



Baffinland Iron Mines Corporation
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August 18, 2022

NIRB File No. 08MN053
NPC File No. 149829

Attention: Chairperson Kaluraq
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU X0B 0C0

Dear Chairperson Kaluraq,

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

Per your procedural direction of July 19, 2022, please find enclosed Baffinland Iron Mines Corporation (**Baffinland**)'s final reply to written submissions and Community Roundtable comments directed to Baffinland and received by the Nunavut Impact Review Board (**NIRB or the Board**) in relation to its assessment of our "Production Increase Proposal Renewal Proposal", as filed with the NIRB on May 20, 2022 and as further described to NIRB in June 2022 (**PIP Renewal**).

The following documents are enclosed:

- Baffinland Summary of Community Roundtable
- Baffinland Response to Comments on the Production Increase Proposal Renewal
 - 2022 Marine Mammal Monitoring Program Daily Observations – Preliminary Data
 - Representative satellite imagery and photos showing ice concentrations at 3/10^{ths} or less
 - Radashevsky VI, et al. (2022) Canals and invasions: a review of the distribution of Marenzelleria (Annelida: Spionidae) in Eurasia, with a key to Marenzelleria species and insights on their relationships. Aquatic Invasions 17(2): 186–206
 - Baffinland Commitment Table
 - Disposition of QIA Commitment List
 - Summary of Engagement

Baffinland requests the Board also give due consideration to this letter, which provides further context for the enclosed materials.

a. Urgency to Avoid Severe Negative Impacts to Inuit and Other Baffinland Employees

At the outset, we want to emphasize that the PIP Renewal is focused on providing stability for our employees from all the North Baffin communities, Nunavut and throughout Canada, who rely on their employment with us or our contractors to support their well being. We recognize this has been a very difficult period of uncertainty for them, and we ask the Board to take this into consideration in the timing of their release of their recommendation report. We thank our employees for their professionalism, particularly those at site that are working hard to provide a safe and supportive work environment for all. We thank the participants in this review process and the NIRB who have also responded expeditiously and for those who have provided their support to the continuation of 6mtpa for 2022.

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

The current situation is urgent. Baffinland expects to reach the transportation limits set out in section 179(a) and (b) in September (trucking) and October (shipping). If that occurs, we will have no choice than to complete the termination of the 1,156 employees (including over 200 Inuit employees) that were sent termination notices on July 31st. We also note that because there is no icebreaking of landfast ice, Baffinland generally completes shipping activities in October of each year (depending on ice conditions) and so we are also limited by weather factors. We feel we owe the communities, NIRB and all participants full and complete transparency about the risk that the operation is facing at this point in time. We appreciate that some participants in the process have suggested such statements are perceived as threats – unfortunately we cannot continue to pay over one thousand employees if there is no work for them to do, and we are providing an accurate reflection of our current situation. It is regrettable that we are currently in this position.

b. PIP Renewal has Broad Nunavut Community and Inuit Support

What follows is a summary of North Baffin communities and community groups that have formally confirmed their support for the PIPE Renewal Proposal in correspondence to NIRB:

- Hamlet of Pond Inlet, NIRB Registry No. 340950 and 340949
- Hamlet of Sanirajak, NIRB Registry No. 341201 and 341200
- Hamlet of Arctic Bay, NIRB Registry No. 340954
- Hamlet of Igloolik, NIRB Registry No. [pending]
- Sanirajak Hunters and Trappers Association, NIRB Registry No. 341199
- Igloolik Hunters and Trappers Association, NIRB Registry No. 341337
- Ikajutit Hunters and Trappers Association, NIRB Registry No. 341282
- Arctic Co-operatives Limited, NIRB Registry No. 341336
- Elders of Pond Inlet, NIRB Registry No. 340843
- 59 Inuit employees of Baffinland (via the International Union of Operating Engineers, NIRB Registry No. 341334)

We have not included the participants in the Community Roundtable in this list, where we heard many positive oral statements of support for the PIP Renewal from the majority of participants.

