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FISHERIES AND OCEANS CANADA

Technical Review Comments

Baffinland Iron Mines Corporation
Mary River "Phase 2 Development" Project Proposal
Amendment to Water Licence No. 2AM-MRY1325

Submitted to: Nunavut Water Board
July 15, 2019
DFO File No.: 07-HCAA-CA7-00050
NWB File No.: 2AM-MRY1325

Canada

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Executive Summary

The Mary River "Phase 2 Development" Project application to amend the Type "A" Water Licence 2AM-MRY1325 (the Project), proposes a modification to an approved iron ore mine operated by Baffinland Iron Mines Corporation (the Proponent) located on Baffin Island approximately 100 km south of Pond Inlet, Nunavut and 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 which will support increased shipping activities.

On behalf of Fisheries and Oceans Canada (DFO), the Fish and Fish Habitat Protection Program (FFHPP) has reviewed the application and supporting documents related to the Project, as it relates to the departmental mandate under the *Fisheries Act*, to maintain the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries, including marine mammals and their habitat. DFO-FFHPP's primary focus of this review was to ensure that works, undertakings and activities are conducted in compliance with the applicable provisions of the *Fisheries Act*.

The fisheries protection provisions of the *Fisheries Act* (2013), specifically subsection 35(1), state that "*No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery or to fish that support such a fishery*." However, under paragraph 35(2)(b) of the *Fisheries Act*, the Minister of Fisheries and Oceans may issue an authorization with terms and conditions in relation to a proposed work, undertaking or activity that may result in serious harm to fish. Serious harm to fish is defined in Section 2 of this Act as the death of fish, or permanent alteration to or destruction of fish habitat.

DFO-FFHPP is providing the following technical submission in response to the Nunavut Water Board's (NWB) correspondence dated May 16, 2019, which states that technical review comments are due to the board on July 15, 2019. The technical comments in this submission are categorized under the following general topic of Freshwater Environment with respect to watercourse crossings, fish passage, water withdrawal and blasting.

Proposed construction and operation of various watercourse crossings structures including diversions and encroachments have the potential to negatively impact the fish and fish habitat within watercourses. Additional information is required to ensure that all potential impacts to the freshwater environment are understood and adequately accounted for, and to ensure adequate and appropriate mitigation and monitoring plans are developed.

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ᐅᓇ ᓄᓗᑦᖢᓂ “ᐊᖏᑭᓪᓗᐊᖅᑕᐅᓂᖓ 2 ᐱᓕᕐᓪᓚᐃᑎᑕᐅᓂᖓ” ᐅᓴᕐᖃᓂᐊᕐᓇᖅ ᐅᐸᑐᑎᖓ ᐊᕐᑭᑦᓪᓗᓂ ᖃᓄᓇᑐᓂᖓ “A” ᐃᒪᖓᓄᑦ ᓪᐃᓗᓴ 2AM-MRY1325 (ᐅᓴᕐᖃᓂᐊᕐᓇᖅ), ᑐᓴᓂᖅᑐᖅ ᐊᕐᑭᑦᓪᓗᑎᐊᕐᓂᑦᓪᓚᑦ ᐊᖏᖅᑕᐅᓂᖓᓄᑦ ᓴᓇᕐᓴᖅᓴᕐᒥᖅ ᐅᓴᕐᖃᓂᐊᕐᓇᖅ ᐊᐅᓪᓚᑦᑎᐊᖅᖢᖅ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓴᖅ ᐅᓴᕐᖃᓂᐊᕐᓇᖅ ᓱᐊᓴᓵᓴᓕ (ᑐᓴᓂᖅᑐᖅ) ᑕᐅᕙᓵᓕᑐᑦ ᖃᑭᖅᑕᓪᓚᖓ ᖃᓄᑎᓴᖓ 100 ᑭᓪᓗᑕ ᓂᒋᑎᑕᓪᓚᖓ, ᓄᓇᕗᑦ ᐊᓯᓪᓚᓗ ᐃᓪᐊᓂᓄ ᖃᑭᖅᑕᓂ ᓄᓇᖓᑦ ᓄᓇᕗᓪᒥ. ᐅᓇ ᐅᓴᕐᖃᓂᐊᕐᓇᖅ ᐊᐅᓪᓚᑦᑎᐊᖅᖢᖅ ᐊᖏᑭᓪᓗᐊᕐᓇᓕᒍ ᐅᓴᕐᖃᓂᐊᖅᓂᖓ 12 ᒥᓪᓂᐊᓱ ᑕᓐᓴ ᐊᕐᕿᒍ ᐊᑕᐅᓯᕐᒥ, ᐅᓯᒃᑕᖅᑕᐅᓪᓚᖓ ᓴᐃᕐᓴᕐᓴᖅ ᖃᑦᖻᐊᓓᓂᑦ ᑕᒪᐅᓐᓇ ᓴᓇᕐᐅᓪᓚᖓ ᓄᑦᕿᖅ ᓄᓇᓯᐅᑎᓂᑉᑐᖅ ᑐᑭᓯᑕᖅᑐᖅ ᓴᓇᕐᓴᖅᓴᕐᒥᖅ ᐃᓐᓇᐃᓐᓇᕐᓚᐅᑦᓪᓚᖓ ᐃᒃᓴᓂᓄᑦᖢᖅᑐᖅ ᐅᓄᖅᑕᖅᑐᖅ ᐅᓪᓗᕈᑎᑦᓪᓚᖓ ᐱᖓᑦᓂᓕᕆᓂᖅ ᐃᒃᓴᓂᓄᑦᖢᖅᑐᖅ ᐅᓄᖅᑕᖅᑐᖅ ᐱᖓᑦᓂᓕᕆᓂᖅ ᐊᐅᓪᓚᑦᑎᐊᖅᖢᖅ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓴᖅ ᐃᒃᓴᓂᓄᑦᖢᖅᑐᖅ ᐅᓄᖅᑕᖅᑐᖅ ᐅᓇᓱᖅᑐᑦᓪᓚᖓ ᐅᒥᖅᑕᖅᑐᖅ ᐅᓪᓗᕈᑎᑦᓪᓚᖓ ᐅᓄᖅᑕᖅᑐᖅ ᐅᓇᓱᖅᑐᑦᓪᓚᖓ.

