



NUNAVUT IMPACT REVIEW BOARD

MARY RIVER PHASE 2 PROPOSAL

BAFFINLAND IRON MINES CORPORATION

NIRB File. No. 08MN053

BAFFINLAND WRITTEN COMMENTS

September 10, 2021



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Appendix B – “Development of Measures to Reduce Risks of Use and Carriage of Heavy Fuel Oil as Fuel by Ships in Arctic Waters” (Canada’s submission at the Sub-Committee on Pollution Prevention and Response, 7th Session, December 13, 2019)

Appendix C – 2014 Transport Canada North of 60 Marine Spill Risk Assessment



1. Per written direction from the Nunavut Impact Review Board (**NIRB**) dated September 1, 2021, Baffinland Iron Mines Corporation (**Baffinland**) provides the following written responses and comments to the NIRB respecting certain issues raised and statements made by participants during the NIRB public hearing sessions that have been completed to date. Baffinland submits these written responses and comments, in lieu of making oral submissions on these topics during the time originally designated for Baffinland's Reply on the Public Hearing agenda for the April 2021 sessions.
2. Baffinland confirms it has no further questions for any of the Intervenors or Parties at this time.
3. As a supplement to all of its submissions to the NIRB made to date, in this submission, Baffinland has provided its further responses and comments on the following topics raised by Parties during the Public Hearing:
 - (a) Comments on Environment and Climate Change Canada (**ECCC**) submissions and suggested term and condition regarding lighter distillate fuels;
 - (b) Comments on Fisheries and Oceans Canada (**DFO**)'s comments regarding M. Viridis;
 - (c) Comments on World Wildlife Fund (**WWF**)'s February 2021 Updated Marine Spill Probability Analysis;
 - (d) Comments on Jones Presentation on Behalf of Oceans North;
 - (e) Comments on Vergara Presentation on Behalf of Mittimatalik Hunters & Trappers Organization (**MHTO**);
 - (f) Comments on MHTO submissions regarding dust accumulation near Milne Port and potential for impacts on seal breathing holes;
 - (g) Comments on updates to the working groups and interaction with the Inuit Committees;
 - (h) Comments respecting cortisol;
 - (i) Comments relating to food security;

- (j) Comments relating to concerns raised by the Hamlet of Pond Inlet (**HPI**) regarding drinking water (note this information was previously provided to HPI by Baffinland in a memo dated June 28, 2021, as reflected in the attachments to the Engagement Summary Update dated September 9, 2020);
 - (k) Comments relating to concerns raised by the HPI regarding dust (note this information was previously provided to HPI by Baffinland in a memo dated May 31, 2021, as reflected in the attachments to the Engagement Summary Update dated September 9, 2020);
 - (l) Ringed seals; and
 - (m) Adaptive management and the ICA.
4. Where appropriate for each topic, Baffinland has included reference to the transcripts and submissions to which it is responding. For the Board's reference, Baffinland has also indicated the company representatives and third party experts responsible for preparing the response for each topic included in this Reply. Other than as noted, each individual attributed to each response has been previously sworn in or affirmed by NIRB legal counsel during the Public Hearings.

I. Reply to ECCC suggested term and condition re lighter distillate fuels

5. This Section I of the Reply was prepared by Lou Kamermans, Senior Director, Sustainable Development, Baffinland, Dan Jarratt, EP, P.Eng., Senior Atmospheric Engineer, Stantec and Kaliprasad Varadarajan, Chartering, Canfornav. Inc.¹

6. The following submission is in reply to certain statements made by ECCC during the public hearing held January 25 to February 6, 2021 and during April 12 to April 15, 2021, as well as the Term and Condition proposed by ECCC in April 2021 in Exhibit 90 concerning the marine fuel used by Baffinland's third party contracted ore carriers. In particular, the following provides a response to statements made by ECCC in: Transcript, February 4, 2021, pages 1794-1804; Transcript, February 6, pages 2230-2260; Transcript, April 13, 2021, pages 2614-2616; Transcript, April 14, page 2898.

7. ECCC's recommended Term and Condition is more onerous than necessary to address the potential environmental effects of the Phase 2 Proposal, and if accepted by the Minister could undermine the viability of the Project.

Baffinland has already proposed a commitment to have the ore carriers calling on Milne Port under an approved Phase 2 proposal to use lighter distillates within the northern marine Regional Study Area, which shares a border with the Nunavut Settlement Area (NSA). This commitment is a challenge within itself and continues to be subject to a rigorous feasibility analysis.

8. This topic is not of a nature that is appropriate for inclusion as a Term and Condition and is appropriate to remain as a Commitment that will require Baffinland to provide annual compliance updates to NIRB. In recommending its Commitment wording to the NIRB, Baffinland emphasizes the following points:

¹ Note as Mr. Varadarajan was not previously sworn in or affirmed before the NIRB during the public hearings, a declaration will be filed separately.

- (a) Applicable Canadian laws and international conventions do not currently require the use of lighter distillate fuels (**LDF**) by ore carriers in either the Nunavut Settlement Area (**NSA**) or the Canadian Exclusive Economic Zone (**EEZ**).
- (b) Clarifications are required in relation to certain of ECCC's statements made to the NIRB on this topic during the Public Hearings.
- (c) Baffinland's commitment to use only lighter distillate fuels within the Northern marine Regional Study Area for Phase 2 (the LDF Commitment) exceeds current Canadian regulatory requirements as well as international conventions. Baffinland has given due consideration to the feasibility of ECCC's proposal to extend the LDF Commitment from the NSA to the EEZ, but taking into consideration the significant added cost, business complexity and the minimal added benefit cannot agree with ECCC's Term and Condition.
- (d) ECCC's Term and Condition would result in minimal additional reductions to overall black carbon emissions in the EEZ at an unreasonable effort and cost to Baffinland as an individual project proponent. Further, overall contributions to black carbon emissions from Arctic shipping will remain low both before and after the Phase 2 Proposal as compared to the contributions from shipping in the rest of Canada. Implementing the ECCC Term and Condition would be onerous and would compromise Baffinland's ability to ship the full tonnage proposed as part of Phase 2. The ECCC Term and Condition also unreasonably constrains Baffinland's ability as a Canadian iron ore producer to compete with other sellers on the International iron ore market and is of grave concern from a competition perspective. Baffinland cannot accept a Term and Condition that could undermine the viability of the Mary River Project and the purpose for the Phase 2 proposal, especially one that does not add significant value in terms of environmental protection.
- (e) Terms and conditions of a NIRB project certificate should be project-related. The rationale for ECCC's proposal to apply its Term and Condition to the edge of the EEZ is not project-specific, but instead attempts to establish general shipping regulations or

prematurely impose requirements under international conventions via project-level conditions rather than the transparent, consultative and established legislative method.

For all of these reasons (which are expanded on below), Baffinland is of the view that it would not be reasonable or appropriate for NIRB to recommend the Term and Condition put forward by ECCC to the Minister.

Applicable Canadian laws do not currently require the use of lighter distillate fuels by ore carriers in either the Nunavut Settlement Area or the Canadian Exclusive Economic Zone

9. Under the *Nunavut Project Planning and Project Assessment Act (NuPPAA)*, per section 134 the responsible Minister is directed to not accept or impose terms and conditions that would be inconsistent with federal or territorial legislation:

134 In exercising the powers and performing the duties and functions relating to terms and conditions that are to apply in respect of a project, the responsible Minister must not “accept or impose terms and conditions” that would be inconsistent with any standard established by any environmental or socio-economic Act of Parliament of general application or territorial law of general application or by any regulation of general application made under such an Act or law.

Accordingly, in recommending terms and conditions to the Minister, NIRB should give due consideration and weight to the domestic laws that currently apply to fuels used by ore carriers in Canada and in the Arctic, which were developed taking into consideration Canada’s commitments under applicable international conventions, including those set by the International Marine Organization (**IMO**).

10. The regulation of marine shipping within Canadian waters falls under the jurisdiction of Transport Canada (**TC**) pursuant to the *Canada Shipping Act 2001* and the *Marine Transportation and Security Act*. ECCC’s proposal exceeds the current fuel requirements set out in the *Vessel Pollution and Dangerous Chemicals Regulations* (the **Regulations**). This approach is inconsistent with Canadian shipping laws of general application. The IMO has already imposed a limit of 0.50% m/m (mass by mass) for sulphur in fuel oil used on board ships globally (the **Sulphur Cap**). The Sulphur Cap will significantly reduce the amount of sulphur oxides emanating globally from

ships, already applies to Baffinland shipping, and will continue to apply during Phase 2. The *Regulations* do not require the exclusive use of LDF and presently permit the use of higher density fuels. Pursuant to s. 111(1)(d) and (e) of the *Regulations* the fuel oil used by ships must have a sulphur content not exceeding 0.50%.

11. The HFO Ban (**HFO Ban**) proposed by the IMO is set to come into force on July 1, 2024, with some exemptions. In particular, until July 1, 2029, the HFO Ban will not apply to ships constructed in accordance with MARPOL Annex I (International Convention for the Prevention of Pollution from Ships) and Polar Code requirements that provide extra protection for fuel tanks. This exemption applies to the double-hulled ships that Baffinland's contracted ore carriers will use.

Clarification of and comments on statements made by ECCC during public hearing

12. In its oral submissions at the public hearing on February 4, 2021, ECCC suggested that their recommendation is feasible based on their interpretation that LDF is commercially available, and that the configuration of ore carriers typically used by Baffinland would physically allow for the carriage of lighter distillate (on the basis that LDF is used in the North Sea emission control area on approach to the Port of Rotterdam).
13. ECCC's analysis respecting feasibility of its recommendation is overly simplistic. There are significant complications beyond simple availability of LDF. In order to make these statements an understanding of and expertise in international commercial shipping is required to fully appreciate the complexities, which are further described in the following paragraphs.
 - (a) Baffinland wishes to correct ECCC's statement to the Board that Baffinland "time charters" its vessels. In fact, Baffinland "voyage charters" its vessels. A voyage charter is a type of charter in which a vessel is chartered for a one-way voyage between specific ports with a specified cargo at a negotiated rate of freight. The charter agreement lists the ports of call, destination, and restrictions on cargo, if any. The responsibility of duty and other payments along with recruitment is handled completely by the shipowner, while the cargo is the sole responsibility of the charterer. This means that the cargo capacity of the vessel is chartered and not the entire vessel (as suggested by ECCC).

Unlike time charters, under the Voyage charter it is the responsibility of the ship owner to arrange for bunkers. Put another way, voyage chartering means that Baffinland has much less direct control over vessel operations than suggested by ECCC as part of its remarks to the Board. In a voyage charter, Baffinland is simply hiring space on a vessel to transport iron ore – all other aspects remain under the control of the shipping company.

- (b) It would be operationally challenging to comply with ECCC's request on entity owned (Owner) vessels² subject to long-term voyage charter arrangements and next to impossible (both from a commercial and operational perspective) to guarantee on spot chartered-in tonnage. Spot cargos are negotiated on an as needed/required basis (i.e. "on the spot") and are a function of production levels and geographic sales considerations. All spot cargos are subject to prevailing market conditions, restrictions/limitations and vessel availability. In the case of a non-entity owned vessel, the shipping company (Disponent Owner) charters a vessel from the ultimate owner (Head Owner). Under these commercial arrangements, the Head Owner will dictate the commercial and operational terms to be included in the Head Owner/Disponent Owner charter-party agreement as well as any sub-charter arrangements between the Disponent Owner and sub charterers. This would include items such as type of cargo to be carried, area of trade, availability, crewing and fuelling. For this reason, any specific requirements for a vessel as part of a charter-party agreement will need to be acceptable to the Head Owner. They may decide it is not worth their time and money to engage in certain types of cargo trades, if simpler commercial opportunities are available to them elsewhere. This is also considered in light of other restrictions Baffinland has put on Vessel operations while operating under contract for Baffinland within the RSA including ship speeds, additional ballast water testing requirements and navigational constraints. These requirements combined with an additional significant

² An Owner vessel refers to a vessel where the shipping company has direct ownership in the vessel thereby allowing full commercial and operational control of the vessel

fuel requirement increase the risk that commercial trade with Baffinland will not be considered desirable.

- (c) Baffinland requires access to long term voyage charters, spot cargo charters and FOB sales arrangements in order to operate and has already entered into contracts relating to the current 6.0 Mtpa production level that would continue during Phase 2. At the current 6.0 Mtpa production level, 45-50% of Baffinland cargo is delivered on a spot charter and free on board (FOB) basis³. FOB charters mean that the customer purchasing the ore is responsible for contracting the vessel, while Baffinland is solely responsible for providing the ore. This will increase to 53% to 58% in 2022 with the execution of a further long-term FOB sales contract. FOB customers' reasonable expectations upon their vessels arriving in Canada's EEZ for FOB delivery at Milne Port is they will be subject to Canadian federal shipping regulations. There is no certainty that customers would be willing to agree to any such requirement, let alone the associated costs, putting Baffinland's long term FOB sales agreements in jeopardy.
- (d) Expanding the Phase 2 LFO Commitment to Canada's EEZ would add an estimated 8 additional days (Rotterdam-Milne round-trip is approximately 20 days) of LFO consumption to each voyage, assuming no delays in transit. Given it is usual for vessels to wait a number of days before coming to the berth at Milne Port as well as encounter bad weather on their journey, this presents a risk that the vessel will require more than 8 days' worth of LFO for its voyage. To mitigate this risk, Owners may decide to run 100% LFO for the entire voyage (at significant expense to Baffinland) or decide they are not able to comply with the requirement and decline the opportunity to carry Baffinland ore. It is noted there is significant uncertainty in the price spread between LFO and MGO between today (currently \$35USD/t) and into the future given the ongoing (IMO/Maritime industry) debates on future fuels, availability and access.

³ Free on Board (FOB) means that the customer purchasing the ore is responsible for contracting the vessel, while Baffinland is responsible for clearing the iron ore for export and ensures the iron ore is delivered to and loaded onto the buyer's vessel.

- (e) ECCC does not appear to understand that although Baffinland may have multi-year contracts⁴ with shipping Owners or Companies, Baffinland can only contract vessels that are available to it in any given year based on the Owners/Companies alternative opportunities in the market. Even if ECCC's "feasibility" comments about the 2017 and 2018 vessel configuration were accurate, there is no guarantee that the vessels available to the company in 2017 and 2018, would be the same configuration or available going forward.
- (f) Implementing ECCC's recommendation will significantly constrain the number of vessels available for contract to Baffinland, despite the fact that the otherwise available vessels comply with all applicable Canadian laws and international conventions. It will likely limit BIM's access to otherwise suitable vessels (those already in the BIM trade, are Polar Code fitted and have crews experienced in the BIM trade and/or Arctic ice navigation) that might not be able to comply with this additional restriction. This issue will be further amplified with the Phase 2 installation of a second Cape-size capable dock/port facility as such vessels fuel tank configuration is highly constrained and the number of such vessels positioned in the Atlantic are extremely limited.
- (g) For those Owner/BIM Charter Party vessels willing and capable of making this change to its operations, the costs and risks will be higher. Just how much higher will be a function of (i) the price spread between the different fuel types; (ii) the design/specifications of the vessel; (iii) location and amount of extra vessel layup time to ready tanks for fuel adjustments, fuel premiums and all other (yet to be understood) costs associated with such a requirement. Pre-empting Federal regulation will have the effect of Baffinland carrying 100% of the increased cost and risk. We also know that several of the vessels presently in our fleet make-up will not be able to comply with the ECCC proposal due to their existing fuel tank configuration. In response, Baffinland has proposed a reasonable compromise that meets the intention of ECCC's request while ensuring the commercial viability of the operation, albeit with significant commercial cost.

