baffinland, Inuit, and the MEWG to ensure that the long term Passive Acoustic Monitoring Program is robust,

	appropriately addresses existing data gaps, and addresses any residual uncertainty.
<b>Recommendation / Request</b>	<b>Recommendation 3.3 NEW:</b> Based on the information received and Baffinland's subsequent commitments, DFO considers recommendations 3.3.1 NEW and 3.3.2 NEW. DFO also considers 3.3.3 NEW to be resolved, and recommends to the NIRB that a T&C be established in the Project Certificate that includes a clear deadline for when Baffinland should have a draft that includes the frequency of monitoring with AMAR's for the long-term acoustic monitoring program submitted to the MEWG for review.

### 3.4 Impacts to Marine Mammals: Shoulder Season Shipping and Ice-breaking

<b>Review Comment Number</b>	3.4 Impacts to Marine Mammals: Shoulder Season Shipping and Ice-breaking
<b>Subject/Topic</b>	Environmental impacts to marine mammals from shoulder season shipping and ice-breaking activities
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• Baffinland Iron Mines Corporation Final Environmental Impact Statement, Volume 2, Table 2.3.4</li> <li>• Marine Mammal Effects Assessment (TSD 24): Section 2.5. Table 2.3 (p. 20); Section 2.5.2.2 (p. 26); Appendix A: Marine Mammal Baseline report (entire document)</li> <li>• Cumulative and Transboundary Assessment (TSD 27): Section 1.4.14 (p. 42-46)</li> <li>• IR Responses Phase 2 Proposal – Mary River Project: Appendix 11, Commitment Register, Commitment 156 (p. 24 of 27)</li> <li>• Knight Piésold Consulting Memorandum TSD27 – Cumulative Effects Assessment, p. 20-21).</li> <li>• Golder Associates Ltd. November 1, 2016. Peer Review: Marine Mammal Aerial Surveys in Eclipse Sound, Milne Inlet and Pond Inlet, 1 August - 17 September 2015 (15 March 2016). Report Number: 1663724-002-R-RevA</li> <li>• Golder Associates Ltd. November 15, 2016. Integration Report: Marine Mammals in Eclipse Sound, Milne Inlet and Pond Inlet, Table 1, p.ii. Report Number: 1663724-006-R-RevA</li> <li>• DFO Technical Review Comments to the NIRB, March 2019, Technical Comment 3.4</li> <li>• Baffinland Iron Mines Corporation. March 26, 2019. Technical Comment Responses, Phase 2 Proposal – Mary River Project: DFO 3.4.4, pg. 21, DFO Recommendation 3.4.1, pg. 19</li> </ul>

- Golder Associates Ltd. May 17, 2019, Assessment of Icebreaking Operations during Shipping Shoulder Seasons on Marine Biophysical Valued Ecosystem Components (VECs): Section 1.3, pg. 13; p. 48; pg. 77–80, section 5.6.3, pg. 42; pages 50, 53, 54 & 56.
- Knight-Piésold Consulting. May 17, 2019. Socio-economic Assessment of Icebreaking Operations during Shipping Shoulder Seasons: section 5.6.3, pg. 13 & pg. 42, pg. 46-47, pg. 50
- Draft Baffinland Early Shipping Season – Operational Guide. August 20, 2019: section 5.2, page 9
- Hemmera Envirochem Inc. (Hemmera). 2019. Review of the Mary River Phase 2 Assessment Conclusions on the Effects of Icebreaking to Narwhal. Project No. 103182-01. October 11, 2019.
- Baffinland Iron Mines Corporation, DFO Final Written Submission Disposition Table, received by DFO on October 31, 2019.
- Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019, Technical Review Comment 3.5 (recommendation 3.5); Technical Review Comment 3.6 (recommendations 3.6, 3.6.2, 3.6.5)
- Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, October 15, 2019, pages 42, 46, 48
- Baffinland Iron Mines Corporation, Phase 2 Proposal Updated Information Package, Attachment 2 – Commitments and terms and condition following the Public Hearings, January 6, 2020
- Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 28-41
- Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 6-8
- Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020, pages 49, 57
- Summary of Results for the 2019 Marine Mammal Monitoring Programs Technical Memorandum – Golder, May 15, 2020, page 67
- Early Warning Indicators for Marine Mammals Technical Memorandum – Golder, August 20, 2020, page 16

Publications:

Brueggeman, J.J., Malme, C.I., Grotefendt, R.A., Volsen, D.P., Burns, J.J., Chapman, D.G. Ljungblad, D.K., and Green, G.A. 1990. 1989 Walrus monitoring program: The Klondike, Burger, and Popcorn prospects in the Chukchi Sea. Prepared by Ebasco Environmental for Shell Western E&P, Inc. Houston, TX. 121 p. + appendices.



- DFO. 2015. Abundance estimates of narwhal stocks in the Canadian High Arctic in 2013. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/046.
- DFO. 2019. Science Review of the Phase 2 Addendum to the Final Environmental Impact Statement for the Baffinland Mary River Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/015.
- DFO. 2019. Science Review of Additional Documents Submitted June 18–August 29, 2019 for the Final Environmental Impact Statement Addendum for the Baffinland Mary River Project Phase 2. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/038. (Erratum: March 2020).
- Fay, F.H., Kelly, B.P., Gehnrich, P.H., Sease, J.L., and Hoover, A.A. 1984. Modern populations, migrations, demography, trophics, and historical status of the Pacific walrus. *In* Outer Continental Shelf Environmental Assessment Program: Final Report of Principal Investigators 37. NOAA, U.S. Department of Commerce, Washington, DC. pp. 231–376.
- Ferguson, S.H., Young, B.G., Yurkowski, D.J., Anderson, R., Willing, C., and Nielsen, O. 2017. Demographic, ecological, and physiological responses of ringed seals to an abrupt decline in sea ice availability. PeerJ doi: 5:e2957; DOI 10.7717/peerj.2957.
- Garlich-Miller, J., MacCracken, J.G., Snyder, J., Meehan, R., Myers, M., Wilder, J.M., Lance, E., and Matz, A. 2011. Status review of the Pacific walrus (*Odobenus rosmarus divergens*). US Fish and Wildlife Service, Marine Mammals Management, Anchorage, AK. vi + 155 p.
- Marcoux, M., Montsion, L.M., Dunn, J.B., Ferguson, S.H., and Matthews, C.J.D. 2019. Estimate of the abundance of the Eclipse Sound narwhal (*Monodon monoceros*) summer stock from the 2016 photographic aerial survey. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/028. iv + 16 p.
- Matthews, C.J.D., Hornby, C.A., Ferguson, S.H., and Marcoux, M. 2019. Evaluation of LGL visual aerial survey data for estimating narwhal abundance in Eclipse Sound during the open water season 2013–2015. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/029. iv + 23 p.
- McFarland, S.E., and Aerts, L.A.M. 2015. Assessing disturbance responses of Pacific Walrus (*Odobenus rosmarus divergens*) to vessel presence in the Chukchi Sea (Abstract). Chukchi Sea Environmental Studies Program (CSESP), Olgoonik-Fairweather, Fairweather Science, Anchorage, AK.
- Thomas, T.A., Raborn, S., Elliott, R.E., and Moulton, V.D. 2015. Marine mammal aerial surveys in Eclipse Sound, Milne Inlet, Navy Board Inlet, and Pond Inlet, 1 August – 22 October 2014. Final LGL Report No. FA0024-2. Prepared by LGL Limited, King City, ON for Baffinland Iron Mines Corporation, Oakville, ON. 70 p.
- Watt, C.A., Marcoux, M., Dunn, J.B., Hodgson, R., Moore, R., and Ferguson, S.H. 2019. Effect of the 2015 narwhal (*Monodon monoceros*) entrapment on the



	<p>Eclipse Sound narwhal stock. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/030. iv + 12 p.</p> <p>Wilson, S.C., Trukhanova, I., Dmitrieva, L., Dolgova, E., Crawford, I., Baimukanov, M., Baimukanov, T., Ismagambetov, B., Pazylbekov, M., Jüssi, M., and Goodman, S.J. 2017. Assessment of impacts and potential mitigation for icebreaking vessels transiting pupping areas of an ice-breeding seal. Biol. Conserv. 214: 213–222.</p> <p>Yurkowski, D.J., Young, B.G., Dunn, J.B., and Ferguson, S.H., 2018. Spring distribution of ringed seals (<i>Pusa hispida</i>) in Eclipse Sound and Milne Inlet, Nunavut: implications for potential ice-breaking activities. Arctic Science. <a href="https://doi.org/10.1139/as-2018-0020">https://doi.org/10.1139/as-2018-0020</a></p> <p>Yurkowski, D.J., Young, B.G., Dunn, J.B., and Ferguson, S.H. 2019b. Spring distribution of ringed seals (<i>Pusa hispida</i>) in Eclipse Sound and Milne Inlet, Nunavut: implications for potential ice-breaking activities. Arctic Sci. 5(1): 54–61.</p>	
Summary	<b>DFO Updated Technical Comment Recommendations (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<p><b>3.4.1 NEW:</b> DFO recommends that Baffinland prepare a monitoring plan, with an appropriate survey methodology, for the purpose of documenting and reporting any impacts due to icebreaking and shoulder season shipping activities, which includes the indicators Baffinland intends to use and rationale for the selection of said indicators. Baffinland should provide this plan or an adequate outline of the proposed plan to DFO for review and approval prior to any addition of ice breaking activities.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland commits to update the Marine Monitoring Plan (MMP) to include a specific section relevant to icebreaking and shoulder season shipping activities in advance of the 2021 shipping season. Through the ICA, Baffinland is also committed to the development initial Indicators for the MMP in collaboration with QIA by December 2020. These initial OITR's will then be subject to review by Inuit (through the Inuit Committee) and regulators (through the MEWG) before finalization (no later than August 30, 2021).</p> <p>In advance of the 2021 shipping season, BIM can also commit to providing an updated draft MMP that will include a placeholder for a dedicated section specific to icebreaking and shoulder season activities. A full update to the MMP will occur following receipt of a</p>

		<p>positive decision from the Minister. Updates to the MMP will be actively worked on with the MEWG in 2021 (following a decision). A final MMP would then be in place for the 2022 shipping season. Recommendations from MEWG members on survey methodologies and initial indicators will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p>
	<p><b>3.4.2 NEW:</b> DFO recommends Baffinland provide consideration for the re-evaluation of the magnitude and the reversibility of the impacts of ice entrapment on narwhals.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland recognizes that DFO disagrees with the certainty assigned to the potential for ice entrapments of marine mammals in the Phase 2 FEIS Addendum. To address DFO's concerns about uncertainty, Baffinland has committed to run annual end of season clearance surveys (DFO 3.6.2) and develop a response plan for the potential event of an ice entrapment (DFO 3.4.3 NEW).</p>
	<p><b>3.4.3 NEW:</b> DFO recommends Baffinland commit to producing a response plan in the event of ice entrapments, as determined by the committed to multi-year aerial surveys. This plan should include action level triggers and associated outlined response actions, in the event of an ice entrapment and subsequently an increase in frequency of ice entrapments. This plan should be developed in discussion with DFO and other parties and provided to DFO for review and approval.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland commits to run an annual end of season clearance survey. The survey will occur within 7 days following the close of the shipping season. Determination on the need for the end of season surveys will be where ice conditions warrant the survey, and in collaboration with MHTO and DFO. Baffinland commits to provide GIS coordinates and a description of group size(s) of narwhal along the aerial survey tracks. In addition, Baffinland will document ice conditions along the aerial survey tracks in order to inform changes in ice conditions and/or areas of greater risk for entrapment. This data will be provided to DFO as part of the fall shoulder season</p>