ᑭᓚᖅᑐᖅᓴᓂᑦ ᐃᖃᓗᓕᕆᔨᒃᑯᑦ ᐊᓯᓚᓗ ᐃᒪᐃᓕᕆᔨᒃᑯᑦ ᑲᓇᑕ, ᐃᖃᓗᖓᑦ ᐊᓯᓚᓗ ᐃᖃᓗᖃᖅᓴᐃᐅᔪᑦ ᓴᓪᒥᐱᓛᕐᖓᑦ ᖃᑎᖅᑭᑦᓴᖅᑕᐅᓪᓚᕆᔪᑦ ᐅᐸᑐᑎᖓ ᐊᓯᓚᓗ ᐃᑲᔪᖅᓴᕐᔪᑦ ᑎᑎᖅᑦ ᐱᓕᕐᓗᒍ ᐅᓴᕐᖃᓂᐊᕐᓇᖅᓴ, ᐊᑕᔪᖅ ᐊᐅᓪᓚᕐᓴᐃᖏᓪᓕ ᑎᓪᓗᐅᐅᓪᓚᕆᔭᐃᓐᓇᖓ ᐊᑕᒍᔪ ᐃ ᖃᓗᓐᓂᓪᓕᐊᓴᖅᖢᖅ, ᐃᖃᓗᖃᐃᓐᓂᕐᓂᐊᕐᓇᖅᒪᑦ ᐊᓯᓚᓗ ᑭᐃᓕᓴᐃᓐᓇᖅᑐᑦ ᐃᓕᓴᕐᓇᕐᓂᖓ, ᑭᓴᐃᓕᕆᔨᒃᑯᑦ ᐃᖃᓗᓐᓂᑦ, ᑕᐅᔭᐊᓗ >ᐃᓕᑦ ᐊᓯᓚᓗ ᓇᔪᖅᑕᖏᑦ. ᐃᖃᓗᓕᕆᔨᒃᑯᑦ ᐊᓯᓚᓗ ᐃᒪᐃᓕᕆᔨᒃᑯᑦ ᑲᓇᑕ, ᐃᖃᓗᓐᓂᑦ ᐊᓯᓚᓗ ᐃᖃᓗᖃᖅᓴᐃᐅᔪᑦ ᓴᓪᒥᐱᓛᕐᖓᑦ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓂᖓ ᐅᓇ ᖃᑎᖅᑭᑦᓴᖅᑕᐅᓪᓚᖓ ᖃᐅᔨᓴᓇᓕᒫᓂᐊᖅ ᑕᑯᔭᐊᓗ >ᐃᓕᑦ ᐊᓯᓚᓗ ᓇᔪᖅᑕᖏᑦ. ᐃᖃᓗᓕᕆᔨᒃᑯᑦ ᐊᓯᓚᓗ ᐃᒪᐃᓕᕆᔨᒃᑯᑦ ᑲᓇᑕ, ᐃᖃᓗᓐᓂᑦ ᐊᓯᓚᓗ ᐃᖃᓗᖃᖅᓴᐃᐅᔪᑦ ᓴᓪᒥᐱᓛᕐᖓᑦ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓂᖓ ᐅᓇ ᖃᑎᖅᑭᑦᓴᖅᑕᐅᓪᓚᖓ ᖃᐅᔨᓴᓇᓕᒫᓂᐊᖅ ᑕᑯᔭᐊᓗ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓴᖅᓴᕐᒥᖅ ᐃᖃᓗᓐᓂᑦ ᐅᐸᑐᑎᖓ ᐊᓯᓚᓗ ᐃᖃᓗᖃᖅᓴᐃᐅᔪᑦ ᓴᓪᒥᐱᓛᕐᖓᑦ ᐊᐅᓪᓚᑦᑎᐊᖅᑐᓂᖓ

ᓴᓇᐅᔨᒪᔪᖅ ᐊᓚᒐ ᐊᐅᓪᑕᐅᓗᓂᓄ ᐊᐱᕆᓵᖏᑦᑐᑦ ᐃᒧᒍᑦ ᐃᑲᖏᕕᖅ ᓴᓇᐅᓗᓂᑎᑦ ᑕᑲᓂᐊᓐ ᓴᖅᒍᑎᐊᖅᕕᖏᑦ ᐊᓚᒐ ᐊᖏᑭᐊᑭᑎᖏᑦ ᐱᐅᑭᓂᐊᓂᖅᓯᓂᑦ ᓂᓚᓵᖏᑦᑐᑦᑐᓄᑦ ᐊᑲᑐᐃᑦᓴᖏᒪᑦ ᐃᖅᓱᓐᓂᑦ ᐊᓚᒐ ᐃᖅᓱᓐᓂᕐᔪᓂᑦ ᓄᓕᓂᖅ. ᑐᑭᓯᑎᐊᖅᖁᑕᐅᑲᓂᓂᑭᒪᔪᑦ ᖁᐅᓴᒪᓂᐊᖏᒪᑕ ᑕᒪᑲᓄᐊ ᑕᒪᖏᑲ ᐊᑲᑐᐃᑦᓴᖏᑐᑦ ᐃᒪᑦᑎᐊᕐᖓᑦᑐᖅ ᐊᕐᕌᑎᑦᑎᓂ ᑐᑭᓯᐊᓕᕐᓂᖅ ᐊᓐᑎᑎᖅᑌᓴᐅᓂᐊᖏᑐᖅᑐᓂᑯᓂ, ᐊᓚᒐ ᐊᑐᖅᑕᐅᔨᓴᓪᒪᑦᑎᐊᖅᑐᓂᑯᓂ ᐊᓚᒐ ᓄᒪᓴᑐᓂᑯᓂ ᐊᐅᑐᓗᐊᖅᑕᐃᓕᓪᒪᑎᑦᑎᔨᑎᐅᑦᓴᓂᑯᓂ ᐊᓚᒐ ᒥᐊᓂᓪᔨᐸᑎᐅᑦᓴᓂᑯᓂ ᐸᖁᓪᓗᐊᑎᐅᑦᓴᓂᑯᓂ.