⁴ Note multi year contracts cover about 40-45% of the export targets basis 6 MTPA

14. Baffinland is also concerned about how ECCC has presented certain context around the HFO Ban and Canada's involvement in its development.

(a) Canada is addressing the issue of the use of HFO by ships in Arctic waters on an international level through the Sub Committee on Pollution Prevention and Response of the IMO. TC carried out extensive consultation on this topic (see "Let's Talk Marine Fuel in the Arctic", attached as Appendix A). In addition, as part of Canada's participation in the development of new regulations to implement the HFO Ban, on December 9, 2020, Canada made a submission to the International Maritime Organization's Sub Committee on Pollution Prevention and Response entitled: "Development of Measures to Reduce Risks of Use and Carriage of Heavy Fuel Oil as Fuel by Ships in Arctic Waters" ("Canada's IMO Submission" attached as Appendix B). Canada's IMO Submission provided an assessment of the HFO Ban including consideration of details about the significant costs of the HFO Ban for industrial shippers (emphasis added):

- Para 48: "A proposed HFO ban, with a switch to the use of distillate fuels, would increase fuel costs and could translate into an increase cost of shipping ore by an estimated CAD\$0.75-CAD\$1 per tonne of ore shipped, above any impacts from the 2020 Global Sulphur Cap. This calculation does not take into consideration additional costs associated with increased costs of shipping equipment or material to the mine site, nor does it include costs associated with any de-bunkering and tank cleaning that might be required. As mining is a global industry, projects that are currently at the exploratory phase could become less attractive, and projects in operation may face a reduction in the number of vessels available for chartering purposes." (it is noted by Baffinland that the cost of using LDF in the EEZ would be considerably more than CAD\$1, especially in the circumstance where a vessel owner chooses to fill all of its available fuel capacity with a lighter distillate, given that it is required for the majority of its journey)
- Para 49: "Assuming cost increases are passed on to resource companies by shipping companies, this could affect the competitiveness of Canadian mining

companies. Furthermore, when the de-bunkering costs and impacts on equipment and materials, along with the increased life costs for communities are added, this may make some mining projects at the exploratory stage less attractive than similar projects based in the south.”

- (b) The Government of Canada supported the IMO’s HFO Ban but also has supported internationally a phased-in approach to the HFO Ban in the Arctic. Specifically, as noted above Canada agreed to the exemption to 2029 for double-hulled ships.
- (c) Canada’s IMO Submission included ECCC’s analysis of the estimate of the incremental impact of an HFO ban in the Arctic on air pollutant emissions which assumed that ships would be in compliance with the Sulphur Cap, and considered the incremental benefits to the environment of a switch to LDF under the HFO Ban.
- (d) We draw this to the Board’s attention as ECCC was misleading in suggesting at the Public Hearing on February 4, 2021 that the HFO Ban is only intended to mitigate the risk of spills in the Arctic marine environment and does not address black carbon mitigation. Canada’s position internationally with respect to the HFO Ban has explicitly taken into account the impact of black carbon.
- (e) As expressed in Canada’s IMO Submission, Canada considered concerns respecting a ban on heavy fuel oil in the Arctic, taking into account ECCC’s modelling regarding environmental benefits of black carbon reduction. Canada considered that the HFO Ban would have economic impacts, including the following: potentially affecting communities through the provisions of Impact Benefit Agreements, resulting in an increase in cost of shipping ore, potentially reducing the number of vessels available for charter, and potentially affecting the competitiveness of Canadian mining companies (see Canada’s IMO Submission, paras. 45, 47, 48, 49, 55).
- (f) Canada took into account both ECCC’s modelling regarding the HFO Ban and black carbon mitigation, together with the potential economic impacts that would result from the HFO Ban. As outlined in Canada’s IMO Submission, Canada has continued to support a phased-in approach for the HFO Ban internationally to balance the potential

environmental, economic and social impacts on, and benefits to, northern Indigenous and Inuit communities. It is not accurate to conclude that Canada's position internationally regarding the HFO Ban only reflects concerns relating to the potential mitigation of the risk of spills. Accordingly, Baffinland asks that the Board carefully consider the statements made by ECCC with respect to this issue during the public hearing.

Baffinland's commitment to use only lighter distillate fuels within the NSA exceeds regulatory requirements, is operationally feasible and is a reasonable proposal to mitigate project effects

15. Baffinland has been open and transparent in its discussions with ECCC with respect to costs and feasibility of various proposed black carbon mitigations. Baffinland refers the NIRB to its memo to ECCC dated October 1, 2020 titled "Review of Mitigation Options for Reducing Black Carbon Emissions from Shipping", NIRB Registry No. 331635.
16. Baffinland has made a number of Project commitments to address concerns raised about climate change during the NIRB process, and in particular has made a significant commitment to address concerns raised respecting black carbon emissions associated with Baffinland shipping, as reflected in the Phase 2 LDF Commitment.

As detailed above, implementing the Phase 2 LDF Commitment will introduce a significant cost and competitive business constraint on Phase 2. Baffinland does not have its own ships and in order to ship its product, it must enter into contracts with third party shippers. Because the Phase 2 LDF Commitment exceeds current Canadian and international requirements, shippers may elect to make their vessels available to competitors with fewer constraints and risk. Practically, this commitment will reduce Baffinland's access to otherwise suitable vessels available to Baffinland for shipping. It will also increase the price that Baffinland might otherwise have paid for the ships it contracts, as the constraint will result in increased effort by shippers and shipping costs. Baffinland has carefully considered the financial cost of its LDF Commitment, and based on the advice of its third party experts in international shipping considers the additional cost and effort associated with this commitment to be substantial, but it is willing to make the LDF Commitment nonetheless in order to address concerns raised in the NIRB process.

ECCC's recommendation to extend the Phase 2 lighter distillate fuel restriction to the EEZ is more onerous than necessary to adequately mitigate adverse impacts of Phase 2 shipping

17. Under s. 105(a)(ii), *NuPPAA* empowers the federal Minister to reject a recommended term and condition where the Minister considers it is “more onerous than necessary to adequately mitigate” adverse impacts of the project:

105 If the Board determines that a project should proceed, the responsible Minister must, within 150 days after receiving the Board’s report, either

(a) agree with that determination and either

(i) accept the terms or conditions recommended in the report, or

(ii) reject those terms and conditions on one or more of the following grounds:

(A) one or more of the terms or conditions are insufficient, or more onerous than necessary, to adequately mitigate the adverse ecosystemic and socio-economic impacts of the project, or

(B) the terms or conditions are so onerous that to impose them would undermine the viability of a project that is in the national or regional interest; or

(b) reject that determination if, in the opinion of the responsible Minister, the project is not in the national or regional interest.

18. On April 14, 2021, ECCC told the NIRB that if Baffinland uses distillate fuel within the EEZ, this will result in a “significant reduction in black carbon emissions in the Arctic”. Baffinland disagrees with this assertion. ECCC’s proposal to extend the commitment to the EEZ is more onerous than necessary – particularly given the minimal additional black carbon reductions as compared to the existing Phase 2 LDF Commitment. Nunami-Stantec has undertaken calculations to estimate and describe projected black carbon emissions in the Canadian Arctic from Phase 2 iron ore shipping (2025 onward) under various fuel-use scenarios. The following paragraphs summarize the methods, assumptions, and results of this analysis.

- (a) The shipping fuels assessed include HFO, and marine gas oil or marine diesel oil (MGO or MDO), a LDF. Residual oils require heating before use (combustion) whereas distillate oils do not require heating. Black carbon emission factors published by the IMO were

used in the evaluation (IMO 2020). Emissions of black carbon were estimated for the following fuel-usage scenarios:

- (i) HFO used for the entire exclusive economic zone (EEZ) (700 nm round trip) during 2025-2038 (base case)
 - (ii) MGO used in the Regional Study Area (RSA)/Nunavut Settlement Area (NSA), (250 nm round trip) during 2025-2029, HFO outside the RSA/NSA (450 nm round trip)
 - (iii) MGO within the entire EEZ (700 nm round trip) during 2025-2038
 - (iv) HFO in EEZ 2025-2029, MGO in EEZ during 2030-2038
 - (v) MGO in RSA/NSA, HFO outside the RSA/NSA till 2029, MGO after (full EEZ)
- (b) It is noted that as current regulations indicate HFO will be banned in the Arctic as of July 1, 2029 (for double hulled vessels), only scenarios 3, 4 and 5 are viable options that will comply with pending regulations; scenarios 1 and 2 are presented for comparative purposes.
- (c) BC emissions were estimated using fuel quantities and emission factors based on engine type (2-stroke) and load (assumed 65%), which were obtained from Figure 7 of the IMO July 2020 Document "Reduction of GHG Emissions from Ships - Fourth IMO GHG Study 2020 - Final Report." (IMO 2020, Attachment 2). HFO fuel quantities for the distance shipped per scenario were estimated by the percent of distance travelled in each scenario relative to the fuel usage for the distance travelled in Canadian Arctic waters. The quantities of MGO required were estimated using the ratio of High Heating Value (HHV) between MGO and HFO, assuming that the energy required for the vessels for each round trip remains constant.
- (d) The following assumptions were made when estimating the BC emissions per scenario:
- (i) a full production of 30 Mtpa that could be approved under the Phase 2 expansion;

- (ii) a 250 ML HFO annually for shipping of 30 Mtpa, as estimated for the initial Phase 2 assessment would still be applicable, quantity of LFO (MGO) was estimated using the ratio of HHV (energy density) between fuels;
 - (iii) all marine vessel engines are 2 stroke;
 - (iv) engines operate at 65% load (largely due to the speed restrictions implemented within the marine RSA).
- (e) The black carbon emission estimates per year of shipping from 2025-2038 and for each scenario are presented below in Table 1.



Table 1 Annual BC Emissions Estimates from In Transit Shipping in Canadian Waters

Scenario		BC Emissions [Tonnes/year]														Total BC Emissions from 2025 - 2038 [Tonnes]	Percent Reduction Compared to HFO – Full EEZ (%)
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		
1	HFO - Full EEZ	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	68.08	Not applicable
2	MGO to RSA/NSA, HFO outside	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	48.48	29%
3	MGO full EEZ	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	13.18	81%
4	HFO – Full EEZ until 2029, MGO after (full EEZ)	4.86	4.86	4.86	4.86	4.86	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	32.79	52%
5	MGO in RSA/NSA, HFO outside until 2029, MGO -full EEZ after 2029	3.46	3.46	3.46	3.46	3.46	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	25.79	62%

- (f) On an annual basis, the percentage reduction of black carbon emissions in the EEZ from using HFO (scenario 1) for the entire EEZ to using MGO for the entire EEZ (scenario 3) is approximately 81%. An estimated 29% reduction in black carbon emissions can be achieved through the use of MGO for the RSA/NSA only (scenario 2). Over the full period (2025-2038), an estimated 52% reduction in BC emissions for the full EEZ can be achieved through the use of HFO until 2029 and then switching to MGO for 2030-2038 (scenario 4), as would be allowable by regulation. Scenario 5, which goes beyond regulation by using MGO outside the RSA/NSA prior to 2030, is being proposed by Baffinland and will result in 62% reduction in black carbon emissions over using HFO alone.
 - (g) The results of this analysis shows that there is only a moderate improvement (19% compared to the base case) in black carbon emissions between ECCC's proposal (Scenario 3 – 81% from the base case) and Baffinland's Phase 2 LDF Commitment (Scenario 5 – 62% from the base case).
 - (h) It is also helpful to compare the black carbon emissions from Baffinland's shipping activities to overall black carbon emissions in the region to establish the relative contribution to the total black carbon being emitted annually. As per Canada's most recent black carbon inventory (ECCC, 2021), the total black carbon emissions in Nunavut in 2019 were estimated at 150 tonnes. On this basis, under scenario 5, Baffinland's shipping emissions in the region would contribute approximately 2% to the total until 2030 and 0.6% after 2030.
19. Baffinland also notes the comparatively low contribution of Arctic shipping to Canadian black carbon emissions. Overall, Arctic shipping makes up only a very small proportion of Canadian black carbon emissions. The provinces make far more significant black carbon emissions contributions from marine shipping. For example, according to Canada's Black Carbon Inventory Report 2013-2019 the latest available (2019) total black carbon estimated for shipping in Canada (previously referred to as marine transportation but now referred to as domestic marine navigation) is 1,000 tonnes and of this total northern Canada contributes 24.81 tonnes (0.71

tonnes for Yukon, 2.1 tonnes for NT and 22 tonnes for NU). Northern Canada contributes 2.5% to the total black carbon emissions for Canada. By comparison British Columbia emits 340 tonnes of black carbon (34% of the total for Canada) for domestic marine navigation. Quebec emits 260 tonnes of black carbon (26% of the total for Canada) for domestic marine navigation. Newfoundland emits 180 tonnes of black carbon (18% of the total for Canada) for domestic marine navigation. In a broader context the estimated black carbon emissions for Baffinland ore shipping (Scenario 5, 3.46 tonnes per year until 2030) are 2.3% of the 2019 Nunavut black carbon emissions for domestic marine navigation (22 tonnes) which is 2.2% of the 2019 Canadian black carbon emissions for domestic marine navigation (1,000 tonnes). Baffinland ore shipping (Scenario 5, 3.46 tonnes per year until 2030) is 0.011% of the 2019 Canadian black carbon emissions (31,000 tonnes).

20. ECCC's proposal to extend the LDF Commitment to the EEZ would significantly increase the amount of LDF that contracted vessels would need to have on hand, thereby significantly increasing the business complications, constraints and expenses described above.
21. If sufficient vessels are not available on the market, this could render Baffinland unable to ship the full tonnage permitted under the Project Certificate, which could undermine the overall viability of the Project, as well as reduce royalties payable. The increased level of cost, operational uncertainty and risk associated with the ECCC request is unacceptable and unreasonable.
22. As presented earlier in paragraph 18(g) there is a 19% difference between ECCC's proposed black carbon emissions reductions (Scenario 3 – an 81% reduction from base case) and Baffinland's Phase 2 LDF Commitment (Scenario 5 – an 62% reduction from base case). Overall Baffinland's Phase 2 LDF commitment (Scenario 5, 3.46 tonnes per year until 2030) is 0.011% of the 2019 Canadian black carbon emissions (31,000 tonnes). In light of the above, the moderate improvement in black carbon emissions between ECCC's and Baffinland's proposals does not warrant the hardships the former proposal would have on the project.