We appreciate that IUOE Local 793 have provided considerable support to our Inuit employees to help them share their views and experiences with NIRB in this process. The IUOE represents approximately 150 employees that reside in the Qikiqtani Region of Nunavut. We are proud to hear the experiences of Mary River Project employees and how the employment and training opportunities have transformed their lives. We have read the submissions, spoken with employees and heard their statements at the Community Roundtable. We thank them for sharing their support. We are committed to our shared goal of maximizing Inuit employment and training opportunities, with an emphasis on areas where there is room to grow, including the trades and management, and we are working hard with youth to help prepare them for any opportunities they wish to pursue. As confirmed through community support letters, employee support letters and oral statements provided at the Community Roundtable, there are very limited opportunities to provide for oneself and family in North Baffin, and we are proud to be the largest private sector employer in the region.

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

c. Mary River Inuit Impact Benefit Agreement and Other Benefits

We have followed the process identified in Article 26 of the Nunavut Agreement, and together with QIA have developed a strong and comprehensive Mary River Inuit Impact Benefit Agreement (**IIBA**) that protects Inuit interests and enables Inuit to take full advantage of the opportunities created by the operation of the mine. In 2018, Baffinland and the QIA agreed to important updates to the Mary River IIBA that included specific considerations for the 6 mtpa operating limit contained in the original PIP.

At the time the PIP Application did not request the expiry of Terms and Conditions 179(a) and 179(b), and it received the support of the QIA, Hamlet of Pond Inlet and MHTO. The added benefits related to the PIP included in the Mary River IIBA at that time, and that will continue to apply to the 2022 operation include:

- 17.7 Harvesters Enabling Program, this has provided \$1.68 million in benefits to date
- 17.8 Wildlife Monitoring Program, this has funded one proposal to date in 2019 for \$205,000;
- 17.9 Marine research Equipment, Pond Inlet will receive a marine research vessel once deliveries can be made in 2023
- Although not included directly in the Mary River IIBA, the Tasiuqtiit Working Group will receive \$10,000 for every ore carrier required to carry more than 4.2Mt to market in 2022; this fund has received \$730,000 to date

Baffinland has made additional commitments through the PIP Renewal that further enhance the role of Inuit and IQ in project management, including but not limited to:

- Agreement to QIA's proposed commitment to review and implement changes to the Wildlife Compensation Agreement (Commitment 26); and
- Agreement to QIA's proposed commitment to complete the Pond Inlet Country Food Baseline and Culture, Resource and Land Use Assessment (Commitment QIA-09), develop Inuit focused indicators (Commitment QIA-07) and Inuit led monitoring programs (Commitment QIA-08).

To be clear: Baffinland is not waiting for the results of these additional CRLU studies in order to implement mitigations designed to address the concerns regarding dust, wildlife and hunting. The Commitment List has been developed to help address these concerns now.

The Mary River IIBA provides significant benefits to Inuit and there are numerous examples where Baffinland has provided benefits to communities over and above the terms of the IIBA. Many of these are detailed in the submission to NIRB from the Arctic Co-op dated August 11, 2022, as follows:

- Approximately 78 tons of Food delivered to Kaniqtugaapik Food Bank and Iliqsaqsivik Society in Clyde River;
- Food/contributions of \$67,600 in the amount of approximately 21 tons provided to Qajuqturvik Food Centre in Iqaluit;
- Food/contributions of \$75,000 in the amount of almost 22.5 tons of food provided to school foodbanks at Nakasuk and Joamie schools in Iqaluit;
- Over 15 tons of water valued at more than \$50,000 contributed by Baffinland to the Iqaluit DEA during the water crisis October 2021;
- \$10,650 contributed to the Nunavut Kamtsiaqtut Helpline;
- \$5,250 contributed to the REACH Program in Iqaluit;
- \$18,850 to sponsor Iqaluit New Year's Eve Fireworks 2020 & 2021 through 123Go;
- Freight for Foodbanks Canada "After the Bell" program of almost \$6,100;
- Country Food donation to Elder's Centre in Iqaluit valued at over \$1,600;

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

- Christmas Food Hampers delivered to over 1,500 households in impacted communities;
- Two separate cleaning/sanitation kits delivered to each of over 1,500 households in impacted communities during the pandemic valued at approximately \$300,000; and
- Contribution of an ATV and freight valued at over \$22,000 to the school in Grise Fiord.