Sommaire

La demande de la phase 2 du projet Mary River (le projet) visant la modification du permis d'utilisation des eaux de type « A » 2AM-MRY1325 suggère une modification à une mine de minerai de fer approuvée, exploitée par la Baffinland Iron Mines Corporation (le promoteur) et située sur l'île de Baffin, à environ 100 km au sud de Pond Inlet, dans la région de Qikiqtani au Nunavut. Le projet vise une augmentation de la production à 12 millions de tonnes par an pour le transport du minerai jusqu'à Milne Port, par la construction d'un nouveau chemin de fer en grande partie parallèle à la route Tote existante et par la construction et l'exploitation d'un deuxième quai minéralier qui permettra d'accroître les activités de transport maritime.

Au nom de Pêches et Océans Canada (MPO), le Programme de protection du poisson et de son habitat (PPPH) a examiné la demande et les documents à l'appui liés au projet, dans l'optique du mandat du Ministère selon la *Loi sur les pêches*, afin de maintenir la durabilité et la productivité continue des pêches commerciales, récréatives et autochtones, y compris les mammifères marins et leur habitat. Le principal objectif de l'examen réalisé par le PPPH était de s'assurer que les travaux, les entreprises et les activités sont menés en conformité avec les dispositions applicables de la *Loi sur les pêches*.

Les dispositions sur la protection des pêches de la *Loi sur les pêches (2013)*, et plus précisément le paragraphe 35(1), portent qu'« *il est interdit d'exploiter un ouvrage ou une entreprise ou d'exercer une activité entraînant des dommages sérieux à tout poisson visé par une pêche commerciale, récréative ou autochtone, ou à tout poisson dont dépend une telle pêche »*. Néanmoins, selon l'alinéa 35(2)b) de la *Loi sur les pêches*, le ministre des Pêches et des Océans peut délivrer une autorisation assortie de conditions qui se rapportent à l'activité, à l'entreprise ou à l'ouvrage proposé qui est susceptible de causer des dommages sérieux aux poissons. L'article 2 de cette Loi définit les dommages sérieux causés aux poissons comme « la mort de tout poisson ou la modification permanente ou la destruction de son habitat ».

Le PPPH présente la soumission technique suivante en réponse à la correspondance de l'Office des eaux du Nunavut (OEN) datée du 16 mai 2019, selon laquelle les commentaires sur l'examen technique doivent lui parvenir au plus tard le 15 juillet 2019. Les commentaires techniques contenus dans la présente soumission sont classés sous le thème général du milieu d'eau douce en ce qui concerne les traversées de cours d'eau, le passage des poissons, l'extraction d'eau et le dynamitage.

La construction et l'exploitation proposées de diverses structures de traversée de cours d'eau, y compris les dérivations et les empiètements, pourraient avoir des répercussions négatives sur le poisson et son habitat dans les cours d'eau. Des renseignements supplémentaires seront nécessaires pour s'assurer que les répercussions possibles sur les milieux marins d'eau douce sont comprises et prises en compte, et que des plans d'atténuation et de surveillance nécessaires sont élaborés.

1 Introduction

This technical review submission summarizes Fisheries and Oceans Canada (DFO) – Fish and Fish Habitat Protection Program's (FFHPP) assessment and recommendations concerning the Baffinland Iron Mines Corporation's (Baffinland) Mary River Project, Phase 2 Development Proposal (the Project). The purpose of these technical review comments is to provide expert advice to the Nunavut Water Board (NWB) regarding Baffinland's proposed modifications and identify potential impacts to fish and fish habitat associated with the project changes.

This submission focuses on a technical assessment of the Project. The objective being to analyse the updated plans and/or revised information presented by Baffinland in support of the proposed modifications, and reflects DFO-FFHPP's mandate (see section 2).

As directed by the NWB in their letter dated May 16, 2019, this submission focuses on analysis of information presented by Baffinland Iron Mines Corporation (the Proponent) as part of the amendment application, including the Project proposal and supporting documents.

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).

In general, DFO-FFHPP undertakes the review of proposed project in and around fisheries waters to ensure 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.*

The mandate of DFO-FFHPP is to maintain the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries. Sub-section 35 (1) of the *Fisheries Act* states that "No person shall carry on any work, undertaking or activity that results in *serious harm to fish* that are part of a commercial, recreational, or Aboriginal fishery or to fish that support such a fishery."

Fisheries and Oceans Canada interprets *serious harm to fish* as:

- the **death of fish**;

- a **permanent alteration** to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- the **destruction of fish habitat** of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of these life processes.

However, under Paragraph 35 (2) (b) of the *Fisheries Act*, the Minister of Fisheries, Oceans and the Canadian Coast Guard may issue an authorization with terms and conditions in relation to a proposed work, undertaking or activity that may result in serious harm to fish. Subject to the consideration of the four factors in Section 6 of the *Fisheries Act*:

1. The contribution of the relevant fish to the ongoing productivity of commercial, recreational or Aboriginal fisheries;

2. Fisheries management objectives;

3. Whether there are measures and standards to avoid, mitigate or offset serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or that support such a fishery; and

4. The public interest.

DFO-FFHPP is guided by the "Fisheries Protection Policy Statement (2013)", which is intended to provide guidance to Canadians and ensure compliance with the *Fisheries Act*. The *Fisheries Protection Policy Statement* strengthens the Federal Government's ability to address key threats to the productivity and sustainability of our fisheries, through standards and guidelines to avoid, mitigate, and offset impacts to fisheries.