Terms and conditions of a NIRB project certificate should be project-related

23. On April 14, 2021, ECCC told the NIRB that that “If Baffinland does use distillate fuel, it will have an impact on regional climate change effects.” Baffinland disagrees with this characterization. as shipping activities associated with the Mary River mine would be unlikely to make any measurable difference to climate change effects being experienced in the Arctic, especially considering the timing of Baffinland’s shipping window, and that there is limited overlap with periods of ice and snow cover, where black carbon can have an added albedo effect.
24. Baffinland does not disagree that black carbon is an important issue, which is why it has given careful consideration to this topic as part of its assessment and made the LDF Commitment. However, it is not appropriate to characterize black carbon emissions from shipping as a local regional issue. Black carbon is a global issue that is being mitigated and addressed through Canada’s involvement in international conventions and implementation of domestic laws. This effort is well underway and Canada has proceeded in a careful and considered manner. Imposing constraints on individual projects, as proposed by ECCC, will not be an effective mitigation to address the climate change effects being experienced in the Arctic.
25. The rationale for ECCC’s proposal to extend Baffinland’s LDF Commitment from the NSA to the edge of the EEZ is not project-specific, but instead attempts to establish general shipping regulations or prematurely impose international conventions via project-level conditions rather than the transparent, consultative and established legislative method.
26. ECCC’s recommended Project-specific approach contradicts Canada’s domestic laws as well as Canada’s position taken in relation to international conventions, suggests that Baffinland should be required to meet a standard that would not apply to other ships in the Arctic (e.g., Canadian Coast Guard ships or community supply carriers) or to Baffinland’s international competitors, and adds onerous regulatory burdens and costs to Baffinland’s shippers and to the Phase 2 Proposal.

Conclusion

27. In making the above submissions, Baffinland understands and fully respects that for some project effects, the NIRB may make recommendations to the Minister that exceed applicable regulatory requirements. In fact there are numerous examples during the NIRB process where Baffinland has made commitments to mitigations with respect to the current operation as well Phase 2 which exceed applicable regulatory requirements as well as applicable industry standards. Baffinland's LDF Commitment is only one example of this.
28. However, ECCC's specific request to extend Baffinland's Phase 2 LDF Commitment from the NSA to the EEZ is more onerous than necessary, undermines the viability of the Project and is not appropriate in the overall context of black carbon emissions and fuel regulation in the Canadian Arctic. ECCC's approach does not balance the relatively small additional black carbon reductions against the full potential consequences, including the significant negative economic effects to the Project (including imposing a serious competitive disadvantage to a Canadian iron ore producer selling its product to an International market) and resultant potential reduction in benefits to Inuit communities and to Canada.
29. For all of these reasons, Baffinland requests that the NIRB reject ECCC's recommendation to extend Baffinland's LDF Commitment from the NSA to the EEZ.

II. Reply to DFO Comments re *M. Viridis*

30. This Section II of the Reply was prepared by Lou Kamermans, Senior Director Sustainable Development, Baffinland and Marina Winterbottom, Senior Marine Biologist, Golder Associates.
31. The following submission is in reply to certain statements made by DFO during the public hearing held January 25 to February 6, 2021 and during April 12 to April 15, 2021, concerning the species *Marenzelleria viridis* (***M. viridis***). In particular, the following provides a response to statements made by DFO in: Transcript, April 13, page 2559-2565; Transcript, April 14, page 2786-2788.
32. During the April hearing, DFO asked Baffinland if it was aware of a recent taxonomic revision from Sikorsky and Bick, 2004, that DFO indicated stated that *Marenzelleria arctica* and *Marenzelleria wireni* occur in the Arctic, while *M. viridis* is restricted to East Coast and Europe. In follow up to this commentary, Golder, on behalf of Baffinland, contacted the author of Sikorsky and Bick, 2004 and confirmed Golder's interpretation that the paper did not in and of itself refute the possibility of *M. viridis* being established in the Arctic (and by extension the RSA) prior to the start of Baffinland's shipping operations. Therefore, Sikorsky and Bick, 2004 is not inconsistent with Baffinland's preliminary interpretation that *M. viridis* may have potentially been present in the Project area prior to operations and not associated with Project effects. In any event, since the April 2021 portion of the hearing concluded, Baffinland has confirmed with third party experts that the species initially identified as *M. viridis*, was in fact *Marenzelleria arctica*, as outlined below. As indicated in Sikorsky and Bick, 2004, *Marenzelleria arctica* is a species that commonly occurs in the Arctic and is not considered invasive.
33. DFO has made a number of requests of Baffinland, including that interpretations of historic records be made in light of the most up to date taxonomic and genetic publications; Baffinland would like to assure the Board that the literature reviews performed for *Marenzelleria* have been exhaustive and that the papers brought forward by DFO have already been reviewed and are cited in the 2020 Marine Environmental Effects Monitoring Program (**MEEMP**) final report. DFO also requested Baffinland provide an update on consultations with global polychaete specialists and confirm whether or not samples of the species were sent for genetic barcoding. Lastly, DFO requested Baffinland confirm whether a memo describing the outcomes of actions

taken by Baffinland since the 2019 results were released to investigate the potential presence of *M. viridis* in the Project area.

34. Baffinland can confirm specimens collected in 2020 were sent to Dr. Vasily Radashevsky of the Russian National Scientific Center of Marine Biology in Vladivostok. Dr. Radashevsky was selected for the review due to his expertise on Spionidae, the order of marine worms that contains *Marenzelleria*, as well as his familiarity with Canadian spionids through collaborative research with the Canadian Museum of Nature in Ottawa. Dr. Radashevsky examined four specimens fixed in formalin. Based on morphological examination, Dr. Radashevsky was confident in the identification of the specimens as *M. arctia*, as opposed to the previously assumed *M. viridis* based on his experience in specific identification for this genus.
35. Baffinland will continue to undertake targeted monitoring for this genus in Milne Port, will send any specimens collected in summer 2021 for DNA analysis, and will continue to collaborate with federal and global specialists to resolve species identifications. In addition, all archived *Marenzelleria* samples from the NIS/AIS monitoring program are also in the process of being sent to Dr. Radashevsky for taxonomic review.
36. A memo summarizing the above was included as Appendix 8F to the 2020 MEEMP and Aquatic Invasive Species (AIS) Monitoring Program Final Report filed on the NIRB Registry for the Production Increase Proposal on September 9, 2021, NIRB Registry No. *pending*. This update to the Board confirms that, to date, no Project-related invasive species have been found through the AIS/NIS monitoring program. Baffinland requests that this memo be considered by NIRB as part of its decision making process on Phase 2, and that the NIRB indicate if it wishes for Baffinland to file this document separately on the Phase 2 registry.

III. Reply to World Wildlife Fund's February 2020 Updated Marine Spill Probability Analysis

37. This Section III was prepared by Richard Cook, P. Geo., Specialist Scientist of Knight Piésold Ltd.
38. The following submission is in reply to the statements made by WWF in its February 2020 Updated Marine Spill Probability Analysis (Environmental Research Consulting (**ERC**), 2020) (NIRB Registry Doc.# 328460) and statements made during the Public Hearings based on the ERC Report. (See Transcripts, Volume 12, pages 2187-2189).
39. ERC's latest analysis (NIRB Registry Doc.# 328460) estimates the probabilities of a marine fuel spill from vessel traffic associated with the Project using vessel transit data and accident and spill probabilities from various sources. This analysis is an update to a previously issued version dated July 22, 2019 (ERC, 2019; NIRB Registry Doc.# 326943), for which KP provided a previous review (KP, 2019; NIRB Registry Doc.# 327139-327149).
40. While some adjustments were made to the latest version of ERC's report filed on February 6, 2020 to better reflect Baffinland's proposed shipping activities, there are still several key issues which we believe contribute to overstated probabilities of a spill event occurring. Our comments on the previous oil spill probability analysis remain valid:
- (a) **ERC (2020) overstates the percentage increase in shipping proposed under Phase 2 by a miscalculation and the use of incorrect shipping levels.** ERC (2020) indicates that previous vessel traffic included 70 ore carrier round trips, and compares that to the 176 ore carries required for Phase 2 as representing a 250% increase in shipping. While using those numbers actually only yields a 150% increase in shipping, the base number is artificially low. At the time the report was developed Baffinland was, and continues to be, approved to transport 6 Mtpa with up to 84 ore carriers. Using 84 as the base number presents a more modest 110% increase in shipping levels under Phase 2. Baffinland's recent commitment (see Commitment No. 242, Commitment List, NIRB Registry Doc.# 334537) to reduce the maximum number of ore carriers allowed to call on Milne Port each year to 168 even further reduces the increase to 100%.

- (b) **Ore Carriers, representing a significant proportion of project shipping, were assigned the highest risk activity (a transfer error), but ore carriers do not transfer fuel.**

Incorrectly applying one of the highest probability events to the most frequently transiting vessels contributes to an overstated risk of a large spill.

- (c) **Marine accident and spill statistics may not reflect recent trends in marine safety.**

Marine safety trends have greatly improved over time, especially over the last decade. One of the referenced sources of accident and spill statistics is the author's own 2013 report, which cites a 2002 ERC report. The other reference includes data from 2000-2010. It is reasonable to assume the positive trend towards fewer spills documented over the last decade and before will continue. While this issue is acknowledged by ERC, it does not materialize in the outcomes of the analysis and as such it bears worth repeating here.

- (d) **The likelihood of collisions or grounding resulting in a spill is low in the study area.**

The International Tanker Owners Pollution Federation (2019) reported that 62% of spills worldwide between 1970 and 2018 were due to collisions or groundings. ERC (2020) acknowledges the low likelihood of collisions, but its probabilities are not adjusted for this or the low likelihood of grounding.

- (e) **WWF's conclusions are not consistent with the findings of TC's 2014 marine spill risk assessment.**

Transport Canada's 2014 North of 60 marine spill risk assessment (WSP Canada Inc., 2014) estimated the risk of marine spills of various sizes using Canada and Worldwide spill data and projections of shipping traffic that included the then-proposed traffic associated with shipping from Steensby Port through the southern shipping route, as well as shipping through the northern shipping route associated with the Early Revenue Phase. It was estimated that small spills of low consequence in the arctic are unlikely to occur, with a return period of 285 years. That is, a small spill may occur once every 285 years. For spills 100 to 1,000 m³ in size, the calculated return period was 920 years, and for spills 1,000 to 10,000 m³, it was once every 92,000 years. TC's risk assessment classified the risk of large ship-source marine spills in the arctic as relatively very low. ERC's calculated probabilities and conclusions that a large marine spill is likely

to occur because of vessel traffic associated with the Project is not consistent with Transport Canada's North of 60 marine spill risk assessment.

- (f) **Baffinland's existing mitigation measures and safety protocols are also not considered.** Baffinland has established operating procedures beyond regulation to further mitigate and reduce risks associated with events that might give rise to accidental releases. Such measures include:
- A speed restriction of 9 knots starting before the entrance to Pond Inlet to Milne Port.
 - Baffinland monitors vessel speeds and reports this information in its annual report to the NIRB.
 - No passing zones are in place around Poirier Island and Bruce Head within Milne Inlet.
 - Specific instructions (Standing Instructions to Masters) are provided to vessels for safe vessel operation provided to vessels navigating in and out of Milne Port. This document among other things provides navigation waypoints to follow into and out of the port.
 - Vessels used by the Project are selected through Rightship, which is a vetting organization that tracks and scores vessels according to their compliance with international regulations and if they have had any recent safety or environmental incidents.
 - Support for additional marine mapping along the transportation corridor through the Canadian Hydrographic Society.
 - Implementation of other risk mitigating factors in place, consistent with the recommendations of TC's Tanker Safety Expert Panel (2014), including:
 - Improved automatic identification system (AIS) coverage of all vessels;

- Requiring vessels to obtain clearance from NORDREG;
- Hiring experienced ice navigators;
- Requirement for all vessels to have onboard Shipboard Oil Pollution Emergency Plans (also required under the Vessel Pollution and Dangerous Chemicals Regulations established under the *Canada Shipping Act*);
- Conducting fuel spill modelling and risk assessments to inform emergency preparedness response plans (i.e., Baffinland's Spill at Sea Response Plan) (also required under the Environmental Response Standards established under the *Canada Shipping Act*);
- Establishment of contract with spill response company before the start of each shipping season;
- Annual spill response training exercises are conducted at Milne Port at the beginning of each shipping season.

Several of the above measures are consistent with legislation, while others are beyond what is legally required.

41. In summary, we have undertaken a review of the updated spill probabilities analysis that the WWF filed with the NIRB in January 2021 (ERC, 2020), and despite the updates made since its original filing, we continue to be of the view that the analysis overstates the risk of a major oil spill from project vessel traffic. It is also at odds with Transport Canada's comprehensive risk assessment of marine spills in the Canadian arctic, which included projected increases in shipping associated with the approved phases of the Project.

IV. Reply to Josh Jones Presentation on Behalf of Oceans North

42. This Section IV of this Reply was prepared by Melanie Austin, PhD, Senior Scientist, JASCO Applied Sciences.
43. The following submission is in reply to certain statements made by Josh Jones in his February 5, 2021 presentation to the NIRB on behalf of Oceans North, in particular statements made in Transcript, February 5, 2021, pages 2116-2129.
44. In the Oceans North presentation, Josh Jones showed a graphic to represent areas where there is potential for behavioural responses to shipping noise. The image shown during the animation portion of his presentation, highlights a region within 5 km of the shipping route. According to Mr. Jones, this graphic is intended to depict the area where narwhal may exhibit a behavioural response, in this case it's the distance in which narwhal actively engaged in foraging at the time of exposure sometimes reduced the number of subsequent foraging dives when within 5 km of a ship. We would like to clarify some misleading features of Mr. Jones' graphic.
45. The first point to clarify is that the Jones graphic misrepresents the actual area of exposure at any point in time. The image shows a static band surrounding the entire shipping lane, giving the impression that marine mammals anywhere along the shipping lane could experience behavioural disturbance. In reality, the sound footprint is a dynamic area around the ship, moves with the ship and does not extend along the entire shipping lane.
46. In reality, if a ship approached a stationary animal, the animal would be within the area of exposure when the ship is within 5 km of the animal. After the ship passes beyond 5 km from the animal's location, the animal would be outside of the area where a behavioural response would be expected. Based on relative travel speeds of the ship and the narwhal, it would not be possible for a narwhal to be exposed to the noise field from a single vessel transit more than one time per transit. And an individual narwhal would not experience behavioural disturbance within the entire area depicted in the Jones graphic.
47. The Jones graphic gives the impression that there is very little area for narwhal to occupy along the shipping lane without experiencing behavioural disturbance. The more realistic scenario

described above demonstrates that the vessel noise does not create a barrier to narwhal movement. While the narwhal may temporarily move away from nearby vessels, this disturbance effect would only last for as long as the vessel was present. Once the vessel moved past the animal, the animal's behaviour would return to its prior state. For an exposure area that extends to 5 km from the ship, this duration of exposure would be 34 minutes. The duration would be shorter for responses that occurred at a closer distance of say, 1 km (which was the distance within which narwhal were observed to change their turning angle when a ship was present).

48. The second point to clarify is that this distance of 5 km is a conservative estimate of where this response occurred, based on the integrated narwhal tagging study data. Tagged narwhal exhibited this response behaviour sometimes when they encountered ships. When this response occurred, it occurred at distances of up to 5 km, but usually at closer distances. Sometimes, narwhal did not respond at all to ships at this distance. 5 km is the maximum distance at which this response was observed.
49. During its Marine Environment Presentation to the NIRB in January 2021, Baffinland presented an animation showing the local surface movement of three tagged narwhal (shown in grey), swimming just south of Bruce Head at the entrance of Koluktoo Bay in August 2017. Note that the animation was sped up and that actual vessel travel speeds are slower than perceived in the video.
50. In that animation, the path of the narwhal is first crossed by an ore carrier travelling northbound from the port and, shortly thereafter, by two separate Project vessels approaching Bruce Head from opposing directions, one from the north and one from the south.
51. As can be seen in the animation, the first encounter does not seem to generate any obvious directional avoidance from the narwhal. But, the second dual exposure appears to elicit a localized temporary response, in terms of the narwhal changing direction and adjusting their position away from the shipping lane, and then reoccupying the shipping lane shortly after the vessels have passed.
52. This type of response is consistent with assessment predictions.