		<p>shipping reports as committed to under DFO 3.2.1 (NEW).</p> <p>A reporting structure will be determined in collaboration with MHTO, DFO, and other relevant boards and organizations in the event an ice entrapment is observed during the annual end of season clearance survey, as will procedures for determining if the event is a natural or project-related event, and associated response actions. This reporting structure is essential to determine the best course of action should an ice entrapment occur. After five years of annual end of season clearance surveys once Phase 2 shipping is operational, Baffinland and DFO will collaborate to analyze the data acquired from these surveys to determine what has been learned about any potential ice entrapments, and if the annual surveys should continue to proceed.</p>
	<p><b>3.4.4 NEW:</b> Overall, DFO reiterates the recommendation that Baffinland implement the most conservative mitigation measure and avoid shipping during the shoulder seasons and ice-breaking activities; only ship during the open water season.</p>	<p><b>Status: Outstanding, but DFO is actively working with Baffinland on the development of a commitment; see further discussion in the “-Detailed Review Comment” section</b></p>
<b>Importance of issue to the impact assessment</b>	Shipping and icebreaking activities on the shoulder seasons are likely to cause negative impacts to marine mammals.	
<b>Detailed Review Comment Gap/Issue Disagreement with Addendum/TSD conclusion Reasons for disagreement with</b>	Throughout the Phase 2 Environmental Assessment, DFO has indicated concern regarding the proposed increase in shoulder season shipping and icebreaking activities, and disagrees with Baffinland’s conclusions that overall the impacts will not be significant. As discussed throughout the DFO Science review, Baffinland has not provided information, references, data and/or analyses to support the “ <i>Not Significant</i> ” rating (DFO 2012a,b, DFO 2014, DFO 2019a).	

<p><b>Addendum conclusion</b></p>	<p>DFO acknowledges that Baffinland has committed to engaging in end-of-season aerial clearance surveys in the fall shoulder season and to developing a response plan for potential ice entrapment events. DFO agrees that further development and implementation of these measures may help to address residual uncertainty associated with icebreaking and shoulder season shipping activities and potential ice entrapment events. However, as noted above, it will be important for robust monitoring and ongoing re-evaluation of this plan to ensure its effectiveness for the duration of the project. DFO notes that the ice entrapment response plan should be implemented if an ice entrapment event is detected either during aerial surveys or at any time along the shipping route when Baffinland's vessels are active in the Regional Study Area, and must include coordination with DFO, the Mittimatalik Hunters and Trappers Organization, wildlife boards, and other relevant organizations.</p> <p>The most conservative mitigation measure to reduce potential impacts from icebreaking and shipping in the shoulder season is to avoid icebreaking and shoulder season shipping activities. However, Baffinland asserts that these activities are integral components that would affect the viability of the Phase 2 Development Proposal if they were prohibited. Therefore, DFO recommends that, at minimum, additional mitigation and monitoring measures are required to ensure that any impacts from icebreaking and shoulder season shipping activities are adequately detected, documented, and managed.</p> <p>DFO notes that Baffinland's spring transit restriction mitigations were initially established to address concerns related to noise disturbance, and are applied from July 1<sup>st</sup> to July 30<sup>th</sup> of any given year. These mitigations currently do not cover the entire period of navigation through ice conditions identified by Baffinland as causing disturbance to narwhal. DFO recommends that spring transit restriction mitigations be applied as long as relevant ice conditions persist along the shipping route, and that similar mitigations be developed and applied to the fall shipping season to address noise disturbance to narwhal.</p> <p>DFO notes that Marine Wildlife Observers are currently only permitted on the MSV Botnica and that there are limitations to visibility during the shoulder season that would influence detection of ship strikes or injury during icebreaking and shoulder season shipping activities. DFO notes that Baffinland has committed to undertake a pilot program using remote technology to monitor for ship strikes, as per the commitment for DFO 3.5 NEW. Implementation of this pilot program during icebreaking and shoulder season activities would increase confidence that potential ship strikes with marine mammals are appropriately detected and documented. This would allow</p>
-----------------------------------	---

	<p>Baffinland to initiate adaptive management strategies and additional mitigations to address these impacts.</p> <p>DFO is currently a member of the Marine Environmental Working Group (MEWG), and reviews monitoring plans and reports as they become available. DFO indicated that it would be useful to have the results of the marine mammal monitoring programs interpreted and integrated together and has proposed a comprehensive monitoring framework in section 3.1 of Science Response 2019/038. This would allow for DFO and other MEWG members make more effective and targeted recommendations for mitigation and adaptive management strategies.</p> <p>Baffinland has indicated that adaptive management strategies will be implemented in the event that project effects exceed predictions. DFO is of the opinion that adaptive management strategies should be identified in advance of potential impacts, such that any adaptive management strategies are implemented quickly and effectively to limit potential negative impacts on the marine environment. DFO recommends that Baffinland work with MEWG members and Inuit to establish and review thresholds, indicators, and adaptive management strategies related to the marine environment. These thresholds, indicators, and strategies should be established in advance of Phase 2 shipping operations. A proactive approach to adaptive management would increase DFO's confidence that any potential impacts from icebreaking and shoulder season shipping activities will be adequately addressed and mitigated.</p> <p>DFO acknowledges that Baffinland has committed to further develop the Passive Acoustic Monitoring Program and undertake long-term acoustic monitoring, as per the commitment established for DFO 3.3.3 NEW. DFO recommends that this program be expanded to include acoustic monitoring at the floe edge. Baffinland has previously acknowledged "<i>Narwhal is particularly sensitive when congregating at the floe edge in July</i>" (Socio-economic Assessment of Icebreaking Operations, p. 50). However, Baffinland does not expect narwhals to be negatively impacted. Noise pollution and habitat destruction is highly likely to lead to displacement of narwhals during this sensitive time. Expansion of passive acoustic monitoring at the floe edge would increase confidence that impacts to narwhal from icebreaking and shoulder season shipping activities are appropriately monitored and adaptively managed.</p> <p>DFO acknowledges that Baffinland provided an Early Warning Indicators (EWIs) for Marine Mammals Technical Memorandum, completed by Golder, on August 20, 2020. Page 16 of the technical memorandum indicates that 'change in</p>
--	---

	<p>calving rate' has been selected for further development as an EWI for narwhal. DFO is concerned that selection of only one EWI is insufficient to actually detect early warning signs that potential adverse impacts may be occurring. DFO recommends that Baffinland consider monitoring of an additional EWI. This indicator could be focused on narwhal body and health condition to ensure that the EWIs capture the full suite of potential impacts on narwhal.</p> <p>DFO has shared these recommendations with Baffinland, and is currently working with Baffinland to develop commitments that will satisfy DFO's concerns.</p>
<b>Recommendation / Request</b>	<p><b>Recommendation 3.4 NEW:</b> DFO is concerned about the impacts to marine mammals from shoulder season shipping and ice-breaking, and is currently working with Baffinland to develop commitments that will satisfy DFO's concerns.</p> <p><b>3.4.1 NEW:</b> DFO considers this technical comment resolved.</p> <p><b>3.4.2 NEW:</b> DFO considers this technical comment resolved.</p> <p><b>3.4.3 NEW:</b> DFO considers this technical comment resolved, and recommends to the NIRB that a T&amp;C be established in the Project Certificate that includes a clear timeframe being established for the clearance survey; due dates and information requirements for the data Baffinland has committed to provide to DFO; and a reporting structure for narwhal ice entrapments should they be observed.</p> <p><b>3.4.4 NEW:</b> Outstanding; DFO is still engaging in discussion with Baffinland to reach an agreeable commitment to satisfy DFO's concerns related to icebreaking and shoulder season shipping. DFO recommends to the NIRB that a T&amp;C be established in the Project Certificate for icebreaking and shoulder season shipping activities that includes measures that are protective of the marine environment.</p>

### 3.5 Marine Mammal Observation

<b>Review Comment Number</b>	3.5 Marine Mammal Observation
<b>Subject/Topic</b>	Marine Mammal Observation and Ship-board observation programs
<b>References considered throughout Phase 2</b>	<ul style="list-style-type: none"> <li>Marine Mammal Effects Assessment (TSD 24)::; Section 2.3 (p. 14-15)</li> <li>TSD28, Appendix V, Section 5.3, Table 2, p. 166; Draft Shipping and Marine Wildlife Management Plan, p. 72</li> </ul>

<b>Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• IR Responses Phase 2 Proposal – Mary River Project: GN 67 (p. 29)</li> <li>• Advance Technical Comment Responses Phase 2 Proposal – Mary River Project: 3.2.3 (p. 6-7)</li> <li>• Golder Associates Ltd. November 15, 2016. Integration Report: Marine Mammals in Eclipse Sound, Milne Inlet and Pond Inlet, Table 1, p.ii. Report Number: 1663724-006-R-RevA</li> <li>• Nunavut Impact Review Board Mary River Project Certificate 005 – Amended October 31, 2018, Term and Condition No. 106, page 53</li> <li>• DFO Technical Review Comments to the NIRB, March 2019, Technical Comment 3.7, recommendation 3.7.1</li> <li>• Baffinland Iron Mines Corporation. March 26, 2019. Technical Comment Responses, Phase 2 Proposal – Mary River Project: DFO 3.7.1, pg.</li> <li>• Golder Associates Ltd. May 17, 2019, Assessment of Icebreaking Operations during Shipping Shoulder Seasons on Marine Biophysical Valued Ecosystem Components (VECs): pg. 70; Shipping Mitigation Measures</li> <li>• Knight-Piésold Consulting. May 17, 2019. Socio-economic Assessment of Icebreaking Operations during Shipping Shoulder Seasons: pg. 14</li> <li>• Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019, Technical Review Comment 3.3 (recommendation 3.3); Technical Review Comment 3.9 (recommendation 3.9.1)</li> <li>• Hemmera Envirochem Inc. (Hemmera). 2019. Review of the Mary River Phase 2 Assessment Conclusions on the Effects of Icebreaking to Narwhal. Project No. 103182-01. October 11, 2019.</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, October 15, 2019, pages 39-40, 52-53</li> <li>• Baffinland Iron Mines Corporation, Phase 2 Proposal Updated Information Package, Attachment 2 – Commitments and terms and condition following the Public Hearings, January 6, 2020</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 41-48</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 8-9</li> <li>• Literature Review of New and Developing Ship-Based Technologies to Detect Marine Mammal Species – Golder, April 29, 2020, pages 4-5. Reference No. 1663724-189-TM-Rev-1-38000</li> </ul> <p><u>Publications:</u></p> <p>DFO. 2019a. Science Review of the Phase 2 Addendum to the Final Environmental Impact Statement for the Baffinland Mary River Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/015.</p>
---------------------------------	---