The "Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting (2013)" provides guidance on undertaking effective measures to offset serious harm to fish that are part of or that support a commercial, recreational or Aboriginal fishery, consistent with the fisheries protection provisions of the *Fisheries Act*. The objective of offsetting is to counterbalance unavoidable *serious harm to fish* and the loss of fisheries productivity resulting from a project. For more information, see: http://www.dfo-mpo.gc.ca/pnw-ppe/pol/index-eng.html

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 of Fisheries, Oceans and the Canadian Coast Guard 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 Watercourse Crossings

Review Comment Number	3.1 Watercourse crossings
Subject/Topic	Locations and types of proposed watercourse crossings
References	• DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comments 3.10.1 and 3.10.3. • Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.2: North Railway Freshwater Habitat Survey, Appendix 1, Table A1-1 • 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 • Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.3: North Railway Catchments • Updated Application for Amendment No. 2 of Type A Water Licence, Attachment 13.1 appendices: Project Infrastructure Interactions With Fresh Water Streams and Ponds • 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) • DFO Information Requests (IRs) to the Nunavut Water Board (NWB), May 14, 2019. DFO IR 1b. • 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)
Summary	1. In DFO's technical review comments submitted to the Nunavut Impact Review Board (NIRB) (Technical Comment 3.10.1), DFO-FFHPP recommended "*Baffinland clarify when they will provide the short-list of crossings that are better suited to alternatives to CSP culverts, and provided specific details on what the short list will contain (e.g. method for the ranking and selection of options)*.". DFO notes that Baffinland has provided an updated list of crossing in: Table A1-1 (Appendix 1 of the North Railway Freshwater Habitat Survey: attachment 13.2) of the Updated Application for Amendment No. 2 of Type A Water Licence "*list of crossings, cuts, encroachments/infills and bridges and 2018 fish habitat designations*" and Table A2-1 (Appendix 2 of the Project Infrastructure Interactions with Fish Habitat: attachment 13.1) of the

	Updated Application for Amendment No. 2 of Type A Water Licence: "*List of North Rail Infrastructure Interactions with Fresh Water*." 2. In DFO's technical review comments, submitted to the NIRB, Technical Comment 3.10.3, DFO recommended "*Baffinland provide the missing watershed/catchment information between CV-070 and CV-100, which can be provided in the form of Sheets 9-12 (i.e. Figures A9-A12) of TSD 13 Appendix D, Appendix A "Northern Transportation Corridor Stream Crossing Catchments*". DFO-FFHPP acknowledges document 13.3: North Railway Catchments, provided as part of the updated water licence application and notes that Rail Site Drainage Catchments sheets 2 and 3, contain the section of the railway which had missing information from the previous application. In DFO's IRs submitted to the NWB(IR 1d) DFO-FHFPP noted "*that these sheets do not show the full extent of the catchment areas extending from the proposed North Railway*". DFO-FFHPP reiterated this request during the NIRB technical session June 17-19, 2019. Baffinland committed to provide "*Additional maps will be provided with June 28th submission to NIRB*." 3. DFO-FFHPP acknowledges that the Proponent has provided maps for culverts for the Project as appendices to document 13.1: 'Mary River Phase 2 Proposal Update: Project Infrastructure Interactions With Fresh Water Streams and Ponds'. In Appendix 3 of document 13.1, Maps 1-5 show five segments along the Milne Inlet Tote Road. In DFO's IRs submitted to the NWB, IR 1b, DFO-FFHPP noted "*the maps do not cover the entire road*." and recommended "*the Proponent provides maps for the entirety of the road and label all crossings, which includes the locations of proposed changes to existing Tote Road crossings (as currently provided) and the locations for crossings that are expected to remain as they are*". During the NIRB Technical Session June 17-19, 2019, Baffinland committed to providing the requested maps.
Importance of issue to the impact assessment process	It's important to have complete information for all proposed watercourse crossings, in order to adequately assess all potential impacts to fish and fish habitat resulting from watercourse crossings.
Detailed Review Comment **1. Gap/Issue** **2. Disagreement with conclusion**	1. DFO-FFHPP acknowledges that Baffinland has provided an updated crossing list in Table A2-1 in Appendix 2 of the Project Infrastructure Interactions with Fish Habitat: attachment 13.1. However, DFO-FFHPP notes that a short-list of crossings that are better suited to alternatives to CSP culverts and *what methods were used for ranking and selection of crossing infrastructure options* (emphasis added), has still not been

3. Reasons for disagreement with conclusion	provided. Understanding how these options were ranked to inform the crossing-type selection will aid in DFO-FFHPP's review of the necessity and adequacy of watercourse crossings over fish bearing watercourse crossings. DFO-FFHPP submits that this can be discussed during DFO's regulatory phase and submitted as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, should the project be approved and receive it's Water Licence. 2. In DFO's technical review comments, submitted to the NIRB (TC 3.10.3), DFO-FFHPP recommended that Baffinland provide missing watershed/catchment information. DFO-FFHPP acknowledges document 13.3: North Railway Catchments, provided as part of the updated application and notes that Rail Site Drainage Catchments sheets 2 and 3, contain the section of the railway which had missing information from the previous application. However, DFO-FFHPP notes that the sheets (2 and 3) do not provide the full extent of the catchment areas that extend from the proposed North Railway alignment. DFO-FFHPP suggests that this information is necessary to adequately review downstream effects of water crossings, particularly in regard to downstream flows and potential cumulative hydrological impacts. Knowledge of the particular catchment/watershed that the water crossings are located within, will help inform compounding impacts to waterbodies and downstream areas. DFO-FFHPP acknowledges that Baffinland has committed to providing the requested maps, however, the noted request remains outstanding. 3. Further, DFO-FFHPP reiterates that providing comprehensive / full coverage maps which show all fish bearing crossings proposed for the Phase 2 project would provide additional clarity which can allow reviewers to visualize the whole route and help support an assessment of the cumulative impacts to fish and fish habitat in waterbodies along both the North Railway and the Tote Road. These maps should include but not be limited to identification of crossings along the North Railway, crossings along the Milne Inlet Tote Road (including updated and existing, unchanged crossings), crossings located along temporary access roads within the same catchment areas, clear references/identification of fish bearing crossings, barriers and noting where multiple crossings exist on the same waterbody. DFO-FFHPP notes that although much of this information has been provided/ scattered throughout different documents, maps compiling

	the requested information into one place would be a valuable tool for review. DFO-FFHPP acknowledges that Baffinland has committed to providing the requested maps (made during NIRB process), however, these remain outstanding.
Recommendation/Request	**Recommendation 3.1.1**: DFO-FFHPP recommends Baffinland provide rationale for the selection of crossing infrastructure for fish bearing watercourses. DFO-FFHPP notes this can be provided to DFO as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase. **Recommendation 3.1.2**: DFO-FFHPP reiterates the recommendation that Baffinland provide the full scope and visual of catchment areas associated with fish-bearing water crossings. **Recommendation 3.1.3**: DFO-FFHPP recommends the Proponent provides maps for the entirety of the road and label all crossings, which includes the locations of proposed changes to existing Tote Road crossings (as currently provided) and the locations for crossings that are expected to remain as they are.