The animation shown during Baffinland's Marine Environment Presentation in January 2021 represents one of the more overt surface avoidance responses observed in narwhal following a close shipping encounter. In many of the vessel-narwhal interactions analyzed, it was not uncommon for narwhal to show no distinguishable avoidance response. So at similar distances from ships, responses can vary from nothing to a localized, short term avoidance response.

V. Reply to Vergara Presentation on Behalf of MHTO

53. Section V of this Reply was prepared by Melanie Austin, PhD, JASCO Applied Sciences.
54. The following submission is in reply to certain statements made by Valerie Vergara on behalf of the MHTO surrounding the 120 dB sound level threshold for marine mammal behavioural response, and its appropriateness for arctic marine mammals like narwhal. In particular, the following provides a response to statements made by Valerie Vergara in: Transcript, January 30, page 1124 to 1143.
55. To start, I'd like to provide some context for the NIRB regarding how this threshold is used in the Phase 2 environmental assessment. The sound level threshold provides a way to estimate the distance from a vessel where marine mammals would be likely to react to, or be affected by, a vessel. Without observations of the actual distances where behavioural responses occur, we have to estimate this distance based on the expected noise footprint around the vessel, since noise is one of the factors that predict the likelihood of a behavioural response. For the environmental assessment, we estimated this distance using a sound threshold of 120 decibels.
56. We note that the 120 dB threshold that Baffinland is using was derived, in part, from studies of Arctic whales, namely bowheads and grey whales. These whales have greater hearing sensitivity at lower frequencies compared to narwhal. This means that there is more substantial overlap of their range of best hearing with the frequencies of vessel noise and they would perceive the vessel as being louder than would a narwhal. These whales would likely respond to vessel noise at a lower sound level than would narwhal, who do not hear as well at the low frequencies of the noise output by vessels. This means that the threshold used in the environmental assessment likely overestimates the sound threshold at which narwhal might react to vessel noise and gives a conservative estimate of the distances for behavioural response.
57. When we compare the model predictions to Baffinland's monitoring data, we see that the model-predicted distances that were used in the environmental assessment are greater than the distances where behavioural reactions have been observed in reality. Meaning, we have overestimated the distances from the ship where there would be potential for behavioural disturbance. It is because of these monitoring data that we are confident that the acoustic

threshold and the approach used in the environmental assessment is appropriately conservative. Further, there is no regulatory guidance, or scientific data available at this time suggesting that a threshold lower than 120 db would be more appropriate.

58. Dr. Vergara stated that Baffinland did not use their monitoring data to develop site and species specific acoustic thresholds. In response to this statement, we note that the monitoring data are used to verify the effects predictions, not to establish new thresholds. There is no regulatory guidance directing the development of site and species specific thresholds. This is a topic that we continue to investigate. We are in the process of doing a combined analysis of Baffinland's tagging data acoustic data. It is a complex subject requiring consideration of other contextual factors. But it is important to note that this is not information that is required to review the predictions of the environmental assessment, for the reasons set out in the following paragraph.
59. The monitoring data allow us to directly establish the actual narwhal response distances, making discussions about the appropriateness of the sound threshold irrelevant. The monitoring data remove the need to make a link between the sound levels and the behavioural response distances. And the available data tends to support our original predictions; that behavioural responses are temporary and localized, over distances that are shorter than those predicted in the effects assessment, and at sound levels that are consistent with the threshold that was used.
60. In response to Dr Vergara's comments regarding masking impacts, and the overlap in sound frequencies between narwhal and ship noise, I direct the Board toward Slides 11 and 12 from Exhibit 91. The first slide is a visual aid to show what we mean when we talk about the overlap of the frequency range of vessel noise with the frequency range of narwhal hearing and communication. Frequency is plotted on the horizontal, low frequencies are on the left hand side of the figure and high frequencies are on the right. The blue arrow shows the frequencies where vessel noise occurs, which is higher at low frequencies (on the left of the plot) indicated with the darker blue shading of the arrow. The vessel noise is quieter at the higher frequencies, where the arrow is lighter blue. The grey arrow shows the frequencies where narwhals vocalize; the lowest frequencies are used less often (where the arrow is lighter grey) and the higher

frequencies more often (where the arrow is darker grey). The higher frequencies are used for echolocation for foraging (to find food). The lower frequencies are used mainly for social calls. The black, u-shaped line shows the hearing threshold for mid-frequency cetaceans like narwhal. They have the most sensitive hearing in the frequency range circled in green, which is outside of the range where there is vessel noise. The box shaded in green shows the region where there is overlap between the vessel noise and the frequencies of the narwhal hearing threshold curve.

61. The second slide shows an example of overlapping vessel noise and narwhal vocalizations. These plots are a picture of the noise, and shows the underwater sound in a period of time (in this case, 4 minutes). The colours represent the loudness of the sound; dark blue colours are quiet, green and yellow are medium levels, and red is loud. Different frequencies are shown on the vertical axis; so, high frequencies are at the top of the plots and low frequencies are at the bottom. The horizontal axis is time. The top plot has no frequency filtering, so it shows all of the sound at all recorded sound frequencies. The bottom plot has had a frequency filter applied, to show only the sound that narwhal can hear. In the top plot, the thick solid red bands running across the bottom part of the plot shows the main vessel noise. The spots of red and green in the middle and top of the plot are different types of narwhal calls. The bottom plot shows only the sounds that narwhal can hear. In the bottom plot, there is no longer red vessel noise at the bottom of the plot, but the narwhal calls in the middle and top of the plot are still present and detectable. These plots should clarify for the board that there is very little overlap between vessel noise and the sound frequencies used by narwhal and that the vessel noise does not overlap with most of the narwhal vocalizations.

VI. Seal Breathing Holes

62. This Section VI of this Reply was prepared by Lou Kamermans, Senior Director, Sustainable Development, Baffinland.
63. The following submission is in reply to certain statements made regarding seal breathing holes during the Public Hearing. As part of the MHTO presentation, submitted January 18, 2021, the MHTO included a number of photos on slides 19 and 20 showing dust accumulation on snow in the vicinity of the Project Area. The dates the photos were taken, as well as the precise coordinates were later confirmed through formal responses to written questions submitted by Baffinland to the MHTO on March 22, 2021. The MHTO presentation included a photo of a seal breathing hole with nearby discolored snow. The details are provided here for reference:

Photo 3: May 28 2020. 6:05pm. 71°58'39.60"N 80°46'15.42"W Seal holes Milne Inlet

64. Since the issuance of the MHTO photos, Baffinland received several questions related to the effects of dust on seals and seal holes.
65. As part of Baffinland's follow-up investigation to Photo 3 shared by the MHTO, in early April 2021 Baffinland located a seal breathing hole in the Milne Inlet area, several kilometers closer to the mine site (south) from where the MHTO photo was taken the previous year. What follows provides a summary of our observations.

Comparison of seal breathing holes in Milne Inlet, May 2020 to April 2021

66. Figure 1 shows the area in Milne Inlet where both images were taken. Figures 2a, 2b, 3a and 3b are images of seal breathing holes taken by the MHTO on May 28, 2020 and Baffinland on April 13, 2021, respectively. The photos are presented in the paragraphs below along with Sentinel-2 satellite imagery publically available through SIKU, a popular Indigenous knowledge research and social network (<https://siku.org/>). The satellite imagery available on both dates the photos were taken was limited by cloud cover so the clearest satellite imagery closest in time, has been included. The satellite imagery shows precisely where the photos were taken, and a general overview of potential snow discoloration in the area. Note that discoloration can be natural or a

result of the project, and these images are not meant to infer between one or the other at this point in time.

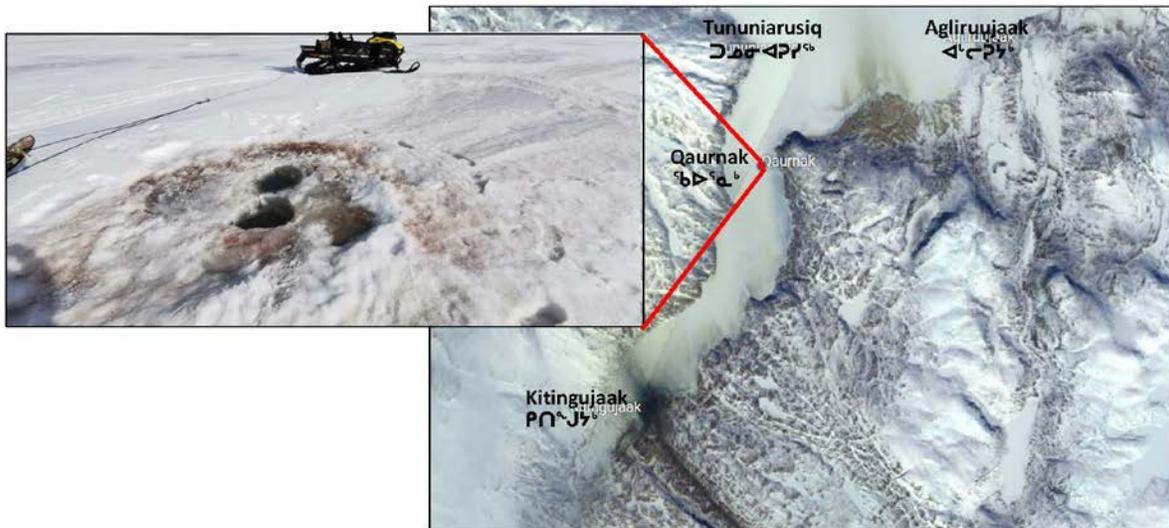
67. The purpose of the photo comparison is to provide additional context regarding the presence of dust in the Milne Inlet area. There are a few key points Baffinland wishes to highlight to the Board:
- (a) Despite the seal breathing hole photographed by Baffinland being several kilometres closer to Milne Port than the one captured by the MHTO the previous winter, there is a complete absence of dust around the seal breathing hole depicted in the Baffinland photo.
 - (b) While there could be natural causes for the change in dust distribution in Milne Inlet between 2020 and 2021 (i.e. wind direction, strength), Baffinland did introduce an important control measure at Milne Port between the two periods that likely contributed to this improvement. Specifically, in November 2020 Baffinland began applying a product known as DusTreat to the Milne Port stockpiles, which forms a crust over the ore and prevents dust from escaping into Milne Inlet and the surrounding area. It is important to note that this additional mitigation was implemented in response to a general request from MHTO representatives at a February 2020 in person meeting of the Terrestrial Environment Working Group to mitigate the release of dust in the project area, particularly in Milne Inlet.
 - (c) While Baffinland recognizes that some hunters have indicated that the visual effect of dust on snow may have the potential to deter hunters, or negatively impact their experiences on the land, extensive environmental monitoring of key environmental components (water quality, vegetation health, fish health, etc.) has not shown dust is negatively affecting the environment, which is consistent with FEIS and FEIS Addendum predictions.
 - (d) Since stockpiling began in Milne Inlet in 2015, ringed seal have continued to use habitat in the area. This is consistent with FEIS predictions made for the Project.

68. There is variability in the extent or magnitude of dust emitted from Project infrastructure, and effective mitigations can be applied to mediate this. The single point in time image provided by MHTO is helpful to Baffinland and other Parties in illuminating a “worst-case” scenario, but does not provide context about the frequency of such “worst-case” scenarios. Over the past two years Baffinland has begun collecting and analyzing satellite imagery to better understand the dispersion of dust in the Project Area, the results of which are reported annually through the Terrestrial Environment Monitoring and Mitigation Annual Report.
69. Preliminary findings from the 2021 Baffinland Dustfall Extent Imagery Analysis suggest dustfall extent in Milne Inlet is smaller than in 2020 and is showing a downward trend from the highest observed in 2019. This can be seen in Figures 4 and 5, which show extracted ferric iron dustfall extent and relative mineral dust magnitudes in Milne Inlet, respectively, using both Sentinel 2 and Landsat 8 imagery. The results of the 2021 analysis will be more fully discussed with the Terrestrial Environment Working Group in the lead up to the reporting period for 2021.

71. Further to paragraph 66 above, the following Figure 2(a) reproduces the seal breathing hole photo taken by MHTO on May 28, 2020 and previously filed with NIRB:



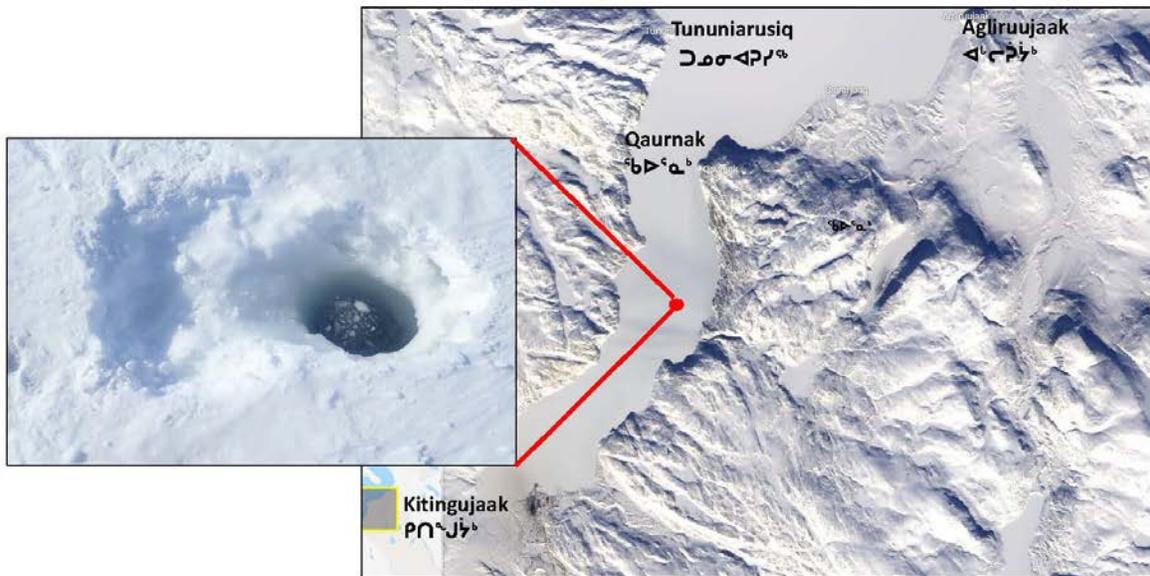
72. Further to paragraph 66 above, the following Figure 2(b) provides satellite imagery from May 17, 2020. The location is roughly 11km from Milne Port:



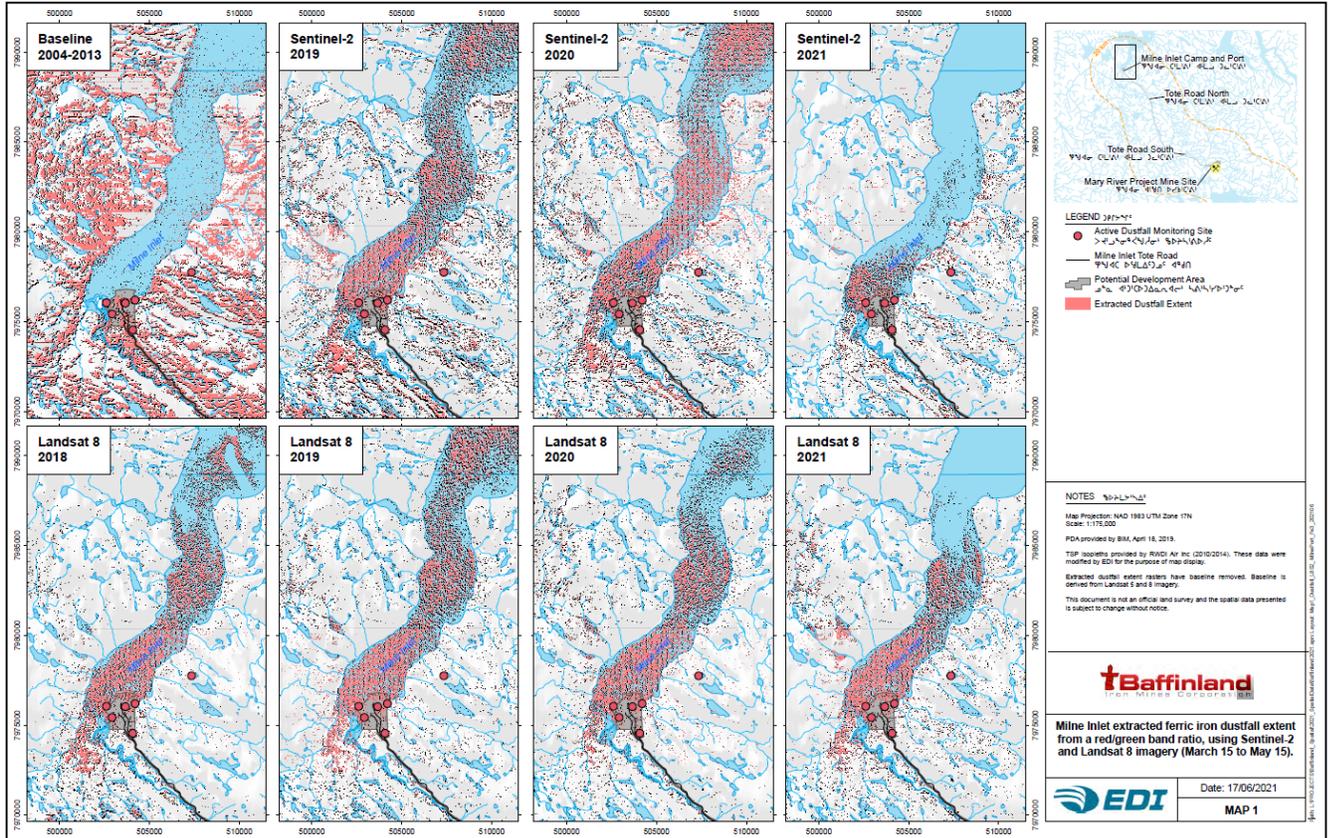
73. Further to paragraph **66** above, the following Figure 3(a) shows a seal breathing hole taken by Baffinland on April 13, 2021 in approximately the same location as the photo shared by the MHTO:



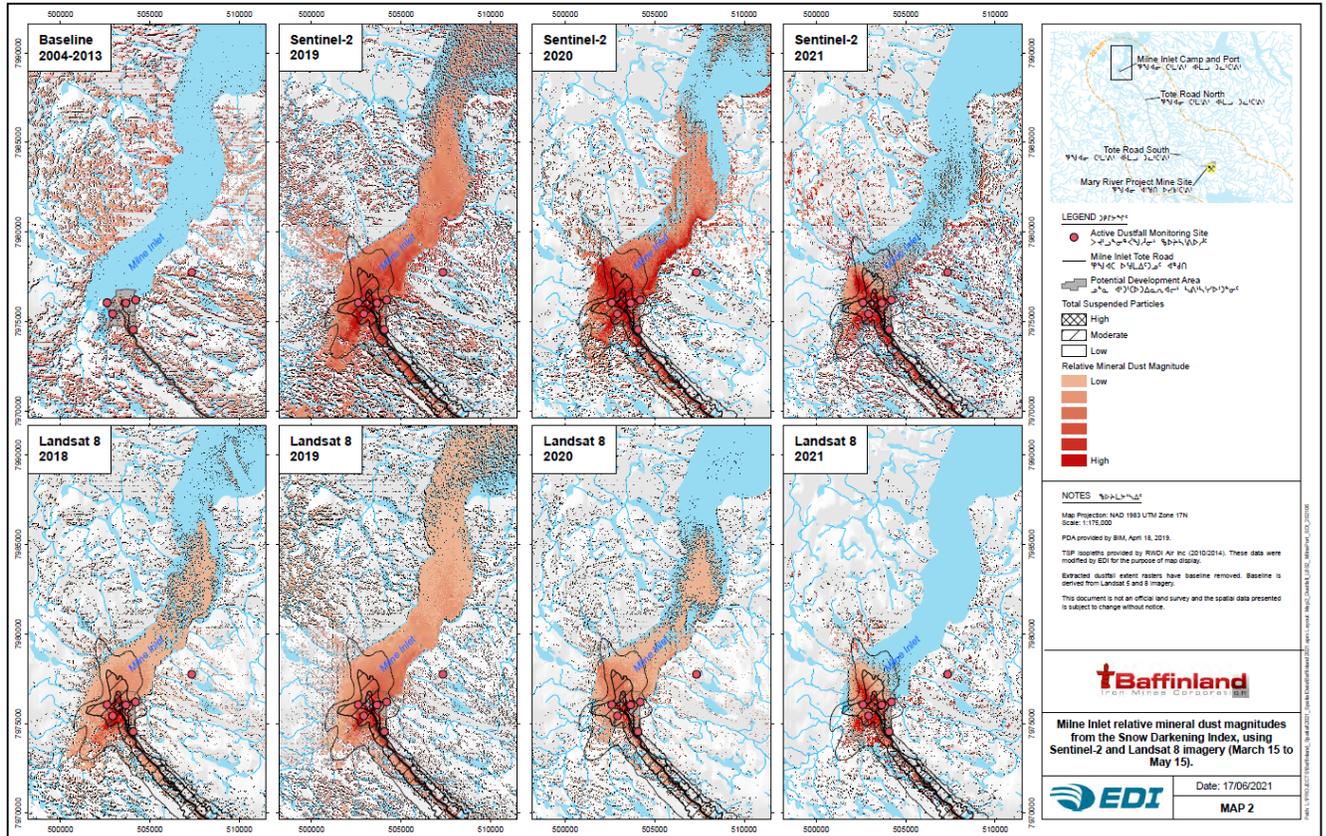
74. Further to paragraph 66 above, the following Figure 3(b) provides satellite imagery from April 13, 2021. The location is roughly 7 km from Milne Port. Compared to the photos and satellite imagery from May 2020, there is noticeably less dust dispersion visible in Milne Inlet, with no dust to be observed in the photograph of the seal breathing hole. While fresh snow cover could explain improvements in the satellite imagery, there does not appear to be any dust in the layers of snow around the seal breather hole:



75. Further to paragraph 69 above, the following Figure 4 provides dustfall extents of ferric iron (Red/Green band ratio) extracted from 2021 Landsat and Sentinel-2 imagery. Both indicate dustfall extents were less than the 2019 and 2020 extents around Milne Port.



76. Further to paragraph 69 above, the following Figure 5 provides dustfall extents of mineral dust (SDI band ratio) derived from 2021 Landsat and Sentinel-2 imagery. Both indicate dustfall extents were less than the 2019 and 2020 extents.



VII. Working Groups

77. This section was prepared by Megan Lord-Hoyle, Vice President, Sustainable Development, and Lou Kamermans, Senior Director, Sustainable Development, Baffinland.
78. During the April Public Hearing, (see Transcript, Vol. 14, 2616) Crown Indigenous Relations Canada stated, “We have one final question for Baffinland. We're seeking for Baffinland to further elaborate or explain their understanding of how the Inuit stewardship committee would work with the various marine, terrestrial, freshwater environmental working groups.” Baffinland deferred its response to this question until its allotted time for reply. What follows provides further details in response to these comments.
79. This section also comments on the topic of improving the existing Working Groups going forward, in reply to general concerns expressed by some hearing participants about functionality (for example, see Transcript, Vol 15, page 2844, where Parks Canada stated, “Parks Canada has definitely been engaged in the review of the terms of reference [for the MEWG]. We outlined in our review some key points such as that the working group operate and render recommendations by consensus, the adherence of the proponent to recommendations rendered by the MEWG, as well as other key points.”)
80. Under Phase 2 commitments to the NIRB, Baffinland has agreed to fund the Qikiqtani Inuit Association (QIA) administered and Inuit-led Inuit Committees (the Inuit Committee (IC) and the Inuit Social Oversight Committee (ISOC)). Baffinland has also committed to proposing amendments to the Terms of Reference for existing environmental working groups, including the Terrestrial and Marine Environment Working Groups, which serve as advisory bodies for Project monitoring and mitigation, in their respective areas of focus. In addition, Baffinland has committed to the development of a Freshwater Environment Working Group. All of these bodies can work interactively to support and inform management of Phase 2 as well as the Adaptive Management Plan. The following paragraphs provide further details.

Marine and Terrestrial Environment Working Groups

81. Baffinland has committed to enhancing the existing oversight capacity of the Terrestrial and Marine Environment Working Groups under Phase 2 (see Commitment No. 38, 121, 164, 189, 192, 193, 194, 195, 196, 198, Commitment List, NIRB Registry Doc.# 334537). Baffinland anticipates that these groups will remain as advisory bodies that are largely scientifically technical in nature. It is expected that member and observer parties will participate according to their mandate and will provide representatives who can participate in the technical scientific discussions that are the primary focus of these groups, and provide recommendations as appropriate. Baffinland anticipates the QIA and Mittamatalik Hunters and Trappers Organization (MHTO) will continue to participate as members and to provide valued Inuit Qaujimagatuqangit (IQ) and/or perspectives from knowledge holders who are living in the area that understand and experience potential impacts from the Project directly. As Pond Inlet is the nearest community and its residents are most frequently in the Project area it is important to have their direct participation through the MHTO. Baffinland anticipates that QIA and MHTO will share Inuit perspectives as part of the working group discussions, and in participating in the MEWG and TEWG, QIA will also draw on recommendations from the Inuit Committee, which will include direct participation from all of the communities affected by Phase 2.
82. The existing Environment Working Groups will continue to operate and provide advice on the development and implementation of marine and terrestrial monitoring programs as well as the effectiveness of mitigation measures, where necessary, and/or modifications to the design of the monitoring programs.
83. As committed to NIRB, Baffinland circulated updated Terms of Reference for the existing Environment Working Groups on October 16, 2020 (NIRB Registry No. 331970). The updated Terms of Reference are still under active review with member and observer parties, but there is alignment on the need for a process that will allow members and Baffinland to develop consensus on recommendations provided by the Environment Working Groups to Baffinland, the NIRB or another directed party (e.g. the Inuit Committee). A process for receiving, responding and tracking these recommendations will be established through the revised Terms of Reference, with the expected result being clear expectations for this process and enhanced

transparency to the NIRB and other Parties on the activities and advice provided by Environment Working Group members to Baffinland.

Freshwater Environment Working Group

84. Recognizing that there is a well-established and significant regulatory oversight system under the Nunavut Waters and Nunavut Surface Rights Tribunal Act, inclusive of clear thresholds for compliance, for freshwater water management and monitoring, NIRB has not previously recommended the establishment of a freshwater working group for the Mary River Project. However, to respond to concerns expressed in the Phase 2 NIRB process, Baffinland has committed to the development of a Freshwater Environment Working Group that will focus on special issues or programs that are identified in Project monitoring (see Commitment No 102). The Freshwater Environment Working Group will therefore meet on an as needed basis, with reporting to the NIRB and NWB delivered on an annual basis, as relevant. The establishment of a Freshwater Environment Working Group is a further example of a measure that Baffinland has committed to during the Phase 2 process that exceeds regulatory requirements as well as standard Nunavut industry practice.

Qikiqtaaluk Socio-Economic Monitoring Committee & Mary River Socio-Economic Monitoring Working Group

85. The Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) creates a forum that brings together government, industry, Inuit Organizations and communities to discuss the state of regional socio-economic affairs in general and in relation to major developments. Baffinland uses this forum to present available results of its monitoring programs and to receive priority feedback from communities. The feedback most often received through this forum concentrates on the balance between socio-economic development and the preservation of traditional lifestyles.
86. The Mary River Socio-Economic Working Group (MRSEWG) aims to support the development and execution of the Mary River Socio-Economic Monitoring Program (SEMP) and to undertake collaborative monitoring in order to identify and access data in relation to the SEMP. Collaborative monitoring involves combining Project-specific performance data with data

generated or provided by other members of the MRSEWG (or other sources, as appropriate) in order to support adaptive management measures implemented by the MRSEWG members, and to minimize adverse effects and maximize benefits from the Project. The MRSEWG acts as a forum for addressing technical aspects of the SEMP in an advisory manner, with the objective that any issues raised on the SEMP is dealt with directly by the MRSEWG itself.

Inuit Committees

87. The concept of the Inuit Committee was first proposed by Baffinland during the April 2019 Technical Meetings. In order to help respond to concerns that were raised by Inuit participants, Baffinland identified the need to establish a formal venue through which representatives from each of the impacted communities could continuously engage with each other and with Baffinland throughout the life of the Project (see Commitment No. 134).
88. The concept evolved further under the Inuit Certainty Agreement, resulting in a substantial expansion of the function of the Inuit Committees (ultimately divided between two committees—see below (IC and ISOC), and their role and responsibilities for informing and leading monitoring and management throughout the life of the Project. The level of joint Inuit-proponent management envisioned for Phase 2 will fundamentally strengthen and improve the incorporation of Inuit views and IQ in Project operations. The role of the Inuit Committees in project oversight going forward is industry-leading in its approach, detail and scope. Baffinland has made this commitment in recognition of the central importance of the incorporation of Inuit knowledge and insights in the operation of Phase 2, and the direct impact the Project has on the livelihood and well-being of each impacted community.
89. The impacted communities, through the Inuit Committees, will have a direct role in the management of the project by providing direction in the implementation of the Inuit Stewardship Plan, administered by QIA, and the Adaptive Management Plan, administered by Baffinland. Under the Inuit Stewardship Plan, Inuit will be leading cultural (Culture, Resource and Land Use Monitoring Program) and social (Social Monitoring Program) monitoring programs focused on the issues most relevant to Inuit, while at the same time establishing the standards that will require Baffinland to take prescribed actions in response to exceedances documented under any Project monitoring programs. The work of the Inuit Committees will guide the

implementation of the Inuit Stewardship Plan and its two monitoring programs, which will generate annual reports on their activities and be available for public review.

90. The establishment of the Inuit Committees should provide an additional level of assurance to the communities and the NIRB that if the effects of the Project exceed predictions, or unanticipated effects occur, in addition to regulatory oversight, Inuit will have direct input into how Baffinland modifies the operation.

Inuit Committee

91. Under Phase 2, Baffinland has committed to fund the development of an IC that is comprised of representatives from each North Baffin Community. The IC will be focused on the monitoring of harvesting, culture, resources and land-use. The draft Terms of Reference for the IC are the responsibility of the QIA. While these have been shared with Baffinland in June 2021, given this is a QIA document Baffinland will leave it to QIA to share this documentation with the NIRB. The role or linkage between the IC and the existing environmental working groups will continue to be refined over the coming months. However, Baffinland believes the existing Environment Working Groups established under the Project Certificate and the IC can work together to provide advice and direction to Baffinland, as described further in the last section of this reply.