	<p>Higdon, J.W., and Ferguson, S.H. 2009. Loss of Arctic sea ice causing punctuated change in sightings of killer whales (<i>Orcinus orca</i>) over the past century. <i>Ecol. Appl.</i> 19(5): 1365–1375.</p> <p>Higdon, J.W., Hauser, D.D.W., and Ferguson, S.H. 2011. Killer whales in the Canadian Arctic: distribution, prey items</p> <p>Kelley, D.E., Vlastic, J.P., and Brilliant, S.W. 2020. Assessing the lethality of ship strikes on whales using simple biophysical models. <i>Mar. Mam. Sci.</i>: 1-17. <a href="https://doi.org/10.1111/mms.12745">https://doi.org/10.1111/mms.12745</a></p> <p>Lawson, J.W. and Lesage, V. 2013. A draft framework to quantify and cumulate risks of impacts from large development projects for marine mammal populations: A case study using shipping associated with the Mary River Iron Mine project. <i>DFO Can. Sci. Advis. Sec. Res. Doc.</i> 2012/154. iv + 22 p.</p> <p>Reeves, R.R., Rosa, C., George, J.C., Sheffield, G., and Moore, M. 2011. Implications of Arctic industrial growth and strategies to mitigate future vessel and fishing gear impacts on bowhead whales. <i>Mar. Policy</i> 36(2): 454–462.</p> <p>Sheldon, K. E. W., Hobbs, R. C., Sims, C. L., Vate Brattstrom, L., Mocklin, J. A., Boyd, C., and Mahoney, B. A. 2017. Aerial surveys of beluga whales (<i>Delphinapterus leucas</i>) in Cook Inlet, Alaska, June 2016. Alaska Fish Science Centre Processed Report 2017–09, NOAA, Seattle, WA, USA.</p>	
Summary	<b>DFO Updated Technical Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<p><b>3.5 NEW:</b> DFO reiterates if having Marine Wildlife Observers (MWOs) present for the entire shipping season on all project related vessels (e.g., icebreakers, escort vessels, ore carriers) is not logistically possible, DFO recommends an alternative plan should be developed by Baffinland to monitor presence, behavior and potential ship strikes of marine mammals.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland has indicated that it is only feasible to have Marine Wildlife Observer's present on the MSV Botnica. Noting that having MWO's present on ships may not be feasible at all times due to safety concerns, and that certain environmental conditions may limit visibility, Baffinland commits to develop a pilot project using remote technology to monitor for ship strikes along the shipping route within the Nunavut Settlement Area. The intent of the pilot project is to determine the efficacy of mitigation to prevent ship strikes and of monitoring to detect ship strikes and any near misses.</p>



		<p>To solicit early feedback from DFO in advance of developing and submitting the methodology and parameters for the monitoring program to the MEWG, DFO will provide reports from all comparable studies conducted by DFO 8 months in advance of the start of the program and will identify what aspects of these programs DFO is recommending Baffinland integrate into the program design. Where relevant, Baffinland will incorporate the guidance provided by DFO into the study design prior to distributing it to the MEWG for review.</p> <p>Methodology and parameters for the monitoring program will be submitted to the MEWG (of which DFO is a member) for review and recommendations. Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p> <p>The monitoring program will run for three years, and will begin one year in advance of Phase 2 shipping operations, with a report submitted to DFO and MEWG members each year the program is implemented. The report will include the following information:</p> <ol style="list-style-type: none"> <li>1. The number of hours and ships on which the program ran</li> <li>2. Types and size of vessels on which the program ran</li> <li>3. Timing during the shipping season when the program was run</li> <li>4. The number of vessels that were called to Milne Port relative to Project certificate limits</li> </ol>
--	--	--

		<ol style="list-style-type: none"> <li>5. If distance of animals to the vessels can be calculated, a discussion of relative CPAs.</li> <li>6. Relevant environmental conditions that may affect detection or increase potential likelihood of an encounter with marine mammals</li> <li>7. If the program is collecting information related to Project effects on the marine environment that is not otherwise being collected through other programs.</li> <li>8. Discussion of cost/value of the Project.</li> </ol> <p>After the third year, Baffinland will submit an overview report on the program, to the MEWG for review. This report will document and discuss the benefits of the project and any challenges faced.</p> <p>If the pilot program confirms ship strikes and/or near misses are occurring the project will be extended and included as a component of the MMP, in consultation with the MEWG, of which DFO is a member. Otherwise, the program will be discontinued as a permanent component of the MMP based on the above listed factors, though the program may be implemented again periodically based on advice from the MEWG or Inuit.</p>
<b>Importance of issue to the impact assessment</b>	It is important to have experienced Marine Mammal Observers aboard ore carriers to monitor reactions and provide localized measures of marine mammal densities along the shipping route.	
<b>Detailed Review Comment Gap/Issue Disagreement with Addendum/TSD conclusion</b>	<p>DFO continues to be concerned that the proposed increase in shipping activities could likely increase in the risk and incidence of injury and mortality to bowhead whale from vessel traffic, and that Baffinland's current monitoring efforts are insufficient to actually detect ship strikes.</p> <p>Baffinland provided DFO with a Literature Review of New and Developing Ship-Based Technologies to Detect Marine Mammal Species, dated April 29, 2020</p>	

<p><b>Reasons for disagreement with Addendum conclusion</b></p>	<p>and completed by Golder. The literature review states: <i>“Given the very low likelihood of a vessel-bowhead interaction (due to the slow vessel speed of 9 knots), and the relatively high ability to detect bowhead whales (given the substantial dedicated, ad hoc monitoring effort of the area) the need to undertake additional monitoring of potential vessel-bowhead whale strikes, as requested by DFO, is considered low and precautionary in nature.”</i></p> <p>However, the literature review also provides the following commentary: <i>“Studies show that data collected from MMOs are often underestimations, as visual observers are highly impacted by a multitude of factors including observer experience, environmental factors (e.g., fog, rain, high sea states), observer fatigue, and availability and perception bias (Verfuss et al., 2018). The former is described as the presence of animals to are not able to be detected (e.g., under ice cover, fog), therefore underestimating species abundance (Pyc et al. 2015). The latter refers to bias occurring when the animal is present, but human error causes it to be missed (i.e., observer fatigue, low observer skillset)(Pyc et al. 2015). Visual observations are also often limited by the need for optimal weather conditions, sea state, and high light conditions. Visual observers are also limited by animal behaviours, as the can only detect marine mammals that demonstrate obvious behavioural cues such as surfacing or blowing (Verfuss et al., 2018). By developing and improving old technologies, researchers can alleviate the need to train personnel, and can improve the ability to collect data in poor environmental conditions.”</i></p> <p>DFO acknowledges that there are limitations to having Marine Wildlife Observers present on vessels, and appreciates that Baffinland has continued the Ship-Board Observer program to ensure there are observers onboard icebreaking vessels during the shoulder seasons. However, as noted in the April 29, 2020 Literature Review of New and Developing Ship-Based technologies to Detect Marine Mammal Species (pages 4-5), there are many factors that influence the ability for Marine Mammal Observers to detect vessel interactions with marine mammals. As well, the logistical constraint of placing observers only on icebreaking vessels leaves a significant gap in reporting and detection of ship-strikes throughout the remainder of the open-water shipping season.</p> <p>DFO also acknowledges that Baffinland has implemented a 9-knot speed restrictions for project-related vessels within the Regional Study Area. There is still is a risk of ship strike and mortality related to strikes with vessels travelling at this speed or lower. Recent model simulations completed by Kelley et al (2020) indicate that strike-interactions between large ships and whales could still result in mortality regardless of speed restriction mitigations. Therefore,</p>
---	---

	<p>DFO notes the slow down mitigation may reduce the risk of mortality but does not eliminate it.</p> <p>Narwhal would be expected to be less vulnerable to ship strikes than bowhead whales, given their smaller size. However, there is still a risk particularly given the increases in voyages, ship size and expansion of the shipping season into the shoulder seasons when whales have begun their migrations. In addition, as the ice environment continues to change from climate change, the removal of sea-ice choked points means that other whales are venturing farther north into the Canadian Arctic, including Baffin Bay to take the advantage of the productive summer months (e.g., Killer whale, Sperm whale, Fin whale) (Higdon and Ferguson 2009, Higdon et al. 2011, Sheldon et al. 2017). The Baffinland shipping corridor crosses perpendicularly to the migration corridor for many of these summer species.</p> <p>DFO acknowledges Baffinland’s commitment to develop a pilot project using remote technology to monitor for ship strikes along the shipping lane within the Nunavut Settlement Area to address residual uncertainty and ensure detection of ship strikes.. The intent of the pilot project would be to determine the efficacy of mitigation to prevent ship strikes and of monitoring to detect ship strikes. Once developed, this program should be submitted to the MEWG for review and recommendations. The development and ongoing review of the program will consider the following factors: the number of hours and ships on which the program ran; the types and size of vessels on which the program ran; timing during the shipping season when the program was run; the number of vessels utilized, relative to the maximum allowed through the Project Certificate; any near misses and distance from the ship; if there are other factors potentially influencing detection or influence the likelihood of encounters with marine mammals; if the program is collecting other valuable information related to the marine environment not captured through other monitoring programs; and cost.</p> <p>DFO has worked extensively with Baffinland on the development of this commitment to ensure that ship strikes with marine mammals are adequately detected and reported, and is of the opinion that development and implementation of this pilot program should sufficiently address outstanding concerns related to ship strikes.</p>
<b>Recommendation / Request</b>	<p><b>Recommendation 3.5 NEW:</b> DFO considers this technical comment resolved, and recommends to the NIRB that a T&amp;C be established in the Project Certificate that includes clear timelines for the pilot project, the factors to be</p>

	considered throughout the life of the program, and the parameters surrounding discontinuation of the program.
--	---

### 3.6 Marine Environment: Ballast Water and Non-indigenous Species

<b>Review Comment Number</b>	3.6 Ballast Water and Non-indigenous Species
<b>Subject/Topic</b>	Impacts of increased shipping related to aquatic invasive species (AIS) and non-indigenous species (NIS)
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• Marine Environmental Effects Assessment (TSD 17): Section 3.7.3 (p. 65)</li> <li>• TSD 21, Risk Assessment for Introduction of Aquatic Invasive Species from Ballast Water, Summary; Section 4</li> <li>• DFO Technical Review Comments to the NIRB, March 2019, Technical Comment 3.8</li> <li>• Baffinland Iron Mines Corporation. March 26, 2019. Technical Comment Responses, Phase 2 Proposal – Mary River Project: DFO 3.8.1, DFO 3.8.2, DFO 3.8.3,</li> <li>• Baffinland Iron Mines Corporation. March 31, 2019. Ballast Water Management Plan: Section 4, pg. 13–14, pg. 8; pg. 7; Section 2, pg. 9; Section 3.2, pg. 13</li> <li>• Baffinland Iron Mines Corporation. May 13, 2019. Draft Shipping and Marine Wildlife Management Plan (SMWMP): Page 11; Section 6.6, pg. 76</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, Appendix N, Attachment 3: Golder Associates Ltd. 2019. Technical Report - Ballast Water Dispersion Modelling - Ballast Water Model Validation. Submitted to Baffinland Iron Mines Corporation. 1663724-154-R-Rev0. 09 October 2019.</li> <li>• Final Submission – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Project Proposal, DFO, September 23, 2019, Technical Review Comment 3.10 (recommendations 3.10.1, 3.10.2, 3.10.3, 3.10.4, 3.10.5, 3.10.6)</li> <li>• Final Written Comment Responses Phase 2 Proposal – Mary River Project, Baffinland, October 15, 2019, pages 53-54</li> <li>• Baffinland Iron Mines Corporation, DFO Final Written Submission Disposition Table, received by DFO on October 31, 2019.</li> <li>• Baffinland Iron Mines Corporation, Phase 2 Proposal Updated Information Package, Attachment 2 – Commitments and terms and condition following the Public Hearings, January 6, 2020</li> </ul>

- Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 48-61
- Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 9-13

Publications:

- Casas-Monroy, O., Linley, R.D., Adams, J.K., Chan, F.T., Drake, D.A.R., and Bailey, S.A. 2014. National risk assessment for introduction of aquatic nonindigenous species to Canada by ballast water. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/128. vi + 73 p.
- Chan, F.T., Bronnenhuber, J.E., Bradie, J.N., Howland, K.L., 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.
- Chan, Farrah & MacIsaac, Hugh & Bailey, Sarah. (2015). Chan et al. 2015 CJFAS. DFO. 2015b. Risk assessment of alternate ballast water exchange zones for vessel traffic to the eastern Canadian Arctic. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/019.
- DFO. 2019c. Science Review of Additional Documents Submitted June 18- August 29, 2019 for the Final Environmental Impact Statement Addendum for the Baffinland Mary River Project Phase 2. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/038.
- Drolet, D. A. Locke, M.A. Lewis and J. Davidson.. 2014 User-friendly and evidence-based tool to evaluate probability of eradication of aquatic non-indigenous species. *Journal of Applied Ecology* 51: 1050–1056.
- Goldsmid, J., Nudds, S.H., Stewart, D.B., Higdon, J.W., Hannah, C.G., and Howland, K.L. 2019. Where else? Assessing Zones of Alternate Ballast Water Exchange in the Canadian Eastern Arctic. *Mar. Pollut. Bull.* 139:74–90.
- Laget, F. 2017. Transport d’espèces de dinoflagellés non-indigènes dans l’Arctique Canadien, suite au déversement des eaux de ballast par un navire domestique. M.Sc. Thesis. Université du Québec à Rimouski. 130 p.
- Locke, A., Mandrak, N.E., and Therriault, T.W. 2011. A Canadian rapid response framework for Aquatic Invasive Species. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/114. vi + 30 p.
- Stewart, D.B., Nudds, S.H., Howland, K.L., Hannah, C.G., and Higdon, J.W. 2015. An ecological and oceanographical assessment of alternate ballast water exchange zones in the Canadian eastern Arctic. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/037. vi + 75 p.
- Tremblay, P. 2017. Évaluation du risque potentiel d’introduction d’espèces non-indigènes de mésozooplancton suite au déversement des eaux de ballast

	d'un navire domestique dans l'Arctique Canadien. M.Sc. Thesis. Université du Quebec à Rimouski. 126 p.	
<b>Summary</b>	<b>DFO Updated Technical Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.6.1 NEW:</b> DFO recommends Baffinland provide clarification on where vessels have been discharging ballast to date and how Baffinland validates/tracks this information.	<b>Status: Resolved</b>  No commitment proposed. Clarification provided in Baffinland's February 22, 2020 Phase 2 Comment Responses on pages 9-10.
	<b>3.6.2 NEW:</b> DFO recommends Baffinland commit to including discharge coordinates in ballast reporting.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland commits to record the Milne Port anchorage and associated coordinates where compliance testing and discharge occurs in the ballast water testing forms, completed by Baffinland's environmental monitors. A dataset with discharge coordinates will be provided to MEWG members as part of annual reporting requirements.
	<b>3.6.3 NEW:</b> DFO recommends that Baffinland make a commitment that exchange will be carried out prior to treatment for all vessels conducting exchange plus treatment procedures.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will require all vessels calling on Milne Port that treat their ballast under the D2 Standard to also perform a ballast water exchange prior to treatment. For ships unable to conduct exchange as specified in Canadian Ballast Water Regulations (e.g. ships on Canadian domestic trips), exchange is to be conducted as specified in revised ABWEZs for Eastern Arctic as per DFO CSAS advice (see DFO 2015, Stewart et al. 2015 and Goldsmit et al. 2019). This updated commitment will be reflected in the 2020 Standing Instructions to Masters.
	<b>3.6.4 NEW:</b> DFO recommends that Baffinland clarify what would trigger Baffinland to	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will consider discontinuing exchange plus treatment

	discontinue exchange plus treatment practices	requirements should treatment systems efficacy reach a point that makes the benefits of an exchange plus treatment system negligible. This decision will be made in consultation with TC and DFO, and will be based on a consideration of factors outlined in DFO 2019 (i.e. if ballast water organism concentration or composition, environmental conditions, shipping patterns, proportion of voyages meeting the D-2 standard, or available data describing these conditions change in the future, and relevant updates to global research on ballast treatment systems). In this event Baffinland will update ballast water dispersion modelling to more accurately reflect the spectrum of salinity, temperature, and discharge volumes that can be expected to be discharged at Milne Port under Phase 2 operations if prior exchange were to be discontinued.
	<b>3.6.5 NEW:</b> DFO recommends that Baffinland provide clarification on how Baffinland intends to monitor ballast water discharges for compliance with D2 regulations	<p><b>Status: Resolved via a joint recommendation between DFO and Transport Canada</b></p> <p><b>Final Commitment:</b> Transport Canada appreciates the efforts by BIM to ensure current regulations are followed with respect to their plans for ballast water management. Given the learning curve associated with use of ballast water treatment systems, for Phase 2, Transport Canada (TC) in consultation with Fisheries and Oceans Canada (DFO), recommends, in conjunction with present sampling and testing protocols being proposed/adopted [NTD - will be summarized in complete package] by BIM, that BIM implement a ballast water compliance sampling plan based on a risk-based targeting methodology to be developed in</p>



		<p>consultation with DFO and TC. Such a risk-based methodology should be applied to evaluate the risk of all vessel ballast water management (D1, D2) with subsequent salinity and D-2 biological compliance sampling conducted on vessels identified as high or very high risk. The respective risk-based methodology and associated ballast water compliance sampling plan will be developed in consultation with DFO and TC following completion of DFO's Project-specific sampling conducted on a subset of vessels calling to Milne Port. The risk-based methodology and associated ballast water compliance sampling plan should include a consideration of other compliance initiatives or research being undertaken elsewhere by TC relative to implementation of the D-2 standard. Sampling conducted that supports building a body of knowledge for D-2 treatment systems, beyond biological compliance sampling conducted on high risk and very high risk tanks, should not compromise Baffinland's ability to transport annual ore quantities as approved under a modified Project Certificate No 005. Understanding that the rationale for this program is tied to a learning curve associated with the use of ballast water treatment systems, the compliance sampling program and risk based methodology will be adapted as deemed necessary based on the results of the program.</p>
--	--	--

	<p><b>3.6.6 NEW:</b> DFO recommends that Baffinland make a commitment to develop of a biofouling sampling program, approved by DFO and completed prior to increase shipping activities for Phase 2, which specifically includes physical collection of organisms in a representative, standardized and comprehensive manner (sampling of hull and niche areas) that will allow for identification of non-native species that may be transported through project shipping.</p>	<p><b>Status: Resolved</b></p> <p><b>Please see detailed final commitment in Section 4 (English) and Section 5 (Inuktitut).</b></p>
	<p><b>3.6.7 NEW:</b> DFO recommends that Baffinland make a commitment to update the monitoring plan, to include more intensive sampling, which includes greater seasonal and spatial coverage, increased sample sizes to address concern related to statistical power for detection, clear protocols for determining identity and status of species (native, non-indigenous or cryptogenic).</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland commits to updating the marine monitoring plan (MMP) in consultation with MEWG members and this will be completed prior to the start of the Phase 2 increased shipping season. The updated MMP will detail the revised MEEMP sampling design which includes greater seasonal and spatial coverage and increased sampling effort and sample sizes to address DFO concerns related to achieving sufficient statistical power for detection of project effects (<math>\geq 0.8</math>) (as per recommendations in DFO 2020, pages 4-7).</p>
	<p><b>3.6.8 NEW:</b> DFO recommends that Baffinland provide an assessment of potential biological and ecological effects of ballast discharge and identification of the high risk species or groupings of species of concern. These species may include, but not be limited to</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland continues to maintain that the identification of high-risk biological species or groupings of species of concern is the primary responsibility of DFO. Despite this, Baffinland is committed to supporting the development of a trigger list of species and associated response plans</p>

	any NIS/AIS that have been detected in the course of past AIS/MEEMP monitoring, and should be updated in the event that new NIS/AIS are detected in future monitoring.	through the process outlined in response to DFO 3.6.9 and 3.6.10, and to refining that list with DFO following Phase 2 approval.
	<b>DFO 3.6.9 NEW:</b> DFO recommends Baffinland commit to develop an appropriate early response plan with a clear sequence of events to be followed in the event that a nonindigenous species is introduced and/or becomes established.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland commits to follow the most updated version of DFO's AIS Rapid Response Framework in the event that a nonindigenous species is introduced and/or becomes established.
	<b>3.6.10 NEW:</b> DFO recommends that Baffinland commit to develop taxa-specific response plans for high risk species or groups of species identified through species level risk assessments. These could be informed by known vessel origins prior to arrival at the project.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland commits to work with the MEWG and DFO to establish species-specific Rapid Response Plans. Rapid Response Plans will be developed for species identified as high risk through ongoing NIS monitoring in the receiving environment, the ROV (or any other future) biofouling monitoring program, results yielded from the 2021 biological ballast water sampling pilot program (and any ongoing ballast monitoring), examination of existing invasive species databases and lists in key ecoregions where vessels calling originate from (as per Goldsmit et al., 2020 Global Change Biology), and based on ranking of potential risk using the Canadian Marine Invasive Screening Tool.
<b>Importance of issue to the impact assessment</b>	Introduction of aquatic invasive species may result in high risk negative impacts to the natural environment including fish and marine mammals and their habitat, and it's important to adequately assess and mitigate the risks of spreading unwanted species to the project area.	
<b>Detailed Review Comment Gap/Issue</b>	Throughout DFO's review of Baffinland's Phase 2 Development Proposal, DFO has been concerned that increased shipping activities pose substantial risk of AIS invasion, particularly through ballast water release and hull biofouling,	