3.2 Fish Passage

Review Comment Number	3.2 Fish Passage
Subject/Topic	Watercourse crossings: high velocity predictions and impacts to fish passage
References	• 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) • 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) • Conceptual Freshwater Offsetting Plan (TSD 15): Section 5.3.2 (p. 19) • DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comments 3.10.4 and 3.11.2. • 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.

	• Email Correspondence from Baffinland to the Nunavut Water Board, April 30, 2019. • 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. • 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 • DFO Information Requests (IRs) to the Nunavut Water Board (NWB), May 14, 2019. DFO IR 1a.
Summary	1. Baffinland has identified several potential fish passage issues associated with the proposed watercourse crossings, diversions, and encroachments that are a part of the Project. For example: "*Of 145 stream crossings in known or potential Arctic char habitat, …..124 crossings may present barriers to fish passage."* (TSD 13, Section 2.5.2 Increased Flow Velocity at North Railway Watercourse Crossings (p. 16). With respect to the Tote Road watercourse crossing issues Baffinland also states: "*Most fish passage issues identified in the annual monitoring surveys was effectively mitigated. However, issues at some crossings have persisted and will require additional mitigation to rectify, including persistent perches and excessive road sedimentation*", further stating in TSD 14, section 2.5.1.2 (p. 23): "*for long culverts, especially in combination with high gradients, maintaining water velocities that fish can manage for the time it takes to pass through a culvert <u>may not be possible</u>*" (emphasis added). This contradicts Baffinlands conclusion : "*With implementation of design and mitigation measures, effects of culvert installations on fish passage are assumed to be negligible*" (TSD 15, s.5.3.2, p. 19). With respect to identifying and addressing potential issues with the watercourse crossings, DFO-FFHPP notes in TSD 14, s.2.2.2 (p. 8), that Baffinland has committed "*to continued monitoring and mitigation including annual monitoring at fish-bearing crossings and development and implementation of a Tote Road Earthworks Execution Plan (TREEP) to improve fish passage issues*", and that Baffinland has indicated the use of 'assorted measures' to reduce stream velocities (TSD 13, section 2.5.2; TSD 14, Appendix 1, section 4.2.3.2). In TSD 13 section 2.5.2 (p. 16) Baffinland asserts: *"It is expected that with additional engineering design, flow velocities that currently exceed fish passage thresholds will be able to be reduced below the thresholds".*

	In DFO's technical review comments to the NIRB (TC 3.10.4), DFO-FFHPP recommended that "*Baffinland clarify when they will provide updated hydrological modelling, and provide specific details on what updated modelling will entail.*" Baffinland responded that "*This information will be provided in the supplemental information package to support water licensing and an application for a Fisheries Act authorization referenced in response to DFO 3.10.1 (in this submission)*." (Response to DFO comment 3.10.4). In an email correspondence from Baffinland on April 30 Baffinland noted "*Additional information necessary for fisheries offset authorizations but not necessary for water licensing will be available by May 31st and includes:* • *Updated Hydrological Assessment – An updated hydrological assessment is being completed for any remaining stream diversions, and culverts will be re-assessed for fish passage using actual rather than the previously assumed gradients*" 2. On page 23, in section 7.2.1.5 of attachment 7.2 of the updated application: North Railway Design Criteria, it states: "*The flow volumes calculated in 7.1.5.3 will be used to determine the ultimate sizing of the culvert structure in terms of number and size of barrels.*" 3. DFO-FFHPP notes section 7.1.1, also on page 23 of attachment 7.2, states "*whilst normally 1:50 for culverts and 1:100 return floods and intensities for major structures are considered for railway line designs. For this project the design was for 1:200*". However, DFO notes that on the same page under section 7.2.3, under the heading "*Flood Return Period*", it states: "*One in one hundred year return period*". DFO-FFHPP notes further inconsistencies exist in relation to this throughout attachments 7.1 and 7.2 of the updated application. 4. DFO-FFHPP notes that Baffinland has identified the potential cumulative aspects of their assorted works, undertakings and activities. In TSD 14 (s.2.5, p. 22), Baffinland states: "*In some instances, the road and rail crossings will effectively become one installation. In these cases, fish passage may be impeded by the cumulative effect of the road and rail crossings*". 5. DFO-FFHPP notes on page 32, in section 8.6 of the updated application attachment 13.7: North Railway Arch Bridges Hydraulic Assessment, it

	states: "*the following mitigation measures, specific to bridges along the rail corridor, will be applied if flow velocities are found to restrict fish passage:* • *Support piers will be placed on concrete pads or steel pile caps covered in riprap to stabilize the streambed.* • *Wherever feasible, riprap material will be selected to match existing streambed material to provide potential habitat for lower trophic biota and fish and to minimize alteration to fish habitat*."
Importance of issue to the impact assessment process	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.
Detailed Review Comment **4. Gap/Issue** **5. Disagreement with conclusion** **6. Reasons for disagreement with conclusion**	1. DFO-FFHPP notes that fish-passage issues have previously occurred along the Tote Road, for example resulting from high-velocities in undersized culverts or from insufficient number of culverts (TSD 14, s.2.2.2; p. 7-8). In the absence of a comprehensive "lessons learned" (for the tote road crossings) and/or a strategic analysis of what will be done differently to ensure the fish-passage issue will be mitigated, avoided and addressed, DFO-FFHPP remains concerned that fish passage issues will not be adequately avoided or mitigated for the proposed watercourse crossings, diversions, and encroachments. DFO-FFHPP acknowledges that Baffinland commits to updating hydrological modelling (Baffinland's response to DFO technical comment 3.10.1 to the NIRB and email correspondence from Baffinland on April 30). DFO-FFHPP reiterates that the updated hydrological assessment is required for adequate assessment of potential impacts. The hydrological assessment will inform flow rates, velocities and discharge, which can further inform the proposed crossing selection and design and assist in DFO's assessment of impacts to fish and fish habitat and fish passage. DFO-FFHPP will await these updates for further review and assessment. Further, in section 7.2.1.6, on page 23 of attachment 7.2, Baffinland states "*It is impossible to have stream flow data for every fish bearing stream*." DFO-FFHPP notes that all watercourse crossings that occur on/within fish-bearing waterbodies will be required to pass fishes, and should the project be approved to proceed and water licence granted, DFO-FFHPP will require updated flow and velocity modelling / predictions (for each water course crossing) as part of Baffinland's Request for Review or Application for *Fisheries Act* Authorization.