Inuit Social Oversight Committee

92. Under Phase 2, Baffinland has committed to fund the development of an ISOC that is comprised of representatives from each North Baffin Community. This committee will be focused on community wellbeing and complement other forms of monitoring related to the project by focusing on community impacts related to the mine (i.e. language, community wellness, social connections, etc.) rather than mine-centered socio-economic monitoring (i.e. payroll, number of contracts, number of training programs run). Similar to the IC, development of the Terms of Reference is the responsibility of the QIA and details respecting linkages between the ISOC and existing socioeconomic working groups will continue to be refined. However, it is clear that the ISOC will extend the role each community has in active socio-economic monitoring in addition to their existing participation in the Qikiqtaaluk Socio-Economic Monitoring Committee and the Mary River Socio-Economic Monitoring Working Group.

Adaptive Management Working Group

93. The Adaptive Management Working Group is established under the Inuit Certainty Agreement and formed by representatives from Baffinland and the Qikiqtani Inuit Association. The primary purpose of the group is to facilitate joint agreement over the final Adaptive Management Plan. Following this, Baffinland and the QIA have agreed that any future amendments to the Adaptive Management Plan, or adaptive management elements of associated Environment Management Plans that are listed in the Adaptive Management Plan will require the reconvening of the Adaptive Management Working Group to assess and come to agreement on potential changes. QIA and Baffinland will incorporate advice from the IC in the development of the final Adaptive Management Plan. The outcomes of the adaptive management process (e.g., new or modified strategies and mitigations) will be reported in a standalone annual report.

Coordination and Administration of Working Groups and Inuit Committees

94. Environment Working Group member and observer parties are actively participating in the redrafting of both the MEWG and TEWG Terms of Reference (TOR). The Government of Nunavut coordinated the review process until the most recent rounds of comments were solicited.
95. In the draft TORs, there is alignment on the need for a consensus based model that would provide concise and clear guidance to Baffinland in regards to its environmental monitoring and mitigation. In the draft TOR, when the listed criteria for a consensus based Environment Working Group recommendation has been met, Baffinland would generally proceed and implement the advice. However, to coordinate and link the IC to the MEWG and TEWG and to ensure that their recommendations are appropriately reviewed and applied through an Inuit lens, Baffinland has suggested that consensus based decisions on recommendations made by the Environmental Working Groups should also be presented to the IC for evaluation and consideration before being implemented by Baffinland.
96. Through this process Baffinland envisions a Phase 2 project where IQ and western science are fully integrated and that our monitoring programs and management measures prioritize the knowledge and perspectives of Inuit. We expect that the Environment Working Groups will provide valuable insights to the Inuit Committees as they develop their recommendations in

relation to adjustments to environmental monitoring programs or the efficacy of mitigation measures.

97. As a further level of oversight, the NIRB will continue to generally evaluate and consider monitoring recommendations made by individuals and organizations through the established regulatory comment opportunities overseen by the expertise of the NIRB.
98. The flow of decision making between and through Environment Working Groups and IC was outlined in several flow charts and submitted to the NIRB as Appendix 12 to Baffinland's Post-Hearing Question Responses, submitted March 22, 2021 (NIRB Registry No. 334147).

Consensus Based Decision Making in Adaptive Management

99. This flow chart shows how consensus based recommendations coming from the Environment Working Groups related to adaptive management would flow through the Inuit Committees before Baffinland's final course of action is confirmed. All MEWG and TEWG recommendations should flow to the IC for evaluation and consideration prior to implementation.
100. It is anticipated that Baffinland would generally accept recommendations that have been made following the consensus requirements in the TOR and supported by the Inuit Committee. If Baffinland identified significant challenges in implementing the recommendation it must go back to the QIA and IC with detailed rationale and present an alternate proposal for consideration. If the alternate proposal is consistent with the approved Adaptive Management Plan and the IC accepts, Baffinland will implement, if the IC rejects the proposal, Baffinland may provide another alternate approach or dispute resolution can resolve the issue. If Baffinland's alternate proposal is not consistent with the approved Adaptive Management Plan, the QIA and IC can review and provide a final recommendation. If Baffinland does not accept the final recommendation, dispute resolution or negotiation can resolve the issue, if Baffinland accepts, the Adaptive Management Plan will be updated and reported to NIRB. See Figure 1.

Figure 1.

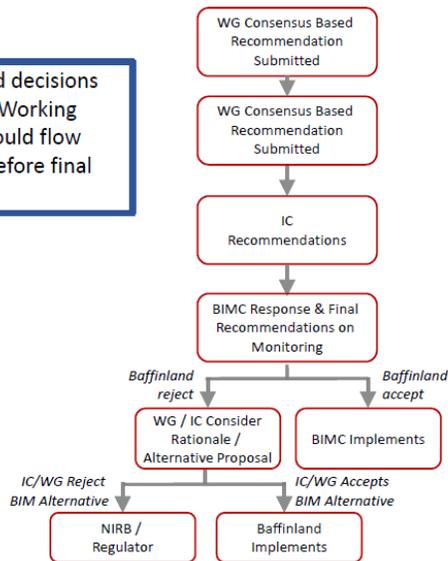
Consensus Based Decision Making in Monitoring

101. Monitoring recommendations take a similar but simplified path where the MEWG/TEWG consensus based recommendations are brought to the Inuit Committee for consideration. If Baffinland does not implement the final recommendation from the Working Groups and the Inuit Committee, NIRB would provide direction to Baffinland, consistent with NIRB’s mandate for monitoring project impacts. See Figure 2.

Figure 2.

This shows how consensus based decisions coming from the Environmental Working Groups related to monitoring would flow through the Inuit Committee’s before final direction is confirmed

Consensus Based Decision Making in Monitoring



Administration

103. The Environment Working Groups will continue to be chaired, organized and administered by Baffinland.
104. The Qikiqtaaluk Socio-Economic Monitoring Committee (QSEMC) is administered by the Government of Nunavut, with a wide spectrum of membership, including the mayors of each Hamlet in the Qikiqtani Region. The Project specific Mary River Socio-Economic Working Group (MRSEWG), is administered by Baffinland, and includes the membership of the QIA, the Government of Nunavut and Crown-Indigenous Relations and Northern Affairs Canada. The MRSEWG is governed by a Terms of Reference that was developed in coordination with all member parties. More details on socio-economic monitoring can be found in a previous submission to NIRB (Coordination of Socio-Economic Monitoring Programs, December 18, 2020) (NIRB Registry No. 332181).
105. Should Phase 2 be approved, the Inuit Committees will be administered by the QIA with representation from each impacted community to create the membership of the Committees. Terms of Reference are still being developed between QIA and the communities. Baffinland does not have further detail to share on this development and any further questions should be directed to the QIA. As the concept for the Inuit Committees is further developed by the QIA and members of the Committee itself, Baffinland will work with each of these bodies to confirm the extent to which they wish to formally engage with one another.

Conclusion

106. The commitments described above will result in the Phase 2 Project having a much greater level of oversight from third Parties than exists today. Collectively, the existing working groups that will be improved and new working groups and committees that will be established as a result of the Phase 2 commitments, acting independently or together, will provide substantive input from both an IQ and western science perspective. These enhancements will ensure our Project will prioritize, respect and reflect Inuit values and perspectives while operating in a respectful manner that results in significant and lasting benefits for Inuit and stakeholders.

VIII. Cortisol

107. This Section VIII of the Reply was prepared by Emma Malcolm, Sustainability Specialist, Baffinland and Patrick Abgrall, PhD, Senior Marine Biologist, Golder Associates Ltd.
108. The following submission is in reply to certain statements made re cortisol during the Public Hearing. During the April hearing, certain intervenors referenced a recently published study (Watt et al. 2021) that examined cortisol levels in narwhal harvested near or in the RSA (locations of harvests are not specified) from 2000 to 2019. See Transcript, Vol. 9 pages 1534 and 1544, which references comments made on this topic by the Igloodik Working Group. The study reports a significant increase in cortisol levels in narwhals harvested from 2000–2006 and those harvested from 2013–2019. Watt et al. (2021) classified both periods as corresponding to periods of pre-project related vessel traffic and during project related vessel traffic. The study did not conclude a causal link between Project shipping and the reported cortisol increase, but it is postulated that there may be a correlation.
109. In response to Intervenor comments, Baffinland supplied a technical review of the paper to the NIRB in February 2021, responses to written questions from intervenors on the technical review in March 2021, and responses to verbal questioning from intervenors on the paper and the technical review during the Public Hearing in April 2021.
110. Baffinland and its third party experts wish to emphasise the following key points, which support the opinion of Golder that Watt et al. (2021) should not be relied on to conclude that vessel traffic is causing higher levels of cortisol in narwhal:
- (a) There are significant gaps in the study that prevent reviewers from appropriately evaluating its findings. These were outlined in the technical review submitted in March 2021. Without further details regarding the data included and potentially excluded from the study, it is not possible to determine if there is a correlation between cortisol levels and Project shipping, if this is a naturally occurring process, or if this is an artifact of a low sample size.

- (b) Baffinland has expressed its willingness to investigate this topic further, in collaboration with DFO, if the data from the study is released for further analysis. To-date, Baffinland's request for access to this data has been denied by DFO and it is not possible at this time to verify the information summarized in the study.
- (c) Extensive behavioural and acoustic monitoring conducted by Baffinland do not indicate that narwhal response to Project vessels is indicative of a 'high-stress' interaction that would result in significant increases in cortisol levels as a direct result of Baffinland's shipping operations.
- (d) To date, narwhal behavioural responses to shipping have been limited to temporary, localized and reversible effects and limited to close exposure distances to ships. These types of 'low severity' responses are within an animal's range of typical, or baseline, behaviours and are unlikely to result in individual, or population level, changes in behavioural patterns. Given the limited daily interactions between individual narwhal and Project-vessel transits in the region, coupled with the types of low severity responses that have been observed, the potential contribution of shipping on narwhal stress levels, and by extension energetic costs in narwhal, is predicted to be low to negligible, although recognizing that it is not non-existent.
- (e) There are a great number of other potential stressors on narwhals that could result in increased levels of cortisol in narwhal, including though not limited to, climate change, increased presence of predators and lack of prey availability. The potential impact of these ecological changes was briefly noted by Watt et al. (2021), but not quantified or further elaborated upon. The progressive increase in Baffinland's shipping operations between 2013 and 2019 was also not quantified by Watt et al. (2021).

Dietz et al. 2021 report a significant change in diet for narwhal between the period of 1960 to 2020, due to declining levels of sea-ice after 1990. The authors identify climate change as a key cumulative stressor to narwhal, and suggest that relying on point-source data (i.e. tissue samples) or mean group data as was done in the Watt et al. (2021) study, increases the likelihood of mischaracterizing an animal's response to cumulative environmental changes. This is particularly important when studying

animals with a long life span, thus making any postulations on the basis a short-term dataset (i.e. 2013–2019) subject to significant error when interpreting the results.

A recent publication from Lefort et al. (2020) estimated that killer whales in the Canadian Arctic (with an estimated population size of 163 ± 27 animals) could consume >1,000 narwhal during their seasonal residency period in Arctic waters. With longer ice-free periods in the area, killer whale are able to enter previously inaccessible areas. Narwhal responses to killer whales are documented as being overt as they display signs of obvious distress (Laidre et al. 2006).

- (f) Likely due to the complexity of this work, a very limited number of studies are available that sought to evaluate effects of vessels on marine mammal's stress levels in comparison to other environmental conditions. One such study, as described in Aryes et al. 2012, assessed stress hormones in killer whales at times of peak vessel abundance and low prey availability. The results of this study showed that prey availability, or rather a lack thereof, has a significantly greater impact on killer whales than vessel traffic. Given that narwhal and killer whale are both high-frequency cetaceans, it is reasonable to postulate that a similar scenario would be the case for narwhal.

111. It would be unreasonable for the Project Certificate to require Baffinland to assume responsibility for monitoring all external non-Project stressors on narwhal, particularly when the extent of these stressors are poorly understood due to gaps in regional monitoring and literature. Baffinland remains committed to a robust Project-effects monitoring program focused on collecting data for indicators that are relevant for understanding the specific effects of the Project such as behavioural responses, underwater noise and animal distribution and abundance). Baffinland reiterates that collecting data on indicators such as stress hormones would not serve to provide relevant information on how Project activities, if at all, have the potential to affect narwhal stress levels

112. Given that a correlation between cortisol and shipping remains only a theory and cannot reasonably be linked to shipping at this time based on the available information, cortisol levels should not be used as an indicator in Baffinland's Project effect monitoring, especially for early

warning purposes. However, given the interest that has been expressed with respect to the theory described in Watts et al. (2021) should Phase 2 be approved, Baffinland would be willing to commit to provide financial and/or in kind support to other Parties (such as DFO and the MHTO) to assist in the development of a regional or community-based research initiative that investigates this topic. As part of this support Baffinland would be pleased to provide technical research advice on this initiative as needed.

113. Baffinland has also advocated that the government can and should carry out more general monitoring in the RSA in order to provide additional data to help understand natural variation to potential stressors on narwhal. This recommendation is aligned with the responsibilities of Canada under the Integrated Fisheries Management Plan for narwhal in the Nunavut Settlement Area. This integrated plan identifies that DFO should maintain an active scientific research program, aimed at an increased understanding of narwhal population processes (e.g. seasonal distribution, movements and diving behaviour, habitat use, diet analysis), environmental factors that influence narwhal distribution and numbers, and the role of narwhal in marine ecosystems.

References (copies can be provided by Baffinland upon request)

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IX. Food Security

114. This Section VIV of the Reply was prepared by Lou Kamermans, Senior Director, Sustainable Development, Baffinland.
115. The following submission is in reply to statements made during the Public Hearing by various Parties regarding food security and the importance of continued availability of country foods.
116. To support healthy country food diets and traditional harvesting under Phase 2, Baffinland is focused on the following:
- (a) Maintaining the availability and quality of wildlife stocks,
 - (b) Enhancing Inuit access to those wildlife stocks, and
 - (c) Enhancing transference of traditional harvesting practices
117. These subject areas are consistent with those identified by the Nunavut Food Security Coalition's Food Security Strategy and the focus of Baffinland's Phase 2 Food Security Assessment. What follows is a summary of the Phase 2 commitments put forward by Baffinland to directly address concerns related to food security.

Maintaining the Availability and Quality of Wildlife Stocks

118. Narwhal and caribou are historically significant sources of country food for the community of Pond Inlet. In recognition of this, Baffinland has developed several important mitigations to avoid or minimize potential effects to these wildlife populations. While Baffinland diligently manages its operations to avoid effects on wildlife generally, Baffinland provides the following summary of mitigations relevant to narwhal and caribou directly relevant to maintaining food availability ((it should be noted that this is not a comprehensive list of mitigations related to project activities that may also serve as general protection for wildlife) . As noted below, further details on each of these important commitments are set out in the Commitment List, NIRB Registry Doc.# 334537 and related correspondence filed with the Board on April 8, 2021):

Narwhal Availability

- Gradual increases in shipping above 6Mt (approximately 84 vessels) tied to confirmation of sustained wildlife populations and harvesting (see Commitment No. 242)
- Planning shipping window to occur between periods of landfast ice, no earlier than Jul 15, and no later than Oct 31 (unless required for contingency, and other shipping conditions can be met) (see Commitment No. 239 and 214)
- Application of daily transit restrictions when ice is present at the beginning and end of the shipping season (see Commitment No. 213 and 215)
- Continued vessel speed limits (see Commitment No. 89 and 95) and avoidance of key harvesting areas (see Commitment No. 89)
- End of season clearance surveys to detect and mitigate (if possible) any potential entrapment events (see Commitment No. 191)

Caribou Availability

- Special Management zones along the railway where design and operations will be suited to caribou crossing (see Commitment No. 33, 67. 236)
- Railway shutdowns during caribou migratory periods (see Commitment No. 220)
- Modified rail design to support caribou crossing (see Commitment No. 33, 67. 236)
- Dedicated caribou monitoring stations (see Commitment No. 238)
- Partnership with the Government of Nunavut on regional monitoring (see Commitment No. 68)

In addition to the availability of country food for harvesting, Inuit have also raised concerns regarding the quality of country food as a result of project activities. Baffinland has committed to the ongoing monitoring of health in key wildlife species.