<p><b>Disagreement with Addendum/TSD conclusion</b></p> <p><b>Reasons for disagreement with Addendum conclusion</b></p>	<p>which are important vectors for the transfer of non-indigenous species. DFO notes that more intensive sampling is required to effectively assess, mitigate, and manage risk associated with AIS, and if more intensive sampling cannot be undertaken due to logistical or operational constraints, more preventative measures are required to proactively reduce risk.</p> <p>DFO acknowledges the considerable progress made with Baffinland since the adjournment of the November 2019 Final Hearing to further develop commitments to resolve outstanding technical comments related to ballast water and aquatic invasive species (AIS) concerns. The implementation of the above-listed commitments should be sufficient to address risk associated with ballast water management and ship hull biofouling by ensuring that associated AIS risk is properly mitigated, monitored, and adaptively managed as required. The intent of the commitments is to ensure that preventative mitigation measures are applied where possible, management plans are established in advance of AIS establishment, and robust monitoring is undertaken to ensure early detection of AIS and determine the species and vessels that pose the greatest risk for AIS spread.</p> <p>DFO notes that effective resolution of DFO's outstanding technical comments related to biofouling required an extensive detailed commitment from Baffinland. This detailed commitment is located in Section 4 of this updated submission for ease of reading.</p>
<p><b>Recommendation / Request</b></p>	<p><b>Recommendation 3.6 NEW:</b> Based on the information received and Baffinland's subsequent commitments, DFO considers all recommendations under 3.6 NEW as resolved.</p> <p>DFO considers 3.6.3 NEW resolved, and recommends to the NIRB that this commitment be established as a T&amp;C in the Project Certificate that includes specifying procedures for ballast water management.</p> <p>DFO considers 3.6.4 NEW resolved, and recommends to the NIRB that a T&amp;C be established in the Project Certificate that includes specifying the parameters of discontinuation of exchange plus treatment practices, including factors for consideration and updates to the ballast water dispersion modelling.</p> <p>DFO considers 3.6.5 NEW resolved, and recommends to the NIRB that a T&amp;C be established in the Project Certificate that include clear timelines, information requirements, and considerations for the risk-based methodology and associated ballast water compliance sampling plan.</p>

	DFO considers 3.6.6 NEW resolved, and recommends to the NIRB that a T&C be established in the Project Certificate that include clear requirements for biofouling management guidelines and practices; timelines and parameters for biofouling monitoring, including biological sampling; and parameters for the biofouling risk assessment and risk-based sampling plan. The T&C should also include that both these programs should be developed with input from DFO.
--	--

### 3.7 Marine Cumulative Effects

<b>Review Comment Number</b>	3.7 Cumulative Effects	
<b>Subject/Topic</b>	Cumulative effects assessment and impacts resulting from cumulative project impacts	
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• TSD 27</li> <li>• Knight Piésold Consulting's Memorandum to TSD27 – Cumulative Effects Assessment, Section 4.3, p. 19–23.</li> <li>• Disposition Table from the June 2019 Technical Meeting for the Mary River Project Phase 2 Development</li> <li>• Revised Addendum to Technical Supporting Document 27 - Cumulative Effects Assessment. August 26, 2019. Section 4.3.3, Pg. 36</li> <li>• DFO. 2019a. Science Review of the Phase 2 Addendum to the Final Environmental Impact Statement for the Baffinland Mary River Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/015.</li> <li>• Baffinland Iron Mines Corporation. August 15, 2019. Animation of Simulated Vessel Movements with Estimated Sound Field</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 61-64</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 13</li> <li>• Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020, pages 57</li> <li>• Summary of Results for the 2019 Marine Mammal Monitoring Programs Technical Memorandum – Golder, May 15, 2020, page 67</li> </ul>	
<b>Summary</b>	<b>DFO Updated Technical Comment Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.7 NEW:</b> DFO recommends that Baffinland conduct a thorough analysis and assessment	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland recognizes that DFO disagrees with the

	<p>examining all the combined impacts of all the Project activities inside and outside the study areas.</p>	<p>determinations of the Combined Effects Assessment located in Table 22 of Baffinland's Marine Mammal Monitoring Technical Memorandum updated in May 2020 (document # 1663724-186-TM-Rev2-38000). DFO is concerned that the combined effects assessment does not adequately consider uncertainty and potential interactions between combined effects, nor does it consider combined effects outside of the Regional Study Area.</p> <p>To account for residual uncertainty in the effects assessment, Baffinland has made several commitments related to the strengthening of monitoring programs, as well as the implementation of pilot projects to better detect and monitor effects of the project on the marine environment. Implementation of these commitments will be developed in collaboration with DFO, Inuit, and relevant organizations to ensure that all recommendations and concerns are addressed and accounted for. If results of the monitoring programs indicate that there are significant or meaningful impacts to the marine environment, Baffinland commits to undertake investigations to determine the cause of the impact, and will identify any mitigations or other adaptive management strategies to address the impact for review and recommendations by Inuit and the MEWG.</p> <p>Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p>
--	---	--

<b>Importance of issue to the impact assessment process</b>	It's important to have a cumulative combined impact assessment on marine mammals, to fully understand and review project impacts.
<b>Detailed Review Comment Gap/Issue Disagreement with conclusion Reasons for disagreement with conclusion</b>	<p>Throughout the Phase 2 Environmental Assessment, DFO has indicated concern that the existing combined effects assessment does not not adequately consider uncertainty and potential interactions between combined effects, nor does it consider combined effects outside of the Regional Study Area.</p> <p>Baffinland provided a Marine Mammal Monitoring Technical Memo, completed by Golder, in Appendix B of their February 21, 2020 Phase 2 Comment Responses. Table 23 (p.57) indicates that significance of residual effects and residual combined effects to marine mammal VECs (valued ecosystem components) are determined to be “non-significant”, and the qualifier columns of probability (of effect) and certainty (of effect prediction) have no rating. Baffinland provided an update to the Marine Mammal Monitoring Technical Memo on May 15, 2020 following a request from DFO to update the table to adequately and transparently address uncertainty. In this update, Table 22 (p. 67) clearly demonstrates Baffinland’s determinations of probability of effects occurring, and the certainty of the effects prediction.</p> <p>DFO has engaged in discussions with Baffinland since the adjournment of the November 2019 Final Hearing, and has developed (and is continuing to develop) commitments related to the marine environment intended to address residual uncertainties, improve and expand existing monitoring programs, develop additional programs to improve the monitoring and address data gaps, and ensure that preventative mitigations measures are applied where feasible. DFO is confident that implementation of the recommendations contained in this updated written submission and related Baffinland commitments will address and reduce uncertainty.</p> <p>Further development of programs will occur in collaboration with DFO, Inuit, relevant organizations and working groups. Baffinland will be required to work with DFO, Inuit, and other relevant stakeholders to determine adaptive management strategies to ensure the continued protection of the marine environment, if the integrated results of the monitoring programs indicate that there are significant or meaningful impacts to the marine environment, or that the applied mitigation and monitoring measures are not as effective as intended.</p>
<b>Recommendation/Request</b>	<b>Recommendation 3.7 NEW:</b> DFO considers this technical comment resolved.

### 3.8 Freshwater Watercourse Crossings

<b>Review Comment Number</b>	3.8 Watercourse crossings	
<b>Subject/Topic</b>	Locations and types of proposed watercourse crossings	
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comments 3.10.1 and 3.10.3.</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.2: North Railway Freshwater Habitat Survey, Appendix 1, Table A1-1</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.1, Appendix 2: List of North Rail Infrastructure Interactions with Fresh Water, Table A2-1</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.3: North Railway Catchments</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.1 appendices: Project Infrastructure Interactions With Fresh Water Streams and Ponds</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.8: North Railway Bridge Drawings, pg. 7-10 of 32 (Adobe PDF)</li> <li>• DFO Information Requests (IRs) to the Nunavut Water Board (NWB), May 14, 2019. DFO IR 1b.</li> <li>• Baffinland Iron Mines Technical Meeting No. 2 Disposition Table as of July 3, 2019, Appendix A of the July 4, 2019 correspondence to NIRB. DFO 3.10.3, page 8 of 23 (Adobe PDF)</li> <li>• DFO Technical Review Comments to the NWB, July 2019, Technical Comment 3.1, recommendation 3.1.1</li> <li>• Baffinland Iron Mines Corporation. August, 2019. Technical Comment Responses, Application to Amend Type A Water Licence 2AM-MRY1325, Phase 2 Proposal – Mary River Project: DFO 3.1.1</li> <li>• Baffinland Iron Mines Corporation. January 6, 2020. Phase 2 Proposal Updated Information Package, Section 2.2.2.</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 64-67</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 13</li> </ul>	
<b>Summary</b>	<b>DFO Updated Technical Comment Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>



	<b>3.8 NEW:</b> If the Project is approved, DFO recommends Baffinland provide decision criteria and decision matrix for the selection of water crossing methods for fish bearing watercourses in support of any regulatory applications made to DFO.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will provide decision criteria and decision matrix for the selection of water crossing methods for fish bearing watercourses in support of any regulatory permit applications made to DFO.
<b>Importance of issue to the impact assessment process</b>	Watercourse crossings of fish bearing waters have the potential to create a harmful alteration, disruption or destruction (HADD) of fish habitat.	
<b>Detailed Review Comment Gap/Issue Disagreement with conclusion Reasons for disagreement with conclusion</b>	DFO acknowledges Baffinland's commitment to provide decision criteria and decision matrix for the selection of water crossing methods for fish-bearing watercourses submitted in support of any future DFO Requests for Review or Applications for Authorization. DFO has robust regulatory mechanisms to manage freshwater fish habitat impacts associated with the construction of watercourse crossings, DFO is confident that concerns related to impacts to fish habitat can be addressed during DFO's regulatory process.	
<b>Recommendation/ Request</b>	<b>Recommendation 3.8 NEW:</b> DFO considers this technical comment resolved.	

### 3.9 Freshwater Fish Passage

<b>Review Comment Number</b>	3.9 Fish Passage
<b>Subject/Topic</b>	Watercourse crossings: high velocity predictions and impacts to fish passage
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• Surface Water Assessment (TSD 13): Section 2.5.2. (p. 16); Section 2.5.3 (p. 19); Section 2.6 (p. 21 Appendix D, (p. 1 -6; D-1 to D-6); Appendix D, Figure 1 (p. D-7); Appendix D, Appendix A, Figures A9-A12 (pages D-18 to D-21); Appendix D, Appendix B (p. B-1 to B-2)</li> <li>• Freshwater Biota and Habitat Assessment (TSD 14): Section 2.2.2 (p. 7-8); Section 2.5, Table 2-3 (p. 14); Section 2.5.1.2 (p. 19- 24); Appendix 1: Table 2-1 (p. 7); Section 4.2.3.2 (p. 31-32); Attachment 3, Table A3-1 (p. 117 to 120)</li> <li>• Conceptual Freshwater Offsetting Plan (TSD 15): Section 5.3.2 (p. 19)</li> <li>• DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comments 3.10.4 and 3.11.2.</li> </ul>

	<ul style="list-style-type: none"> <li>• Baffinland Iron Mines Technical Comment Responses, March 25, 2019. DFO 3.10.4 on page 40, DFO 3.11.2 on page 42, DFO 3.10.1 on page 37.</li> <li>• Email Correspondence from Baffinland to the Nunavut Water Board, April 30, 2019.</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 7.2: North Railway Design Criteria, page 23, sections 7.1.1, 7.2.1.5, 7.2.1.6, and 7.2.3.</li> <li>• Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.7: North Railway Arch Bridges Hydraulic Assessment, section 8.6, page 32</li> <li>• DFO Information Requests (IRs) to the Nunavut Water Board (NWB), May 14, 2019. DFO IR 1a.</li> <li>• DFO Technical Review Comments to the NIRB, March 2019, Technical Comment 3.10, recommendation 3.10.4</li> <li>• DFO Technical Review Comments to the NWB, July 2019, Technical Comment 3.1, recommendation 3.2.1, DFO 3.2.4</li> <li>• Baffinland Iron Mines Corporation. August, 2019. Technical Comment Responses, Application to Amend Type A Water Licence 2AM-MRY1325, Phase 2 Proposal – Mary River Project: DFO 3.2.1, DFO 3.2.4</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 67-71</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 13-14</li> </ul>	
Summary	<b>DFO Updated Technical Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.9.1 NEW:</b> DFO recommends that Baffinland analyze monitoring reports related to the Tote Road existing watercourses crossings and provide comprehensive “lessons learned” report (for the Tote Road crossings) that would include strategic analysis of what will be done differently to ensure the fish-passage issue will be avoided, mitigated and addressed.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will analyze monitoring reports related to the Tote Road existing watercourses crossings and provide comprehensive lessons learned report (for the Tote Road crossings) that would include strategic analysis of what will be done differently to ensure the fish-passage issue will be mitigated, avoided and addressed. This report will be included as part of any regulatory applications made to DFO.