	2. DFO-FFHPP notes that on page 23, in section 7.2.1.5 of attachment 7.2 of the updated application: North Railway Design Criteria, it states: "*The flow volumes calculated in 7.1.5.3 will be used to determine the ultimate sizing of the culvert structure in terms of number and size of barrels.*" However, DFO-FFHPP notes that section 7.1.5.3 does not exist in this report. If flow volumes are available, it will be important for DFO-FFHPP to review this information as these calculations will inform the adequacy of the impact conclusions and validity of culvert sizes. 3. DFO-FFHPP notes sections 7.1.1 and 7.2.3 of attachment 7.2, state "*whilst normally 1:50 for culverts and 1:100 return floods and intensities for major structures are considered for railway line designs. For this project the design was for 1:200*" and "*One in one hundred year return period*" (under the heading "*Flood Return Period*"), respectively. DFO-FFHPP is unclear which flood return period is intended for use for hydrologic analysis. DFO-FFHPP notes inconsistencies in relation to this throughout attachments 7.1 and 7.2 of the updated application. 4. DFO-FFHPP remains concerned about the cumulative impacts of multiple water crossings on the same waterbodies and the particular concern of increased velocity through these multiple crossings. In DFO's technical review comments to the NIRB (Technical Comment 3.11.2), DFO-FFHPP recommended that "*Baffinland provide further information in regard to the potential cumulative impacts of all crossings on flow and fish passage (short-term and permanent; Tote Road, North Rail and Temporary Access Roads), including clear identification of crossings that occur on the same waterbody*." In Baffinland's response to DFO Technical Comment 3.11.2, Baffinland indicated that "*this information will be provided in the supplemental information package to support water licensing and an application for a Fisheries Act authorization*" and "*All crossings, temporary or permanent, will be modelled and designed according to requirements for fish passage. This information and design criteria will reduce potential for cumulative impacts with any other crossing structures on the same waterways*." DFO-FFHPP has reiterated the request as an IR submitted to the NWB as IR 1a and at the NIRB technical session June 17-19, 2019. This remains outstanding.

	5. DFO-FFHPP is unclear regarding Baffinland's proposed "*mitigation measures, specific to bridges along the rail corridor"* and specifically the proposal that mitigation measures "*will be applied if flow velocities are found to restrict fish passage".* DFO-FFHPP notes that t "*Support piers will be placed on concrete pads or steel pile caps covered in riprap to stabilize the streambed*" suggests post construction installation of the mitigations after monitoring of flows of the existing structure show higher than expected flow rates. DFO-FFHPP further notes that mitigations should be installed prior to construction if flow velocities are expected to restrict fish passage. Its also unclear to DFO-FFHPP how flow velocities that restrict fish passage will be determined post installation; noting that adequate site- specific hydrological modelling conducted during the design stage should account for the potential high flows that could restrict fish-passage. This concern that the installation of bridges may still result in potential fish-passage issues, provides further support to DFO-FFHPP's recommendation that site-specific hydrological modelling of fish bearing watercourses be used to inform detailed designs. In addition, the mitigation measure: "*riprap material will be selected to match existing streambed material to provide potential habitat for lower trophic biota and fish and to minimize alteration to fish habitat*" would be best implemented if necessary during initial construction. DFO-FFHPP notes that placing materials into the watercourse can be considered alteration or destruction of fish habitat, and thus potential for serious harm to fish.
Recommendation/Request	**Recommendation 3.2.1**: DFO-FFHPP recommends that Baffinland clarify when they will provide updated hydrological modelling. **Recommendation 3.2.2**: DFO-FFHPP recommends that Baffinland provide the flow volumes referenced as section 7.1.5.3 on page 23, in section 7.2.1.5 of attachment 7.2 of the updated application: North Railway Design Criteria, or provide the appropriate reference. **Recommendation 3.2.3:** DFO-FFHPP recommends Baffinland clarify which flood return period is intended for use for the hydrologic analysis. **Recommendation 3.2.4**: DFO-FFHPP recommends Baffinland provide further information in regard to the potential cumulative impacts of all crossings on flow and fish passage (short-term and permanent; Tote Road, North Rail and Temporary Access Roads), including clear identification of crossings that occur on the same waterbody.