Baffinland wishes to continue its partnerships and support for the improved well-being of the 5 North Baffin impacted communities. At the Community Roundtable, Baffinland provided a summary of socio-economic monitoring results from the years between 2018 and 2021 when Baffinland was permitted to operate at 6 mtpa. The results clearly demonstrate the overwhelming socio-economic benefits of operating at 6 mtpa to date, and of sustaining the operation through the approval of the Production Increase Proposal Renewal.

Benefit Highlights	6 MTPA Operation		ERP	% Increase
	2018-2021	Average	2017	
Payments to QIA	\$ 67,816,349.85	\$ 16,954,087.46	\$ 8,114,453.60	109%
Payments to GN	\$ 58,760,000.00	\$ 14,690,000.00	\$ 1,500,000.00	879%
Payments to Tasiuqtiit Working Group	\$ 730,000.00	\$ 182,500.00	N/A	N/A
Inuit Employee Payroll	\$ 74,680,962.00	\$ 18,670,240.50	\$ 8,313,898.00	125%
Inuit Contract Expenditures	\$ 610,900,000.00	\$ 152,725,000.00	\$ 116,000,000.00	32%
Inuit Training (Hours)	126000	31500	4000	688%

The Hamlets of Pond Inlet, Arctic Bay, Sanirajak and Igloolik have all recognized that they wish to support continuing jobs for their community members that need to participate in the wage economy. The communities have told us they cannot afford to lose those jobs for their community members, that they want to see opportunities for their populations, and that they see the long term benefit to their communities of a continuing mining operation. Baffinland respects the balance between socio-economic benefits and environmental protection that has been shared by the HTOs from Arctic Bay, Sanirajak and Igloolik, that it is essential to protect their ability to protect the environment, practice traditional activities and also that their members and communities rely on the availability of monetary livelihood opportunities. This balance has been considered in their letters of support, which in the case of the Igloolik HTA offered conditions for their support. Baffinland is accepting all conditions put forward and has introduced additional environmental mitigations for the 2022 year to mitigate against environmental impacts.

d. Overview of Key PIP Renewal Proposal Mitigations and Responses to Comments

In the PIP Renewal Proposal, Baffinland has built on the lessons learned since 6 mtpa transportation limits were first introduced in 2018. We are listening to the communities and making changes, particularly on key issues such as dust, wildlife protection and benefits enhancements. We have also listened to the NIRB and its advice on current impacts that are described in the Phase 2 Recommendation Report released on May 13, 2022.

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

We believe we have met the high standards of the NIRB with respect to environmental protection and prevention of negative socioeconomic effects. We have worked hard since the PIP Renewal was initiated in May to meet with interested parties, community members and other groups (see enclosed Engagement Summary; Appendix 5 of the Baffinland Response to Comments on the Production Increase Proposal Renewal). These engagements provided an opportunity to increase understanding of the proposal as well as for Baffinland to hear additional feedback, concerns and advice for improvement. A number of important commitments were developed directly in response to community input. Two prime examples include:

- In response to MHTO requests to implement additional adaptive management to the 2022 shipping season, Baffinland developed and implemented an ore carrier convoy system, extended the 3/10 trigger to avoid icebreaking at the beginning of the shipping season and reduced the maximum number of ore carriers required to transport 6 mt from 86 to 80.
- In response to initial discussions with the Qikiqtani Inuit Association, Baffinland agreed to revise the Marine and Terrestrial Environment Working Group Terms of Reference to include additional HTO representatives, implement a consensus based decision making system, and resource an independent Chair to manage meetings and the disposition of recommendations; Baffinland also agreed to request support from the federal government to appoint an independent Project Monitor to oversee general commitment implementation.
- In line with requests from the Hamlet of Igloolik, Igloolik HTA and Hall Beach HTO, Baffinland will accept the recommendations from the Inuit-led Dust Audit Committee Report to be issued in September 2022.

The commitments above and others are reflected in the enclosed Commitment List (Appendix 3 of the Baffinland Response to Comments on the Production Increase Proposal Renewal).

We also wish to highlight the enclosed (Baffinland Response to Comments on the Production Increase Proposal Renewal), which provides our response to comments submitted by participants up to August 11, 2022. Some participants have indicated that they wish the NIRB to rely on submissions made by their organizations in the Phase 2 process; should the NIRB do so, Baffinland also requests that the NIRB give full consideration to our corresponding responses in the Phase 2 process as relevant to this application.

e. Community Roundtable

Baffinland thanks the Board for organizing a community roundtable session in Pond Inlet on August 16, 2022, which included both in-person participation opportunities in Pond Inlet and opportunities for representatives from the North Baffin region to participate remotely.