Baffinland Led Monitoring Programs

- Adding body condition monitoring to its narwhal monitoring program (Will be included in next Commitment List submission to NIRB)
- Collaborate with the GN and Northern Contaminants Program to monitor caribou health (per current Term and Condition 35, Project Certificate)
- Baffinland will collaborate with the MHTO to monitor arctic char health in and around Milne and Navy Board Inlets (see Commitment No. 247)

It is noted that “Baffinland led” monitoring programs will continue to benefit from the participation of Inuit in the planning, implementation and interpretation stages, further complimenting the objectives of newly proposed Inuit-led monitoring programs agreed to under the Phase 2 Proposal.

Inuit Led Monitoring Programs

- Inuit led monitoring related to country food to be developed through the Pond Inlet Country Food Baseline Study, and implemented under the Inuit Stewardship Plan (see Commitment No. 136)
 - Inuit led monitoring related to culture, resources and land use, including harvesting, through the Inuit Stewardship Plan (see Commitment No. 131)
 - Community Based Monitoring by the MHTO, supported by funding from Baffinland, may also identify unacceptable changes (see Commitment No. 138)
119. Should Baffinland led or Inuit led monitoring programs demonstrate that wildlife are experiencing decreases in their health and/or present concerns for Inuit consumption that can be reasonably attributed to the Project, Baffinland and Inuit will implement jointly developed and agreed to adaptive management plans. Baffinland must respond to unacceptable changes, including the modification of the project to reverse an impact.

Enhancing Inuit Access to Wildlife Stocks

120. Ensuring Inuit are able to access wildlife stocks for harvesting is as essential as ensuring the Project does not have significant effects on those wildlife stocks that affects their availability. Baffinland has committed to mitigations which support hunter access to the Project area specifically and the land and waters around Pond Inlet generally. Relevant Phase 2 commitments include:
- (a) Enhanced Community access to Tote Road under Phase 2 (see Commitment No. 42)
 - (b) Additional hunter cabins along Tote Road, plus monitoring stations that will also serve as emergency shelters for hunters when needed (see Commitment No. 238)
 - (c) Provision of fuel, food and other supplies for Inuit at Mary River (existing Project requirement under Mary River IIBA 13.3.1 and 13.3)
 - (d) Designated hunter crossings across railway (see Commitment No. 61, 163)
121. Access to the land generally is supported primarily through funding to community groups as well as through commitments included in agreements with QIA, and includes:
- (a) Up to \$1.68 million/year to the Tasiuqtiit Working Group (Hamlet of Pond Inlet and MHTO) to support Pond Inlet directed programming, including harvesting programming (\$10,000 per vessel to transport 12 Mtpa on an annual basis) (see Commitment No. 246)
 - (b) \$400,000/year to the Pond Inlet Harvesting Enabling Program to support additional harvesting efforts by hunters (fuel subsidy) (existing requirement IIBA Section 17.7 Harvesters Enabling Program)
 - (c) \$400,000/year to Igloolik, Sanirajak, Kinngait and Kimmirut to support additional harvesting efforts by hunters (fuel subsidy), when Steensby goes into production (existing requirement IIBA Section 17.7 Harvesters Enabling Program)

- (d) The Wildlife Compensation Fund will be amended and further supported with resources to fund a full-time coordinator. (see ID 5, Section 5.1.2(a), ICA)
- (e) \$750,000/year to support regional harvesting enabling programs (available to all 5 North Baffin communities) (see ID 5, Section 5.1.2(d), ICA) A one-time payment of \$1,300,000 to the Mittimatalik Hunters and Trappers Organization (MHTO) for changes in hunting experience that Inuit from Pond Inlet have described and to address difficulties in accessing the Wildlife Compensation Fund. (see ID 5, Section 5.1.2(c), ICA)
- (f) Employment income earned by Inuit supports purchase of harvesting equipment; rotational work schedules allow for extended harvesting trips while off work; creation of more community-based employment roles allows for increased frequency of hunting and harvesting.

122. In addition to the direct funding proposed by Baffinland in Paragraph [94] to support harvesting, the Phase 2 Proposal stands to contribute approximately \$2.4 billion in royalties and other payments to NTI and QIA over the life of mine. Based on the 17-year life of mine presented in the FEIS Addendum for Phase 2, this represents an average of \$140 million/year that should flow to Inuit through various mechanisms including the QIA administered Community Benefits Fund, social programming capacity by both the QIA and NTI and other QIA initiatives. Baffinland understands communities have stated that they do not feel they have seen the benefits of royalties to date, however, these payments accumulate and increase over time, and in the interim the NTI and QIA policies to build trusts to support their ongoing operation have likely prevented the majority of funds from reaching the communities. This will change over time and the difference that the Mary River Project financial payments to QIA and NTI will make for Inuit in the Qikiqtani region will be transformational.

Supporting Traditional Land Use

123. Baffinland has listened to Inuit who have told us that the value in harvesting country food extends beyond the nutritional value it provides. Harvesting country food is a critical cultural practice and a significant contributor to community and individual well-being. To this end

Baffinland proposes for consideration that a portion of the funds received by the Tasiuqtiit Working Group (up to \$1.68 million/year) could support Pond Inlet specific harvesting programs aimed at supporting the preservation of traditional knowledge, including:

- (a) Support for traditional hunting camps for youth
- (b) Support for adoption of traditional hunting techniques and equipment (harpoon guns)
- (c) Other initiatives as determined by the Tasiuqtiit Working Group

124. Baffinland is confident that the Phase 2 Proposal, with the implementation of the comprehensive mitigations and monitoring plans that have been presented to NIRB, will avoid affecting the availability of, and access to, wildlife for harvesting. If wildlife stocks do decline (narwhal, seal), or do not return (caribou), affecting country food availability, Baffinland is committed to work with Inuit to understand the impact by either modifying the project or providing additional supports to overcome barriers preventing country food harvests. This is reflected in Baffinland's commitments to NIRB (see for example Commitment No. 133, 134, 135, 136, 138, 159, 167, 198, 218, 225 and as part of its agreement with QIA under the ICA (see generally ID 2, ICA).

X. Drinking Water

125. This Section X of the Reply was prepared by Christine Moore, Senior Scientist, Intrinsik and Claire McAuley, Senior Scientist, Intrinsik.⁵
126. The following submission is in reply to certain statements made by the HPI respecting their concerns regarding drinking water in the vicinity of the Project. As noted above, a full submission was provided to HPI previously on this topic and is attached to the Engagement Summary Update dated September 9, 2021.
127. As stated in the memo: “The iron water quality monitoring data that we have collected shows that concentrations of iron in freshwater and sampled snow melt water **do not** exceed health-based guidelines. In the few samples with slightly higher levels of iron, there could be slight colour changes or water with a different taste. These taste and color changes are not associated with an elevated health risk. While some years of sampling have shown increased iron levels in some areas, concentrations are often similar to that measured when mining started.

For comparison to water quality samples found in the Project Area, the attached also shows iron water quality data for Pond Inlet, which also does not exceed health-based guidelines, but some samples do exceed the aesthetic guideline.

This means that the water sampled by Baffinland is similar to water found in Pond Inlet in that each area’s water do not exceed health-based guidelines, but from time to time water from each area may exceed aesthetic guidelines and the water may look or taste different. Based on the data collected to date, the measured concentrations of iron would not impact health.

This data, which is publically available and thoroughly reviewed by the NIRB, NWB, QIA and other regulators shows that water at the areas sampled near the Mary River Project do not exceed health based guidelines for iron in drinking water.”

⁵ Note as Ms. McCauley was not previously sworn in or affirmed before the NIRB during the public hearings, a declaration will be filed separately.

XI. Dust

128. This Section XI of the Reply was prepared by Lou Kamermans, Senior Director, Sustainable Development, Baffinland.
129. The following submission is in reply to certain statements made by the HPI respecting their concerns regarding dust in the vicinity of the Project. As noted above, a full submission was provided to HPI previously on this topic and is attached to the Engagement Summary Update dated September 9, 2021.
130. The memo referenced above provides an update on the implementation status of the following three commitments respecting dust mitigation, as of May 31, 2021:
- Baffinland will develop and fund a monitoring program that is Inuit led to monitor the extent of visual dust in the Project Area as well as a snow sampling program (see Commitment No. 234, Commitment List, NIRB Registry Doc.# 334537);
 - Baffinland will increase the number of dust collectors at site in consultation with Inuit from the North Baffin and the Terrestrial Environment Working Group (see Commitment No. 233, Commitment List, NIRB Registry Doc.# 334537);
 - Baffinland will conduct a third party major audit that will involve Inuit to identify the greatest sources of dust (see Commitment No. 230, Commitment List, NIRB Registry Doc.# 334537).
131. Since May 31, 2021 Baffinland has continued to progress the above identified commitments and can provide the following updates:
- Baffinland continues to support QIA's independent Inuit led project to assess dust related to the Mary River Project, and is eager to see the outcomes of sampling conducted in the Spring of 2021
 - Baffinland has installed a total of 9 additional dust collectors at Milne Port and along the proposed rail deviation. An additional 6 dust collectors will be installed at a height of 1m (as opposed to the standard 2m height) based on community requests. The locations of the

- dust collectors were presented to the Terrestrial Environment Working Group in June 2021, without opposition or alternative locations proposed.
- Baffinland has acquired the services of Nunami Stantec to conduct the third party major audit of dust. Nunami Stantec will be working directly with a panel of Inuit representatives from the 5 North Baffin communities, selected by both Hamlets and Hunters and Trappers Organizations. The first planned field work is expected to commence as early as the end of September, 2021.
132. As stated above, Baffinland appreciates the opportunity to continue to work with the HPI towards the resolution of outstanding issues related to the Phase 2 Proposal. The work described in the memo is a clear demonstration of the value Baffinland places on Inuit knowledge and priorities for management and development in the Mary River Project Area.

XII. Ringed Seals

133. The following reply addressing ringed seal mating periods was prepared by Phillipe Rouget, Senior Marine Biologist, Golder Associates Limited.
134. During the January Public Hearing, the MHTO asked several questions relating to the topic of ringed seal mating periods and both scientific knowledge and IQ was shared on this topic (see Transcript, Vol. 8, pages 1466-1471 and Transcript, Vol. 11, pages 1905-1906, 1913, 1955-1957, 2105-2106).
135. I wanted to provide additional details about the western science perspective on when mating occurs in ringed seal. We acknowledge and respect there is some difference about how western science interprets when seals mate and the reason that fetuses are so small in early fall versus the IQ shared during the public hearings on this topic.
136. Based on best available science (McLaren 1958; Smith 1973; Smith 1987; Lyderson 1995; Kelly et al. 2010; COSEWIC 2019), the breeding season for ringed seal which includes pupping, nursing and mating, occurs in the Eastern High Arctic between the months of April and June, with mating occurring towards the end of the nursing period and preceding the annual molt in June, when ringed seals haul out on ice to bask in the sun. Mating occurs in the water underneath the ice, during periods when females temporarily leave their den and enter the water. If mating is successful, the egg becomes fertilized. The embryo then remains dormant in the female for about 2-3 months before it implants in the wall of the uterus and starts to actively grow (this is referred to as 'delayed' implantation). Hence, ringed seals, similar to all other seals, are technically speaking pregnant most of the year, although the period of 'active pregnancy' is only approximately eight months lasting from September to April (COSEWIC 2019).
137. Delayed implantation is an evolutionary adaptation in marine mammals to ensure their offspring is born at the same time each year when there are optimal conditions for pupping and mate selection (Sandell 1990; Boyd 1991; Orr and Zuk 2014). For ringed seal, this occurs at a time of year when they have a stable platform (landfast ice) for their breeding activities such as denning, pupping, nursing and mating, as well as moulting which follows the breeding period. The ringed seal molt period is largely completed by mid July, with animals spending a

larger proportion of their day in water at this time and become increasingly mobile (McLaren 1958; Heide-Jorgensen et al. 1992; Born et al. 2002; Carlens et al. 2006; Kelly et al. 2010). Once the moulting period reaches completion in July, ringed seal move into their summer foraging period where they put back on weight lost during the nursing and moulting period (McLaren 1958; Hammill et al. 1991; Young and Ferguson 2013). Seals become primarily solitary at this time and can venture considerable distances from the breeding sites (Freitas et al. 2008; Ogloff et al. 2021). By September, they are typically at their fattest state and this is roughly when the active portion of the pregnancy starts. Later in October, once sea ice starts to form, adults and maturing subadults return to their traditional breeding ground areas and begin to maintain breathing holes in preparation for the winter (McLaren 1958; Smith and Hammill 1981; Kelly et al. 2010). Ice is in a very dynamic state at that time of year due to weather events, temperature and wind. Seals maintain multiple breathing holes throughout a large area (often several km apart), typically in areas of hummocked ice and where natural weaknesses in the ice exist (tide cracks, pressure ridges) prevail throughout the winter (Smith and Stirling 1975; Smith et al. 1978; Smith 1987; Smith and Hammill 1991; Cleator 2001). These features in the ice make it less onerous for seals to maintain their breathing holes and allow for accumulation of drifting snow, which is needed for ringed seals to build their birthing and resting lairs during the peak winter period. It is not uncommon for seals to have multiple lairs during winter (Smith and Stirling 1975, 1978; Smith 1978; Furgal et al. 2002). During this ice-covered period, ringed seal exhibit small home ranges (Luque et al. 2014; Yurkowski et al. 2016).

138. The mitigation measures in place for ringed seal have been carefully developed to completely avoid shipping impacts on ringed seal during periods when they are 'grouped up' (i.e., the winter and spring) when group behaviour is critical to reproductive activities such as mating. In addition to the mitigations described at the January-February hearing, Baffinland has recently added a new mitigation commitment, in that icebreaking will not begin before July 15, which also helps to protect seals during the moulting period, and will not run later than October 31, which also aims to avoid impacts on seals at a time when they start maintaining breathing holes during initial ice freeze-up.
139. The impact of icebreaking on ringed seal during the fall will be limited to the narrow swath of the icebreaker route, which represents 0.33% of available sea ice habitat in the RSA, plus the

associated acoustic disturbance zone on either side of the corridor. Animals maintaining breathing holes in late October along the ship track might experience localized disturbance effects and may elect to move away from the shipping lane to pursue these activities. The impact is expected to be temporary and intermittent in nature (on the scale of several weeks with limited number of daily transits), and not likely to result in any large-scale displacement within the RSA. No impacts on the reproduction or survival of ringed seal are anticipated to occur from either shipping or icebreaking.