	Recommendation 3.2.5: DFO-FFHPP recommends the Proponent clarify the intent of the statement: *"mitigation measures, specific to bridges along the rail corridor, will be applied if flow velocities are found to restrict fish passage",* and respond with clarification why the proposed bridges will not incorporate appropriate fish passages in the initial design

3.3 Water Withdrawal

Review Comment Number	3.3 Water Withdrawal
Subject/Topic	Proposed new water withdrawal sites from various lakes and streams along the North Railway
References	• FEIS addendum, Surface Water Assessment (TSD 13); Sections 2.1.1, 2.4, 2.5 & 4.0 of Appendix C • FEIS addendum, Surface Water Assessment (TSD 13); Appendix D, Figure 1, p. D-7 • DFO Technical Review Comments to the Nunavut Impact Review Board (NIRB), March 7, 2019. Technical comment 3.12.2 • Baffinland Iron Mines Technical Comment Responses, March 25, 2019. DFO 3.12.2, page 43 • 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.
Summary	1. DFO-FFHPP notes Baffinland is proposing the addition of watercourses and waterbodies for water withdrawal to facilitate the North Railway construction: "*This assessment identifies a total of 28 water take stations along the Tote Road and North Railway construction ROW. Fifteen of these stations are approved under the Type A Water Licence (NWB, 2015). An additional 13 water take stations are proposed, including two lakes and 11 streams*."(TSD 13, App. C, s.4.0, p. 8). DFO-FFHPP notes the potential for negative impacts to fish and fish habitat as a result of water withdrawal, which has been recognized by Baffinland, as stated in the FEIS addendum, TSD 13, Appendix C, section 2.4 on page 5: "*Within streams that provide fish habitat, this may result in a temporary reduction in the amount of fish habitat available, and if the temporary flow reduction is considerable, temporary stranding of fish could occur*."

	2. Baffinland has indicated their monthly cumulative water withdrawal (Section 4.2, page 18 of the updated Fresh Water Supply, Sewage, and Wastewater Management Plan, attachment 23 of the Updated Application for Amendment No. 2 of Type A Water Licence) stating "*Monthly cumulative withdrawals from lakes represent less than 10% of the monthly outflow, unless site specific conditions indicate that a greater water withdrawal will not be significant in the context of fish bearing habitat (i.e. Camp Lake)*." 3. DFO-FFHPP notes the following in regard to the proposed new water withdrawal locations: "*Thresholds were identified and applied for fish-bearing and non-fish-bearing waters (KP, 2014). For fish-bearing streams, the removal of 20% of the 10-year dry unit runoff (1.03 L/s/km2) was identified as an environmentally protective threshold*" and "*Streams confirmed not to be fish habitat typically feed a downstream reach or collecting stream that is fish habitat. In these instances, the subject stream is only one contributor to the flow in the downstream fish habitat stream. Therefore, a higher threshold of 40% of the 10-year dry unit runoff (1.03 L/s/km2) was used."*(TSD 13, App. C, s.2.4, p. 5) In technical comment 3.12.2 from DFO's technical comments to the Nunavut Impact Review Board, DFO recommended "*Baffinland provide rationale and data, using a bathymetric analysis, to support the conclusion that 20% water withdrawal will be an environmentally protective threshold for fish-bearing streams and that 40% water withdrawal from non-fishbearing streams will not negatively affect downstream fishbearing waterbodies*." Baffinland provided the following response: "*With respect to the water withdrawal thresholds of 20% and 40%:* • *These thresholds are applied to the calculated 10-year monthly low flow value of 1.03 L/s/km2; the mean annual unit runoff in the Mary River area is slightly less than 10 L/s/km2. And mean annual peak daily unit runoff values likely range from less than 100 l/s/km2 for watersheds with significant lake volumes, to over 400 l/s/km2 for smaller watersheds without lakes (FEIS Volume 7, Appendix 7A). Hence these thresholds are conservative under normal flow conditions.* • *The water withdrawals from streams are short-term, lasting approximately 20 minutes*"

Importance of issue to the impact assessment process	Water withdrawal from water bodies has the potential to have a negative impact on fish and fish habitat.
Detailed Review Comment **1. Gap/Issue** **2. Disagreement with conclusion** **3. Reasons for disagreement with conclusion**	1. Decreases in waterbodies have the potential to have negative impacts on fish and fish habitat by potentially reducing littoral zones and under-ice over wintering habitat; these are important habitats for various life stages of many fishes. Decreasing flows/discharge in streams/watercourses has the potential to impact affect the downstream catchment areas, regardless if the source streams are non fish-bearing as supported by Baffinland's statement: "*Streams confirmed not to be fish habitat typically feed a downstream reach or collecting stream that is fish habitat*" (TSD 13, App. C, s.2.4, p. 5). DFO-FFHPP will require 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 part of any 'DFO Request for Review' submission, in order to properly assess the potential impacts. 2. DFO-FFHPP notes on page 18 of the Fresh Water Supply, Sewage, and Wastewater Management Plan, it states that water withdrawal amounts for lakes will stay under 10% "*unless site specific conditions indicate that a greater water withdrawal will not be significant*". DFO is unclear what 'specific conditions' are being referenced in this statement. DFO-FFHPP is concerned with the use of 20% and 40% thresholds for water withdrawal and the limited data available to support the conclusion that these thresholds are environmentally protective as stated by Baffinland: "*removal of 20% of the 10-year dry unit runoff (1.03 L/s/km2) was identified as an environmentally protective threshold*" (TSD 13, App. C, s.2.4, p. 5). DFO-FFHPP refers to the following 2013 Canadian Science Advisory Secretariat (CSAS) report (DFO 2013) 'Framework For Assessing the Ecological Flow Requirements to Support Fisheries in Canada" that provides the following conclusions and advice: • "*Cumulative flow alterations <10% in amplitude of the actual (instantaneous) flow in the river relative to a "natural flow regime" have a low probability of detectable impacts to ecosystems that support commercial, recreational or Aboriginal fisheries.* • *Cumulative flow alterations < 30% of the mean annual discharge (MAD) have a heightened risk of impacts to fisheries*"