We also want to thank Mitimatalikmiut for welcoming us to their community for the roundtable as well as for other meetings, whether it be with the meetings with MHTO, Council, or the general public of Mitimatalik.

Generally, the Community Roundtable provided information on the following broad topics and themes:

- Employment
- Training
- Community Benefits
- Project Economics
- Project Planning
- Effects to Wildlife and Harvesting
- Dust and Shipping Mitigations
- Marine Monitoring
- Incorporation of IQ

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

Baffinland provided complete responses to the community representatives and the Board. Baffinland also recorded in writing questions and responses, including those delivered in Inuktitut and provided in English by the interpreters for our reflection and inclusion in future decision making and reporting. Attachment 1 provides a more detailed summary of the topics discussed, which is intended to respond to the NIRB Chair's request at the conclusion of the Community Roundtable to address both written submissions and Community Roundtable questions in our final written response.

f. Response to Procedural Matters Raised by Some Participants

Some parties have criticized the PIP Renewal reconsideration process. Baffinland has respected all of the processes developed under the Nunavut Agreement and reflected in NuPPAA which set out how a "Major Development Project" can proceed. We will continue to do so in future should any applications be needed.

Some participants have expressed a desire for additional consultation, from Baffinland, other organizations and government participant. We respect the need for consultation and as reflected in our enclosed Engagement Summary (Appendix 5 of the Baffinland Response to Comments on the Production Increase Proposal Renewal), are committed to deep engagement with the communities. We work hard to hear the views from Inuit, incorporate IQ that is shared with us, provide feedback to communities and to provide direct opportunities for Inuit to participate in our monitoring programs, and provide support to carry out Inuit led monitoring. We also note that where recommendations have not been incorporated into our Project operations is not a reflection of a lack of consultation or engagement. We have been flexible and responsive to community concerns since beginning operations and have made many requested improvements over the years. For 2022, we have made additional significant commitments in that regard as part of this application (see Commitment List; Appendix 3 of the Baffinland Response to Comments on the Production Increase Proposal Renewal).

However, we also recognize that consultation requires participation of the parties we wish to consult with. Should parties decline opportunities to meet, it is challenging to incorporate their feedback and communicate how the feedback has been incorporated back to them (see Engagement Summary; Appendix 5 of the Baffinland Response to Comments on the Production Increase Proposal Renewal). We will continue extending opportunities even where parties have declined to meet in the past. But, it is our hope that new processes that will provide avenues for direct communication (such as expanded North Baffin hunter and trapper organization participation in the working groups, at Baffinland's cost) will help provide a new venue for all parties to come to the table and share and learn.

g. Future Project Plans

We respect the questions about future plans for the Mary River Mine that NIRB has received from the participants in this process, and have attempted to address them as they were received during the Community Roundtable, in the attachments to our written response submission, and in this cover letter. These responses are all provided in the context of significant permitting uncertainty.

First and foremost, Baffinland is asking for permission to proceed with the PIP Renewal to ensure the Project has a future to build from at all. As set out above, the Mary River Mine cannot currently transport more than 4.2 mtpa and unless transportation limits are increased, we will not have sufficient work available for our employees.

Baffinland wishes to be transparent about the need to continue with similarly elevated transportation levels in future years. Baffinland limited the PIP Renewal to 2022 only in recognition of the need for an expedited process in the circumstances, and also in response to a request from the QIA to do so. Any future applications will be provided as early as is feasible to ensure they are complete. They will also respect the fact that the amendment we are seeking

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

to the Project Certificate Terms and Conditions 179(a) and 179(b) expire on December 31, 2022 (should this current application be approved and the Minister choose to again draft the final Project Certificate terms and conditions in that manner).

As for the longer term, Baffinland is continuing to plan to construct the approved Steensby infrastructure components of the Mary River Mine, which started with the development of the Mine Site in 2015. However, we still face the enormous challenge of obtaining financing for these components and the timeline is thus highly uncertain. As the NIRB is aware, the Phase 2 Proposal is currently before the Minister. We continue to be of the view that Phase 2 presents significant opportunities for benefits to the company and Inuit, and presents a robust and protective approach to environmental management. We respect that the regulatory process relating to Phase 2 is ongoing.