	<p><b>3.9.2 NEW:</b> DFO recommends Baffinland provide updated hydrological assessment of proposed watercourse crossings that includes, but is not limited to, crossing selection and design criteria, flow rates, velocities and discharge, and fish passage.</p>	<p><b>Status: Resolved</b></p> <p><b>Final Commitment:</b> Baffinland will provide an updated hydrological assessment of proposed watercourse crossings that includes, but is not limited to, crossing selection and design criteria, flow rates, velocities and discharge, and fish passage. This content will be included as part of any regulatory permit applications made to DFO.</p>
<b>Importance of issue to the impact assessment process</b>	Fish require access to habitat and the ability to move among habitat types to complete one or more life processes, as such, it's important that all crossings or other structures allow for fish passage, for all flow scenarios and all life stages.	
<b>Detailed Review Comment Gap/Issue Disagreement with conclusion Reasons for disagreement with conclusion</b>	DFO acknowledges Baffinland's commitment to provide a 'lessons learned' report on the Tote Road, as well as updated hydrological assessments submitted in support of any future DFO Requests for Review or Applications for Authorization. Noting that DFO has robust regulatory mechanisms to manage freshwater impacts associated with the construction of watercourse crossings, DFO is confident that concerns related to impacts to fish habitat and fish passage can be addressed during DFO's regulatory process.	
<b>Recommendation/ Request</b>	<b>Recommendation 3.9 NEW:</b> DFO considers technical comments 3.9.1 NEW and 3.9.2 NEW resolved.	

### 3.10 Freshwater Water Withdrawal

<b>Review Comment Number</b>	3.10 Water Withdrawal
<b>Subject/Topic</b>	Proposed new water withdrawal sites from various lakes and streams along the North Railway
<b>References considered throughout Phase 2 Environmental Assessment</b>	<ul style="list-style-type: none"> <li>• FEIS addendum, Surface Water Assessment (TSD 13); Sections 2.1.1, 2.4, 2.5 &amp; 4.0 of Appendix C</li> <li>• FEIS addendum, Surface Water Assessment (TSD 13); Appendix D, Figure 1, p. D-7</li> <li>• DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comment 3.12.2</li> <li>• Baffinland Iron Mines Technical Comment Responses, March 25, 2019. DFO 3.12.2, page 43</li> <li>• Fresh Water Supply, Sewage, and Wastewater Management Plan, attachment 23 of the Updated Application for Amendment No. 2 of Type A Water Licence, Document #: BAF-PH1-830-P16-0010. Section 4.2, pg. 18.</li> </ul>

	<ul style="list-style-type: none"> <li>• DFO Technical Review Comments to the NWB, July 2019, Technical Comment 3.1, recommendation 3.3.2, 3.3.3, 3.3.4</li> <li>• Baffinland Iron Mines Corporation. August, 2019. Technical Comment Responses, Application to Amend Type A Water Licence 2AM-MRY1325, Phase 2 Proposal – Mary River Project: DFO 3.3.2, DFO 3.3.3, DFO 3.3.4</li> <li>• Updated Technical Comments – Baffinland Iron Mines Corporation Mary River “Phase 2 Development” Proposal, DFO, February 6, 2020, pages 71-75</li> <li>• Phase 2 Comment Responses – Baffinland Iron Mines Corporation, February 22, 2020, pages 14</li> </ul>	
<b>Summary</b>	<b>DFO Updated Technical Recommendation (Feb 6, 2020)</b>	<b>Status/Commitments</b>
	<b>3.10.1 NEW:</b> DFO recommends Baffinland provide detailed water withdrawal plan that includes an in-depth risk analysis informed by site specific fish and fish habitat features for the waterbodies chosen for water withdrawal as part of any DFO Request for Review submission.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will provide a detailed water withdrawal plan that includes an in-depth risk analysis informed by site specific fish and fish habitat features for the waterbodies chosen for water withdrawal as supplemental information to water licensing and any DFO Request for Review submission.
	<b>3.10.2 NEW:</b> DFO recommends Baffinland conduct a thorough localized assessments on the waterbodies selected for water withdrawal in order to adequately assess the potential impacts on the fish habitat resulting from 20% of the 10-year dry unit runoff water withdrawal on fish-bearing watercourses and connecting waterbodies. This assessment should include, but not be limited to, an assessment of the effects to littoral/shore/riparian areas from the proposed water withdrawal, the specific withdrawal locations proposed for each waterbody including fish habitat in the area and updated rationale on how this	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will conduct a thorough localized assessment on the waterbodies selected for water withdrawal in order to adequately assess the potential impacts on the fish habitat resulting from 20% of the 10-year dry unit runoff water withdrawal on fish-bearing watercourses and connecting waterbodies. This assessment will include an assessment of the effects to littoral/shore/riparian areas from the proposed water withdrawal, the specific withdrawal locations proposed for each waterbody including fish habitat in the area and updated rationale on how this level of withdrawal will be an environmentally protective threshold. This content will be included as supplemental information to water licensing and regulatory permit applications made to DFO.

	level of withdrawal will be environmentally protective threshold.	
	<b>3.10.3 NEW:</b> DFO recommends Baffinland provide additional rationale/assessment to support the assertion that 40% of the 10-year dry unit runoff water withdrawal from non-fish-bearing streams will not negatively affect downstream fish-bearing waterbodies.	<b>Status: Resolved</b>  <b>Final Commitment:</b> Baffinland will provide additional rationale/ assessment to support the assertion that 40% of the 10-year dry unit runoff water withdrawal from non-fish-bearing streams will not negatively affect downstream fishbearing waterbodies. This content will be included as supplemental information to water licensing and regulatory permit applications made to DFO.
<b>Importance of issue to the impact assessment process</b>	Water withdrawal from water bodies has the potential to cause a HADD to fish and fish habitat.	
<b>Detailed Review Comment Gap/Issue Disagreement with conclusion Reasons for disagreement with conclusion</b>	DFO acknowledges Baffinland's commitments to provide additional assessments related to freshwater water withdrawals submitted in support of any future DFO Requests for Review or Applications for Authorization. Noting that DFO has robust regulatory mechanisms to manage freshwater impacts associated with water withdrawals, DFO is confident that concerns related to impacts to fish habitat and fish passage can be addressed during DFO's regulatory process.	
<b>Recommendation/ Request</b>	<b>Recommendation 3.10 NEW:</b> DFO considers technical comments 3.10.1 NEW, 3.10.2 NEW, and 3.10.3 NEW resolved.	

### 3.11 Additional References

- Cott, P. and Hanna, B. 2005. Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002. Department of Fisheries and Oceans. Offshore Oil and Gas Environmental Effects Monitoring: Approaches and Technologies. P. 493-510.
- DFO (Fisheries and Oceans Canada). (2010). DFO Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut. 3 p.
- DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/017.

- DFO. 2019a. Science Review of the Phase 2 Addendum to the Final Environmental Impact Statement for the Baffinland Mary River Project. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/015.
- DFO. 2019b. Science Review of Additional Documents submitted May 13–June 17, 2019 for the Second Technical Review of the Final Environmental Impact Statement Addendum for the Baffinland Mary River Project Phase 2. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/031.
- DFO. 2019c. Science Review of Additional Documents Submitted June 18–August 29, 2019 for the Final Environmental Impact Statement Addendum for the Baffinland Mary River Project Phase 2. DFO Can. Sci. Advis. Sec. Sci. Resp. 2019/038.
- IMO (International Marine Organization). Adopted on July 15, 2011. ANNEX 26, RESOLUTION MEPC.207(62). 2011 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species. 25 p.

## 4 English Summary of Recommendations, Commitments and Status

ID	Recommendation	Commitment	Status
3.1.1 NEW	DFO recommends Baffinland provide a brief review and assessment of how changing the limitation from the amount of ore to number of voyages will alter any of the provided assessments and models provided to this point in the assessment process.	Baffinland's Phase 2 Comment Response to DFO 3.1.1 NEW addressed the request	Resolved
3.1.2 NEW	DFO recommends Baffinland provide consideration for vessels, in addition to ore carriers, in determining the potential for impacts due to increased production.	Baffinland can confirm that it will not surpass the number of vessels described and assessed in the Phase 2 FEIS Addendum to ship an additional 20% of ore over 12 Mtpa in the maximum operational flexibility scenario. For clarity, this is a limit of 176 ore carriers, 12 freight vessels and 12 fuel vessels.	Resolved
3.2.1 NEW	DFO recommends Baffinland provide a summary of monitoring conducted during the opening and closing of the shipping season	<p>Baffinland commits to provide a summary of the following information as part of its annual reporting requirements, and in preliminary field reports within 35 days of Spring shoulder season shipping activities commencing and 30 days of Fall shoulder season activities ending:</p> <ul style="list-style-type: none"> <li>i. marine monitoring programs,</li> <li>ii. determinants for opening and closing the shipping season,</li> <li>iii. ecological and cultural (or "Inuit use") factors that influence shipping activities</li> <li>iiii. other information, as requested by DFO and other regulators and key stakeholders, relevant to the marine environment</li> </ul> <p>The requirement for, and format of, these reports will be included in the final Marine Monitoring Plan, should Phase 2 be approved. Additional information requested after submission of the preliminary field report is to be provided</p>	Resolved

		by Baffinland as a memo within 35 days and will be included in Annual Reporting.	
3.2.2 NEW	DFO recommends Baffinland provide consideration for marine mammal behaviours or additional ecological factors in their determination of shipping season opening and closing, such as the mentioned outmigration of narwhal, and a commitment to reporting annually on the determination of the opening and closing of the shipping season.	Baffinland commits to updating the Draft Early Shipping Season-Operational Guide, to better characterize considerations used in determining the nominal shipping season. See response to DFO 3.1.2 for the commitment to report on determinants of opening and closing the shipping season.	Resolved
3.3.1 NEW	DFO recommends Baffinland provide the committed to technical memorandum which include calculations for the LSR associated with the proposed increased transits and modelling in other parts of the RSA including Milne Inlet, Eclipse Sound and Koluktoo Bay, for DFO's review.	Requested information provided in Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020.	Resolved
3.3.2 NEW	DFO recommends that, before the Project is approved, Baffinland re-evaluate the impact of masking on narwhal to a magnitude of 2.	Update to Table 23 in Phase 2 Comment Responses, Appendix B Marine Mammal Monitoring Technical Memorandum – Golder, February 21, 2020 addresses this recommendation	Resolved
3.3.3 NEW	DFO recommends Baffinland commit to collect data with Autonomous Multichannel Acoustic Recorders (AMARs) at an appropriate frequency (eg. yearly) and develop a long term monitoring plan, which is provided to MEWG members and approved by DFO, prior to the start of the Phase 2 increased shipping season.	Baffinland commits to collecting acoustic data in the RSA using AMARs to characterize the degree of conservatism in the sound propagation modelling, at an appropriate frequency for the duration of the Phase 2 construction and operation periods. Baffinland will collaborate with Inuit and DFO on the development of the draft program prior to submission to the MEWG for additional advice and recommendations. Recommendations from MEWG members will be treated consistent with the decision-making requirements as	Resolved