	DFO-FFHPP also notes the DFO 2013 framework notes *" For cumulative water use >10% of instantaneous discharge or that results in flows < 30% of the mean annual discharge (MAD), a more rigorous level of assessment is recommended to evaluate potential impacts on ecosystem functions which support fisheries*" (emphasis added). Considering the difficulty of comparing the 10-year dry unit runoff with volumes accepted in the DFO's 'Framework For Assessing the Ecological Flow Requirements to Support Fisheries in Canada", should Baffinland intend to continue with a 20% *(and 40%) of the 10-year dry unit runoff* withdrawal threshold, localized assessment as per DFO accepted methodology, for each of the water withdrawal locations, will be required for DFO to adequately review and appropriately assess impacts of the withdrawal on the individual watercourse. DFO reiterates the technical comment 3.12.2 from DFO's technical review comments to the NIRB that a "*bathymetric analysis, to support the conclusion that proposed water withdrawal will be an environmentally protective threshold for fish-bearing streams and that 40% of the 10-year dry unit runoff water withdrawal from non-fishbearing streams will not negatively affect downstream fishbearing waterbodies"*. DFO is not confident that Baffinland's conclusion that *"these thresholds are conservative under normal flow conditions"* (referencing the 20 and 40% thresholds) (page 43, Baffinland technical comment responses, DFO 3.12.2).
Recommendation/Request	**Recommendation 3.3.1:** DFO-FFHPP recommends Baffinland provide a detailed water withdrawal plan, which can be provided to DFO as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase. **Recommendation 3.3.2:** DFO-FFHPP recommends Baffinland clarify what site specific conditions would indicate, that a greater water withdrawal than 10% in proposed withdrawal lake sites, would not be significant in the context of fish bearing habitat. **Recommendation 3.3.3:** DFO-FFHPP 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. DFO-FFHPP notes this information can be provided as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase. **Recommendation 3.3.4:** DFO-FFHPP further recommends Baffinland provide additional rational/ 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. DFO-FFHPP notes this information can be provided as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase.

3.4 Blasting

Review Comment Number	3.4 Blasting
Subject/Topic	Avoidance and Mitigation of Effects of Blasting on Fish
References	• Updated Application for Amendment No. 2 of Type A Water Licence, attachment 27: Aquatic Effects Monitoring Plan, Document #: BAF-PH1-830-P16-0039. Section 2.4.4, pg. 37.
Summary	On page 37, in section 2.4.4 of the updated Aquatic Effects Monitoring Plan, Baffinland states: "*Effects of blasting on free-swimming arctic charr and their eggs will be mitigated through the implementation of a detailed blasting management plan developed in accordance with DFO's blasting guidelines (Wright and Hopky, 1998).*"
Importance of issue to the impact assessment process	Blasting operations have the potential to have a negative impact on fish and fish habitat if adequate blasting thresholds and setback distances are not appropriately calculated and implemented.
Detailed Review Comment **1. Gap/Issue** **2. Disagreement with conclusion** **3. Reasons for disagreement with conclusion**	DFO notes that studies undertaken since the release of the "*Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*" (1998), suggest that the 100 kPa guideline presented may not be adequate to protect fish from damaging overpressures. As such, DFO recommends using a more appropriate overpressure of 50 kPa to protect fish as presented in "*Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002*" (Cott and Hanna, 2005).
Recommendation/Request	**Recommendation 3.4.1:** DFO-FFHPP recommends that Baffinland revise their instantaneous pressure threshold limit of 100 kPa to 50 kPa when calculating setback distances and update their conclusions as necessary.

3.5 Additional References

- 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.

- 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.

4 Summary of Recommendations

1. Watercourse Crossings		
1	Ref. 3.1.1	**Recommendation 3.1.1**: DFO-FFHPP recommends Baffinland provide rationale for the selection of crossing infrastructure for fish bearing watercourses. DFO-FFHPP notes this can be provided to DFO as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase.
2	Ref. 3.1.2	**Recommendation 3.1.2**: DFO-FFHPP reiterates the recommendation that Baffinland provide the full scope and visual of catchment areas associated with fish-bearing water crossings.
3	Ref. 3.1.3	**Recommendation 3.1.3**: DFO-FFHPP recommends the Proponent provides maps for the entirety of the road and label all crossings, which includes the locations of proposed changes to existing Tote Road crossings (as currently provided) and the locations for crossings that are expected to remain as they are.
2. Fish Passage		
4	Ref. 3.2.1	**Recommendation 3.2.1**: DFO-FFHPP recommends that Baffinland clarify when they will provide updated hydrological modelling.
5	Ref. 3.2.2	**Recommendation 3.2.2**: DFO-FFHPP recommends that Baffinland provide the flow volumes referenced as section 7.1.5.3 on page 23, in section 7.2.1.5 of attachment 7.2 of the updated application: North Railway Design Criteria, or provide the appropriate reference.
6	Ref. 3.2.3	**Recommendation 3.2.3:** DFO-FFHPP recommends Baffinland clarify which flood return period is intended for use for the hydrologic analysis.
7	Ref. 3.2.4	**Recommendation 3.2.4**: DFO-FFHPP recommends Baffinland provide further information in regard to the potential cumulative impacts of all

		crossings on flow and fish passage (short-term and permanent; Tote Road, North Rail and Temporary Access Roads), including clear identification of crossings that occur on the same waterbody.
8	Ref. 3.2.5	**Recommendation 3.2.5**: DFO-FFHPP recommends the Proponent clarify the intent of the statement: "mitigation measures, specific to bridges along the rail corridor, will be applied if flow velocities are found to restrict fish passage", and respond with clarification why the proposed bridges will not incorporate appropriate fish passages in the initial design
3. Water Withdrawal		
9	Ref. 3.3.1	**Recommendation 3.3.1:** DFO-FFHPP recommends Baffinland provide a detailed water withdrawal plan, which can be provided to DFO as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase.
10	Ref. 3.3.2	**Recommendation 3.3.2:** DFO-FFHPP recommends Baffinland clarify what site specific conditions would indicate, that a greater water withdrawal than 10% in proposed withdrawal lake sites, would not be significant in the context of fish bearing habitat.
11	Ref. 3.3.3	**Recommendation 3.3.3:** DFO-FFHPP 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. DFO-FFHPP notes this information can be provided as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase.
12	Ref. 3.3.4	**Recommendation 3.3.4:** DFO-FFHPP further recommends Baffinland provide additional rational/ 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. DFO-FFHPP notes this information can be provided as part of the Proponent's 'DFO Request for Review' submission and/or Application for *Fisheries Act* authorization, during DFO's regulatory phase.
4. Blasting		

13	Ref. 3.4.1	**Recommendation 3.4.1:** DFO-FFHPP recommends that Baffinland revise their instantaneous pressure threshold limit of 100 kPa to 50 kPa when calculating setback distances and update their conclusions as necessary.