140. Baffinland acknowledges feedback from Inuit hunters indicating they are observing local changes in seal abundance and distribution in the RSA, with carry-over effects on seal harvesting. In response to this feedback, Baffinland has recently committed to undertaking targeted ringed seal monitoring along the Northern Shipping Route starting in 2021. This monitoring program will incorporate IQ and Inuit perspectives into the design, planning and implementation of this monitoring program. This will include dedicated ringed seal aerial surveys to monitor for potential shipping-induced changes in ringed seal distribution and relative abundance (i.e., density and seal hot spots) in the RSA. The 2021 survey results will be compared to ringed seal baseline aerial surveys undertaken by Baffinland in the RSA in 2006, 2007, 2008 and 2014, as well as to surveys undertaken by DFO in 2016 and 2017 (Yurkowski et al. 2019). This monitoring will address any residual uncertainty with the impact predictions related to shipping and ringed seal. Tracking ringed seal numbers in the RSA has also been identified as a long-term indicator for this species as part of the OITR developed for the Phase 2 proposal.

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XIII. Adaptive Management and the ICA

141. This Section XII of the Reply was prepared by Megan Lord Hoyle, Vice President and Lou Kamermans, Senior Director, Sustainable Development, Baffinland.
142. During the course of the Phase 2 review, parties have raised concerns respecting commitments made by Baffinland under the ICA as a contract between Baffinland and the QIA. The Igloodik Working Group asked, “Baffinland and QIA have said that they want to put Inuit at the driver’s seat of this project when it comes to adaptive management, the stewardship program and other programs within the ICA. If impacts are felt and they require a decision in regards to adaptive management, would Inuit be part of the decision-making, or would they only be advisors to the executive board at Baffinland?” (Vol 14, p. 2676). The following submission is in reply to certain statements made respecting concerns regarding how adaptive management will be implemented during Phase 2, and generally respecting the relationship between the Project Certificate and the ICA.

The Phase 2 commitments made by Baffinland to NIRB are not dependant on the ICA

143. Baffinland has substantially incorporated the commitments under the ICA into its Commitment Table and into its proposed draft Terms and Conditions that would apply to the Phase 2 Project. The ICA mechanisms provide support to the implementation of these commitments, and Baffinland remains committed to the ICA. However, it is important to emphasize that the commitments that have been made by Baffinland in the NIRB process are direct commitments made to NIRB and to all parties, including the communities, independent of the ICA.
144. Some ICA commitments are appropriate for incorporation as additional Terms and Conditions for Phase 2, enforceable under the Project Certificate. It is acknowledged that some ICA commitments intended to mitigate adverse ecosystemic or socioeconomic effects may not be appropriate as Terms and Conditions due for instance to limits on the NIRB’s jurisdiction. However, recognizing the importance of honouring these commitments to the credibility of the Project, Baffinland will report on the status of implementation of such commitments to the NIRB on periodic basis as applicable.

145. Since signing the ICA with QIA, Baffinland has continued to work with communities and make additional commitments during the NIRB process in order to help address their concerns raised through the Phase 2 process. Baffinland intends to continue working closely with the communities on these items, regardless of the status of ICA implementation.

The Phase 2 Project activities are capable of Adaptive Management and Baffinland has made express commitments for implementation.

146. Baffinland wishes to emphasize to the NIRB the importance of the commitment to adaptive management in connection with this Project. The AMP has the stated and agreed objective of preventing or reversing impacts that exceed assessment predictions, or that exceed other tiered thresholds established jointly by Inuit and Baffinland, based on IQ and science. In this reply to concerns about uncertainty and about aspects of the operation of the AMP commitments, we will reference the following documents which were filed during the public hearing:

- The ICA which includes, in Schedule A:
 - ID 1 – Agreed Terms and Conditions for the Inuit Committee and Inuit Stewardship Program (see also Commitment No. 131, 134, 135, 137, 162, 189, 211, 220, 222, 223, 229, Commitment List, NIRB Registry Doc.# 334537);
 - ID 2 – Agreed Terms and Conditions for Adaptive Management Plans Approval (see also Commitment No. 135, Commitment List, NIRB Registry Doc.# 334537); and
 - Appendix ID 2(1) – Adaptive Management Plan (Revised Draft) – a jointly approved draft between Baffinland and the Qikiqtani Inuit Association (the “QIA”), in relation to the ICA (see also submission of draft to NIRB Registry for Phase 2 in August 2020);
- The Update (the “Update”) on Adaptive Management Plans for Environmental Management Plans attached as Appendix 12 to the Baffinland Response to Written Questions filed on March 22, 2021 (NIRB Registry No. 334147).

147. Of particular importance is that the Project lends itself to adaptive management. In particular, the shipping activities have been, and can be adjusted with respect to scheduling and timing,

vessel speed, vessel numbers, and vessel management to mitigate impacts on narwhal, seals and other marine life. Railway operations can also be adjusted with respect to scheduling and timing, train speed, and train management to mitigate impacts on caribou, caribou migration and other terrestrial wildlife.

148. The initial Mitigation Toolkits for shipping and for railway transportation included with the Update each include the potential for reductions, and for stoppages and suspensions if required for adaptive management. That is to say, Baffinland has agreed to the concept that operations may be directly impacted by implementation of the AMP as a result of Baffinland led or Inuit led monitoring. (See the references below in parts 3(j) and (k) of this Reply).
149. Baffinland expressly recognizes, in the draft AMP, that if environmental assessment predictions or thresholds established jointly under the AMP, based on IQ and science, are exceeded, the shipping or the railway operations may require changes and reductions.
150. As stated by Baffinland in its letter to the Board dated March 22, 2021 at Appendix 12 to the Baffinland Response to Written Questions:

“Despite nuances in processes that may arise, Baffinland believes what is presented demonstrates a precedent-setting commitment to Inuit and ongoing regulatory involvement and oversight in the Project. Should Phase 2 be approved, Baffinland will continue to work with all Parties to finalize an implementation plan for the Commitments related to Adaptive Management that it has put before the Board.”

Adaptive Management will be jointly managed together with Inuit-led structures and committees.

151. The AMP is to be jointly agreed to by QIA and Baffinland. The ICA provides for Inuit-led decision-making by establishing formal responsibilities for the Inuit Stewardship Plan (“ISP”), the Inuit Committee (“IC”) and the Inuit Social Oversight Committee (“ISOC”) directly in the AMP.
152. The QIA’s role in the adaptive management process will at all times be influenced by the advice of the Inuit Committees. Baffinland and QIA will ultimately finalize and modify the AMP, while acting on the advice of the Inuit Committees. The Inuit Committees will have a direct role in establishing designated thresholds of acceptable change. These thresholds will be informed by

existing environmental assessment predictions, outcomes of additional CRLU assessments, the implementation of both Baffinland led (e.g. Marine Monitoring Program (MMP)) and Inuit led monitoring programs (ISP), new and relevant literature as it is made available, and other sources of IQ.

153. To accomplish the above, QIA and Baffinland have created an AMP working group to oversee the advancement of all activities associated with coming to joint agreement on the AMP. Once the AMP is agreed to between QIA and Baffinland, and approved by any applicable regulatory authority as required, the AMP working group will remain as a “standing working group” that can be convened to support the implementation of the AMP. This working group will be comprised of individuals with decision making authority for QIA and Baffinland, to enable effective working relationships and AMP development.
154. It is also important to note that the AMP and processes apply to social and economic factors as well as environmental issues, through the ISP, and the ISOC. (See the ICA and ID 3 – Social Monitoring Framework, and the draft AMP at Part 3.6.

The existing Working Groups established under the Project Certificate will continue to be engaged.

155. Baffinland has explained improvements to the existing Working Groups as well as the linkage between to the Inuit Committees and the Working Groups in a previous section above.

The ICA provides for independent, proactive Inuit-led monitoring.

156. There will be two streams of Inuit-led monitoring:
- Cultural & Environmental – through the CRLU Monitoring Program (see the ICA, ID 1 at Section 1.1.5(a)); and
 - Socio-economic – through the ISOC and the Community Action Research Team (“CART”) (see the ICA, ID 1 at Section 1.1.5(b)).
157. Monitoring led by Inuit will be independent of, and in addition to, the monitoring required and carried out by Baffinland, which will also continue to directly involve Inuit in the planning, implementation and interpretation, along with its third party scientists.

Objectives, Indicators, Thresholds and Responses will be jointly determined and will be based on IQ, community perspectives (CRLU), and science.

158. IQ and community involvement is also a key foundation of the AMP (see Part 1.5, page 12 of the AMP entitled “The Role of IQ and Community Involvement in Adaptive Management”).
159. Progress on development of OITRs, TARPs and Mitigation Toolkits as at March 2021 is summarized in Appendix 12 to the Baffinland Response to Written Questions (NIRB Registry No. 334147).
- OITR = Objectives, Indicators, Thresholds and Responses.
 - TARPS = Threshold, Action and Response Plans.
 - Mitigation Toolkits identify potential mitigation responses.
160. For example, see the TARPS and Mitigation Toolkits attached as part of the Update at Appendix 12 to the Baffinland Response to Written Questions filed on March 22, 2021. This includes TARPs and Mitigation Toolkits for:
- the marine environment (Marine Monitoring Program (MMP));
 - the terrestrial environment (Terrestrial Environment Mitigation and Monitoring Plan (TEMMP));
 - air quality (Air Quality and Noise Abatement Management Plan (AQNAMP)); and
 - aquatic effects (Aquatic Effects Monitoring Program (AEMP)).

The Mitigation Toolkits are used to develop pre-defined actions that are jointly agreed to where an OITR has been exceeded. This will mean that there is no delay in Baffinland’s response to an exceedance of a pre-defined unacceptable impact. The Mitigation Toolkits present a range of potential responses, including (as an example) Moderate or High Action responses included in the Marine Mammal Trigger Action Response Table such as ceasing or suspending shipping activities for a season or a component of a season (i.e. shoulder seasons).

The Precautionary Principle will apply.

161. See the ICA at Sections 2.1.11, 2.1.12 and 2.1.13. The precautionary approach is a key principle of the draft AMP (see the AMP at pages 15, 18, 21, etc.).

Baffinland is responsible for funding the ISP, IC and ISOC and Inuit monitoring for the life of the Project.

162. See the ICA at Sections 5.3 to 5.6, ID 1 at Section 1.4.1, and ID 2 at Section 2.3.

The AMP recognizes regulatory authorities – but it may be more protective than regulatory standards.

163. While the ICA is a contractual agreement between Baffinland and the QIA, it is important to remember that:
- the Agreement confirms that it does not replace and, in fact, recognizes and respects the existing regulatory authorities such as the DFO, the Government of Nunavut, and the Nunavut Impact Review Board (see the ICA, ID 2 at Section 2.1.8); and
 - Per ID 34.1.6 of the ICA, it is understood and acknowledged by both Baffinland and QIA that Baffinland may be required by specific regulatory authority direction to make further changes to agreed plans (or plans that have been subject to an arbitrator’s determination) following submission to regulatory authorities and that final approval of such plans would be subject to approval by the relevant regulatory body (i.e. NIRB, NWB, etc.). Furthermore, in the event of a conflict between agreed upon objectives, including Inuit objectives, and requirements related to various regulatory processes and approvals, the parties will work together to determine if it is possible to identify reasonable revisions to the plans to reconcile such conflict. Requirements of plans agreed by the parties or determined by arbitration will continue to apply and be implemented even if requirements agreed or determined by arbitration are more stringent than the regulatory requirements.

164. Section 2.1.10 of the ICA states:

“2.1.10 Baffinland recognizes and agrees that managing and monitoring the Mary River Project is not limited to achievement of applicable guidelines, and standards; applicable

guidelines and standards may form a basis from which more protective and Inuit informed site-specific criteria may be developed and implemented.”

165. Baffinland has proposed that the commitments to monitoring and adaptive management under the ICA and the AMP in particular, should be included as terms and conditions under the Project Certificate.

Adaptive Management will be included in individual environmental and socio-economic management plans

166. See the ICA, ID 2 at Sections 2.1.17, 2.2.9 and 2.2.10. Each of the 30 management plans (see the AMP at Part 2.1) will be updated to include adaptive management. See Part 3 of the AMP on Adaptive Management Integration, and in particular, Part 3.5 on plans related to Biophysical and Atmospheric Environment, and Part 3.6 on plans related to Socio-economic issues.

Adaptive Management addresses the issue of uncertainty in standard environmental assessment.

167. Section 103 of the *NuPPAA* lists the factors that the Board must take into account in this review of the Phase 2 Proposal. Those factors include ss. 103(1)(h) and (i):

“103 (1) In conducting a review of a project, the Board must take into account the following factors:

(h) the measures, including those proposed by the proponent, that should be taken to

(i) avoid and mitigate adverse ecosystemic and socio-economic impacts, including contingency plans.”

168. For the Phase 2 Project, Baffinland has committed to extensive measures to avoid and mitigate impacts. And, in addition to all of the basic design measures and operational plans to avoid or mitigate impacts, Baffinland has committed to the AMP as a further measure to avoid and mitigate adverse impacts.

169. Baffinland and the expert consultants responsible for authoring the Phase 2 environmental assessment have acknowledged a degree of uncertainty in the environmental assessment predictions, which is standard and expected in the practice of Environmental Assessment. Intervenors have also raised their own concerns.
170. In response to those concerns, the AMP and the commitments to extensive monitoring against jointly agreed indicators and thresholds, and response actions identified in Mitigation Toolkits under that Plan will act as a backstop. The jointly agreed thresholds under the AMP will allow for further actions to be taken if impact predictions or Inuit based objectives are exceeded.
171. The jointly agreed thresholds under the AMP will be set to reflect low, moderate and high risk levels. The intention of this tiered system is to have low risk thresholds set at levels below impact predictions and other measures of unacceptable change to Inuit, allowing Baffinland an opportunity to implement agreed upon actions and prevent greater effects (moderate and high) from occurring.
172. As already noted, activities such as shipping and railway transportation are activities which inherently lend themselves to modification with scheduling and timing, speeds, and convoy management as part of Mitigation Toolkits for adaptive management.
173. As stated in the March 22, 2021 letter at Appendix 12 to the Baffinland Response to Written Questions:

“Through its work with QIA on the priority EMPs, Baffinland has received feedback regarding the development of the moderate and high action level thresholds and responses, specifically QIAs need to provide greater certainty to Inuit that the AMP process committed to under Schedule 2 of the ICA will be meaningful to Inuit. To that end, Baffinland provided the QIA with a ‘pool’ of proposed mitigations that could advance the important discussions that must take place with Inuit, and which could be implemented should respective moderate or high action level thresholds be exceeded. Prior to finalization, these ‘pools’ of mitigations, more formally referred to by Baffinland as Moderate and

High Action Toolkits, are expected to be subject to further review and appropriate categorisation (moderate versus high, or both at different scales). The development of these action toolkits required extensive internal consultation, as well as approval by the Baffinland executive team, and Baffinland emphasizes they represent a firm and material commitment to take action in the event it is deemed necessary under the Adaptive Management Plan. The next step is to discuss with Inuit the way in which they are to be implemented based on the specific situation, observed impact, potential stressor and feedback received through the ISP framework, including recommendations from the Inuit Committees.”

174. Baffinland’s commitments go well beyond the general approach to environmental impact assessment and project approval. Uncertainty has been reduced or eliminated by the commitment to the AMP. Again, the commitment under the AMP is to monitor impacts intensively, to establish indicators and thresholds against which to measure the impacts, and to take action by mandating additional mitigation measures from the Mitigation Toolkits to ensure that impacts are avoided or mitigated.