		outlined in the forthcoming updated MEWG Terms of Reference. Baffinland commits to updating the marine monitoring plan (MMP) with this long-term monitoring plan, should Phase 2 be approved.	
3.4.1 NEW	DFO recommends that Baffinland prepare a monitoring plan, with an appropriate survey methodology, for the purpose of documenting and reporting any impacts due to icebreaking and shoulder season shipping activities, which includes the indicators Baffinland intends to use and rationale for the selection of said indicators. Baffinland should provide this plan or an adequate outline of the proposed plan to DFO for review and approval prior to any addition of ice breaking activities.	<p>Baffinland commits to update the Marine Monitoring Plan (MMP) to include a specific section relevant to icebreaking and shoulder season shipping activities in advance of the 2021 shipping season. Through the ICA, Baffinland is also committed to the development initial Indicators for the MMP in collaboration with QIA by December 2020. These initial OITR's will then be subject to review by Inuit (through the Inuit Committee) and regulators (through the MEWG) before finalization (no later than August 30, 2021).</p> <p>In advance of the 2021 shipping season, BIM can also commit to providing an updated draft MMP that will include a placeholder for a dedicated section specific to icebreaking and shoulder season activities. A full update to the MMP will occur following receipt of a positive decision from the Minister. Updates to the MMP will be actively worked on with the MEWG in 2021 (following a decision). A final MMP would then be in place for the 2022 shipping season. Recommendations from MEWG members on survey methodologies and initial indicators will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p>	Resolved
3.4.2 NEW	DFO recommends Baffinland provide consideration for the re-evaluation of the magnitude and the reversibility of the impacts	Baffinland recognizes that DFO disagrees with the certainty assigned to the potential for ice entrapments of marine mammals in the Phase 2 FEIS Addendum. To address DFO's concerns about uncertainty, Baffinland has committed to run annual end of season	Resolved

	of ice entrapment on narwhals.	clearance surveys (DFO 3.6.2) and develop a response plan for the potential event of an ice entrapment (DFO 3.4.3 NEW).	
3.4.3 NEW	DFO recommends Baffinland commit to producing a response plan in the event of ice entrapments, as determined by the committed to multi-year aerial surveys. This plan should include action level triggers and associated outlined response actions, in the event of an ice entrapment and subsequently an increase in frequency of ice entrapments. This plan should be developed in discussion with DFO and other parties and provided to DFO for review and approval.	<p>Baffinland commits to run an annual end of season clearance survey. The survey will occur within 7 days following the close of the shipping season. Determination on the need for the end of season surveys will be where ice conditions warrant the survey, and in collaboration with MHTO and DFO. Baffinland commits to provide GIS coordinates and a description of group size(s) of narwhal along the aerial survey tracks. In addition, Baffinland will document ice conditions along the aerial survey tracks in order to inform changes in ice conditions and/or areas of greater risk for entrapment. This data will be provided to DFO as part of the fall shoulder season shipping reports as committed to under DFO 3.2.1 (NEW).</p> <p>A reporting structure will be determined in collaboration with MHTO, DFO, and other relevant boards and organizations in the event an ice entrapment is observed during the annual end of season clearance survey, as will procedures for determining if the event is a natural or project-related event, and associated response actions. This reporting structure is essential to determine the best course of action should an ice entrapment occur. After five years of annual end of season clearance surveys once Phase 2 shipping is operational, Baffinland and DFO will collaborate to analyze the data acquired from these surveys to determine what has been learned about any potential ice entrapments, and if the annual surveys should continue to proceed.</p>	Resolved
3.4.4 NEW	Overall, DFO reiterates the recommendation that Baffinland implement the most conservative		Outstanding

	mitigation measure and avoid shipping during the shoulder seasons and ice-breaking activities; only ship during the open water season.		
3.5 NEW	DFO reiterates if having Marine Wildlife Observers (MWOs) present for the entire shipping season on all project related vessels (e.g., icebreakers, escort vessels, ore carriers) is not logistically possible, DFO recommends an alternative plan should be developed by Baffinland to monitor presence, behavior and potential ship strikes of marine mammals.	<p>Baffinland has indicated that it is only feasible to have Marine Wildlife Observer's present on the MSV Botnica. Noting that having MWO's present on ships may not be feasible at all times due to safety concerns, and that certain environmental conditions may limit visibility, Baffinland commits to develop a pilot project using remote technology to monitor for ship strikes along the shipping route within the Nunavut Settlement Area. The intent of the pilot project is to determine the efficacy of mitigation to prevent ship strikes and of monitoring to detect ship strikes and any near misses.</p> <p>To solicit early feedback from DFO in advance of developing and submitting the methodology and parameters for the monitoring program to the MEWG, DFO will provide reports from all comparable studies conducted by DFO 8 months in advance of the start of the program and will identify what aspects of these programs DFO is recommending Baffinland integrate into the program design. Where relevant, Baffinland will incorporate the guidance provided by DFO into the study design prior to distributing it to the MEWG for review. Methodology and parameters for the monitoring program will be submitted to the MEWG (of which DFO is a member) for review and recommendations. Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p>	Resolved

		<p>The monitoring program will run for three years, and will begin one year in advance of Phase 2 shipping operations, with a report submitted to DFO and MEWG members each year the program is implemented. The report will include the following information:</p> <ol style="list-style-type: none"> <li>1. The number of hours and ships on which the program ran</li> <li>2. Types and size of vessels on which the program ran</li> <li>3. Timing during the shipping season when the program was run</li> <li>4. The number of vessels that were called to Milne Port relative to Project certificate limits</li> <li>5. If distance of animals to the vessels can be calculated, a discussion of relative CPAs.</li> <li>6. Relevant environmental conditions that may affect detection or increase potential likelihood of an encounter with marine mammals</li> <li>7. If the program is collecting information related to Project effects on the marine environment that is not otherwise being collected through other programs.</li> <li>8. Discussion of cost/value of the Project.</li> </ol> <p>After the third year, Baffinland will submit an overview report on the program, to the MEWG for review. This report will document and discuss the benefits of the project and any challenges faced.</p> <p>If the pilot program confirms ship strikes and/or near misses are occurring the project will be extended and included as a component of the MMP, in consultation with the MEWG, of which DFO is a member. Otherwise, the program will be discontinued as a permanent component of the MMP</p>	
--	--	---	--

		based on the above listed factors, though the program may be implemented again periodically based on advice from the MEWG or Inuit.	
3.6.1 NEW	DFO recommends Baffinland provide clarification on where vessels have been discharging ballast to date and how Baffinland validates/tracks this information.	No commitment proposed. Clarification provided in response to DFO's February 2020 Updated Technical comments.	Resolved
3.6.2 NEW	DFO recommends Baffinland commit to including discharge coordinates in ballast reporting.	Baffinland commits to record the Milne Port anchorage and associated coordinates where compliance testing and discharge occurs in the ballast water testing forms, completed by Baffinland's environmental monitors. A dataset with discharge coordinates will be provided to MEWG members as part of annual reporting requirements.	Resolved
3.6.3 NEW	DFO recommends that Baffinland make a commitment that exchange will be carried out prior to treatment for all vessels conducting exchange plus treatment procedures.	Baffinland will require all vessels calling on Milne Port that treat their ballast under the D2 Standard to also perform a ballast water exchange prior to treatment. For ships unable to conduct exchange as specified in Canadian Ballast Water Regulations (e.g. ships on Canadian domestic trips), exchange is to be conducted as specified in revised ABWEZs for Eastern Arctic as per DFO CSAS advice (see DFO 2015, Stewart et al. 2015 and Goldsmit et al. 2019). This updated commitment will be reflected in the 2020 Standing Instructions to Masters.	Resolved
3.6.4 NEW	DFO recommends that Baffinland clarify what would trigger Baffinland to discontinue exchange plus treatment practices.	Baffinland will consider discontinuing exchange plus treatment requirements should treatment systems efficacy reach a point that makes the benefits of an exchange plus treatment system negligible. This decision will be made in consultation with TC and DFO, and will be based on a consideration of factors outlined in DFO 2019 (i.e. if ballast water organism concentration or composition, environmental conditions, shipping patterns, proportion of voyages meeting	Resolved

		the D-2 standard, or available data describing these conditions change in the future, and relevant updates to global research on ballast treatment systems). In this event Baffinland will update ballast water dispersion modelling to more accurately reflect the spectrum of salinity, temperature, and discharge volumes that can be expected to be discharged at Milne Port under Phase 2 operations if prior exchange were to be discontinued.	
3.6.5 NEW	DFO recommends that Baffinland provide clarification on how Baffinland intends to monitor ballast water discharges for compliance with D2 regulations.	Transport Canada appreciates the efforts by BIM to ensure current regulations are followed with respect to their plans for ballast water management. Given the learning curve associated with use of ballast water treatment systems, for Phase 2, Transport Canada (TC) in consultation with Fisheries and Oceans Canada (DFO), recommends, in conjunction with present sampling and testing protocols being proposed/adopted [NTD - will be summarized in complete package] by BIM, that BIM implement a ballast water compliance sampling plan based on a risk-based targeting methodology to be developed in consultation with DFO and TC. Such a risk-based methodology should be applied to evaluate the risk of all vessel ballast water management (D1, D2) with subsequent salinity and D- 2 biological compliance sampling conducted on vessels identified as high or very high risk. The respective risk-based methodology and associated ballast water compliance sampling plan will be developed in consultation with DFO and TC following completion of DFO's Project-specific sampling conducted on a subset of vessels calling to Milne Port. The risk-based methodology and associated ballast water compliance sampling plan should include a consideration of other compliance initiatives or research being undertaken elsewhere by TC relative to	Resolved via a joint recommendation between DFO and Transport Canada

		<p>implementation of the D-2 standard. Sampling conducted that supports building a body of knowledge for D-2 treatment systems, beyond biological compliance sampling conducted on high risk and very high risk tanks, should not compromise Baffinland's ability to transport annual ore quantities as approved under a modified Project Certificate No 005. Understanding that the rationale for this program is tied to a learning curve associated with the use of ballast water treatment systems, the compliance sampling program and risk based methodology will be adapted as deemed necessary based on the results of the program.</p>	
3.6.6 NEW	<p>DFO recommends that Baffinland make a commitment to develop of a biofouling sampling program, approved by DFO and completed prior to increase shipping activities for Phase 2, which specifically includes physical collection of organisms in a representative, standardized and comprehensive manner (sampling of hull and niche areas) that will allow for identification of non-native species that may be transported through project shipping.</p>	<p>BIM commits to ensuring that vessels arriving to Milne Port and Steensby Port are following IMO International Guidelines for Biofouling Management (and any associated updates to these Guidelines) by including adherence to these Guidelines as a requirement in vessel procurement contracts.</p> <ul style="list-style-type: none"> <li>• Baffinland will include in its contracts with ship owners a requirement to follow IMO Guidelines for Biofouling Management</li> <li>• Baffinland will require each vessel to maintain a Biofouling Management Plan and Biofouling Record Book consistent with Appendix 1 and 2 of the IMO Guidelines</li> <li>• Baffinland will provide a copy of the management plans and record books for each vessel in its Annual Report to the MEWG.</li> <li>• Initiation of this commitment will begin in 2021.</li> </ul> <p>BIM will develop a robust monitoring program design with input from DFO and</p>	Resolved

		<p>other relevant parties that describes its plan for conducting ROV surveys of vessels to evaluate the extent of biofouling on ship hulls arriving in Milne Port prior to the 2022 shipping season. The sampling design will include appropriate sampling effort (with respect to number of vessels and coverage of each vessel) to evaluate differences in extent of biofouling across vessels with different biofouling management measures and histories to provide data for risk assessments to guide future monitoring and management of high risk vessels. Targets for sampling efforts will be established in consultation with DFO and submitted for review and recommendations from Inuit and the MEWG. Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p> <p>This monitoring program will also be applied to vessels calling at Steensby Port as soon as shipping commences for the southern route.</p> <p>Based on new information gathered through vessel biofouling monitoring, a review of vessels Biofouling Management Plans and Record Books and, where known, a review of vessels sailing history relative to variables that could influence the extent of hull fouling and have already been well described in the literature (e.g., Coutts 1999; Coutts &amp; Taylor 2004; Ruiz &amp; Smith 2005), BIM will develop a risk assessment and establish a risk-based sampling plan to guide future monitoring and management of high risk vessels. This risk assessment and risk-based sampling plan will be developed in consultation</p>	
--	--	---	--



		<p>with DFO, and submitted to the MEWG (of which DFO is a member) for review and recommendations.</p> <p>Recommendations from MEWG members on survey methodologies and initial indicators will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</p> <p>Biological sampling (i.e., collection of genetic material, tissue samples, and/or whole organisms) of vessel biofouling would contribute to the identification and monitoring of aquatic invasive or non-indigenous species that have the potential to propagate in northern waters as a result of the Project's shipping activities. BIM will revisit the state of technology and methods used to assess and conduct biological sampling of vessel biofouling and submit a report, to the MEWG by the end of 2021, on options that exist to conduct this work. It is not expected that this report will consider diving as a means to conduct the biological sampling.</p> <ul style="list-style-type: none"> <li>• Once a feasible and safe technology or method has been determined with the MEWG, a pilot program will be run during the next shipping season to determine if it is suitable. If it is not, the report will be revisited and a new technology or method will be selected for another pilot program to be implemented during the next shipping season.</li> <li>• Based on the results of the pilot program, it will be confirmed with the MEWG whether a technically and economically feasible</li> </ul>	
--	--	---	--

		<p>technology or methods exist. If the MEWG agrees by consensus that the program stands to provide valuable data, BIM will update its MMP to include a biological sampling component for biofouling in advance of the next shipping season. The updated monitoring plan will be provided to the MEWG for review and comment before it is finalized.</p> <ul style="list-style-type: none"> <li>• BIM will revise and update its risk assessment and risk-based sampling plan (see 3, above) once a robust set of biological data has been collected. This will be reviewed by the MEWG prior to the next shipping season. Recommendations from MEWG members on survey methodologies and initial indicators will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.</li> </ul> <p>Any feasible technology or method for biological sampling applied at Milne Port will also be applied at Steensby Port.</p> <p>In the event that modifications to biofouling management practices are proposed, Baffinland will consult with DFO and other relevant parties to determine if updates to the risk assessment and risk-based sampling plan are required. Updates to the assessment and the sampling plan will be submitted to the MEWG for review and recommendations prior to implementation. Recommendations from MEWG members on survey methodologies and initial indicators will</p>	
--	--	--	--

		be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.	
3.6.7 NEW	DFO recommends that Baffinland make a commitment to update the monitoring plan, to include more intensive sampling, which includes greater seasonal and spatial coverage, increased sample sizes to address concern related to statistical power for detection, clear protocols for determining identity and status of species (native, non-indigenous or cryptogenic).	Baffinland commits to updating the marine monitoring plan (MMP) in consultation with MEWG members and this will be completed prior to the start of the Phase 2 increased shipping season. The updated MMP will detail the revised MEEMP sampling design which includes greater seasonal and spatial coverage and increased sampling effort and sample sizes to address DFO concerns related to achieving sufficient statistical power for detection of project effects ( $\geq 0.8$ ) (as per recommendations in DFO 2020, pages 4-7).	Resolved
3.6.8 NEW	DFO recommends that Baffinland provide an assessment of potential biological and ecological effects of ballast discharge and identification of the high risk species or groupings of species of concern. These species may include, but not be limited to any NIS/AIS that have been detected in the course of past AIS/MEEMP monitoring, and should be updated in the event that new NIS/AIS are detected in future monitoring.	Baffinland continues to maintain that the identification of high-risk biological species or groupings of species of concern is the primary responsibility of DFO. Despite this, Baffinland is committed to supporting the development of a trigger list of species and associated response plans through the process outlined in response to DFO 3.6.9 and 3.6.10, and to refining that list with DFO following Phase 2 approval.	Resolved
3.6.9 NEW	DFO recommends Baffinland commit to develop an appropriate early response plan with a clear sequence of events to be followed in the event that a nonindigenous species is introduced and/or becomes established.	Baffinland commits to follow the most updated version of DFO's AIS Rapid Response Framework in the event that a nonindigenous species is introduced and/or becomes established.	Resolved
3.6.10 NEW	DFO recommends that Baffinland commit to develop taxa-specific	Baffinland commits to work with the MEWG and DFO to establish species-specific Rapid Response Plans. Rapid	Resolved

	<p>response plans for high risk species or groups of species identified through species level risk assessments. These could be informed by known vessel origins prior to arrival at the project.</p>	<p>Response Plans will be developed for species identified as high risk through ongoing NIS monitoring in the receiving environment, the ROV (or any other future) biofouling monitoring program, results yielded from the 2021 biological ballast water sampling pilot program (and any ongoing ballast monitoring), examination of existing invasive species databases and lists in key ecoregions where vessels calling originate from (as per Goldsmit et al., 2020 Global Change Biology), and based on ranking of potential risk using the Canadian Marine Invasive Screening Tool</p>	
3.7 NEW	<p>DFO recommends that Baffinland conduct a thorough analysis and assessment examining all the combined impacts of all the Project activities inside and outside the study areas.</p>	<p>Baffinland recognizes that DFO disagrees with the determinations of the Combined Effects Assessment located in Table 22 of Baffinland's Marine Mammal Monitoring Technical Memorandum updated in May 2020 (document # 1663724-186-TM-Rev2-38000). DFO is concerned that the combined effects assessment does not adequately consider uncertainty and potential interactions between combined effects, nor does it consider combined effects outside of the Regional Study Area.</p> <p>To account for residual uncertainty in the effects assessment, Baffinland has made several commitments related to the strengthening of monitoring programs, as well as the implementation of pilot projects to better detect and monitor effects of the project on the marine environment. Implementation of these commitments will be developed in collaboration with DFO, Inuit, and relevant organizations to ensure that all recommendations and concerns are addressed and accounted for. If results of the monitoring programs indicate that there are significant or meaningful impacts to the marine environment, Baffinland commits to undertake investigations to determine the cause of the impact, and will identify any</p>	Resolved

		mitigations or other adaptive management strategies to address the impact for review and recommendations by Inuit and the MEWG. Recommendations from MEWG members will be treated consistent with the decision-making requirements as outlined in the forthcoming updated MEWG Terms of Reference.	
3.8 NEW	If the Project is approved, DFO recommends Baffinland provide decision criteria and decision matrix for the selection of water crossing methods for fish bearing watercourses in support of any regulatory applications made to DFO.	Baffinland will provide decision criteria and decision matrix for the selection of water crossing methods for fish bearing watercourses in support of any regulatory permit applications made to DFO.	Resolved
3.9.1 NEW	DFO recommends that Baffinland analyze monitoring reports related to the Tote Road existing watercourses crossings and provide comprehensive "lessons learned" report (for the Tote Road crossings) that would include strategic analysis of what will be done differently to ensure the fish-passage issue will be avoided, mitigated and addressed.	Baffinland will analyze monitoring reports related to the Tote Road existing watercourses crossings and provide comprehensive lessons learned report (for the Tote Road crossings) that would include strategic analysis of what will be done differently to ensure the fish-passage issue will be mitigated, avoided and addressed. This report will be included as part of any regulatory applications made to DFO.	Resolved
3.9.2 NEW	DFO recommends Baffinland provide updated hydrological assessment of proposed watercourses crossings that includes, but is not limited to, crossing selection and design criteria, flow rates, velocities and discharge, and fish passage.	Baffinland will provide an updated hydrological assessment of proposed watercourses crossings that includes, but is not limited to, crossing selection and design criteria, flow rates, velocities and discharge, and fish passage. This content will be included as part of any regulatory permit applications made to DFO.	Resolved
3.10.1 NEW	DFO recommends Baffinland provide detailed water withdrawal plan that includes an in-depth risk analysis informed by site	Baffinland will provide a detailed water withdrawal plan that includes an in-depth risk analysis informed by site specific fish and fish habitat features for the waterbodies chosen for water	Resolved

	specific fish and fish habitat features for the waterbodies chosen for water withdrawal as part of any DFO Request for Review submission.	withdrawal as supplemental information to water licensing and any DFO Request for Review submission.	
3.10.2 NEW	DFO recommends Baffinland conduct a thorough localized assessments on the waterbodies selected for water withdrawal in order to adequately assess the potential impacts on the fish habitat resulting from 20% of the 10-year dry unit runoff water withdrawal on fish-bearing watercourses and connecting waterbodies. This assessment should include, but not be limited to, an assessment of the effects to littoral/shore/riparian areas from the proposed water withdrawal, the specific withdrawal locations proposed for each waterbody including fish habitat in the area and updated rationale on how this level of withdrawal will be environmentally protective threshold.	Baffinland will conduct a thorough localized assessment on the waterbodies selected for water withdrawal in order to adequately assess the potential impacts on the fish habitat resulting from 20% of the 10-year dry unit runoff water withdrawal on fish-bearing watercourses and connecting waterbodies. This assessment will include an assessment of the effects to littoral/shore/riparian areas from the proposed water withdrawal, the specific withdrawal locations proposed for each waterbody including fish habitat in the area and updated rationale on how this level of withdrawal will be an environmentally protective threshold. This content will be included as supplemental information to water licensing and regulatory permit applications made to DFO.	Resolved
3.10.3 NEW	DFO recommends Baffinland provide additional rationale/assessment to support the assertion that 40% of the 10-year dry unit runoff water withdrawal from non-fish-bearing streams will not negatively affect downstream fish-bearing waterbodies	Baffinland will provide additional rationale/assessment to support the assertion that 40% of the 10-year dry unit runoff water withdrawal from non-fish-bearing streams will not negatively affect downstream fishbearing waterbodies. This content will be included as supplemental information to water licensing and regulatory permit applications made to DFO.	Resolved

## **5 Inuktitut Summary of Recommendations, Commitments and Status**