We wish to thank NIRB and the NIRB staff for their expedited attention to the PIP Renewal, and we request that you issue a positive recommendation to the Minister as soon as possible.

Regards,

Baffinland Iron Mines Corporation



Megan Lord-Hoyle

Vice President, Sustainable Development

Attachment: Attachment 1 Baffinland Summary of Community Roundtable
Attachment 2 Baffinland Response to Comments on the Production Increase Proposal Renewal

c. Udlu Hanson, BIM
Lou Kamermans, BIM

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

Attachment 1

Baffinland Summary of Community Roundtable

Attachment 1: Baffinland Summary of Community Roundtable

While Baffinland addressed the majority of comments below during the Community Roundtable in Pond Inlet on August 16, 2022, we have provided pertinent responses for some of the more commonly asked questions. We have also supplemented with additional information on some topics where we did not get a chance to respond and/or elaborate on an answer provided. Please also note the bullets have been taken from our general notes of what was captured as was said at the Community Roundtable.

Note these topics and responses are based on Baffinland's notes and we defer to NIRB staff's summary of the meeting should they differ.

Generally, the Community Roundtable provided information on the following topics and themes:

- Support for continuing job opportunities and benefits for the North Baffin region;
- Comments on the urgent need for job opportunities in the North Baffin region;
- Support for the application and continuing operating 6 mtpa for 2022 (recognizing and respecting that some individual participants also indicated they do not support the application);
- Support for protection of the environment, and in particular to address dust, and prevent negative impacts on narwhal, seal, and caribou;
- Sharing of views that the environment and hunting has already been impacted by the project operations;
- Sharing of views that the impacts of the project with the mitigations that are proposed and in place are acceptable;
- The work ready program and training opportunities are of benefit to the community;
- Concerns about impacts of layoffs in community;
- Comments about opportunity for wage employment to help friends and family;
- Comments about the difficulties experienced by individuals that are laid off;
- Questions about the impacts of rising costs to the operation, including gas prices;
- Comments about the ability for working at the mine to support social connections and help people struggling with substance use issues;
- Questions about project operational matters, including mitigations such as wind fencing and dust suppressants;
- Questions about how convoying could provide environmental benefits;
- Questions about mitigation measures in place for narwhal;
- Questions regarding icebreaking and the use of the Botnica;
- Suggestion that Baffinland should hire modern ships as a potential acoustic noise reduction mitigation;
- Questions about monitoring programs, including shipping;
- Comments regarding input of technical and legal advisors, that non-Inuit or people from the south should not be leading this – “they have too much say in the communities”;
- Questions regarding aerial surveys of caribou;
- Comments that MHTO hunters are noticing changes and impacts to wildlife;

- Comments that heavy trucks and wheels on the road is causing dust and makes a lot of dust in the spring, and that rail would be less dusty – acknowledgment that some people think the rail will disturb wildlife;
- Request for mining supply ships to help provide supplies to community;
- Questions and comments about how Baffinland supports job opportunities and training;
- Comments that construction at the port drove away narwhal, there was a dock being constructed as well and other ships back and forth, combination of factors driving the narwhals away, there were no seals when they were making the dock in the community;
- Questions and comments about Baffinland’s future plans for the project;
- Comments that community members including youth and Elders continue to hunt, value hunting, and wish to ensure that the opportunity to hunt is protected from damage by mining;
- Concern regarding marine impact and the potential to reduce wildlife populations;
- More research is needed on community matters such as traditional use activities;
- It is important for Baffinland to follow their commitments and the Project Certificate;
- Questions directed to NIRB about the Project Certificate and regulatory process;
- Questions directed to QIA;
- Questions directed to regulatory authorities regarding their mandate, monitoring and research carried out directly by government organizations, and consultation efforts.

Baffinland provided responses as follows (organized by general topic):

Project Support

- Baffinland appreciates the support and confirms that it has committed to existing and new mitigations that are intended to limit potential for environmental impacts and impacts on hunting.
- Baffinland will continue employment and training opportunities and will not proceed with the termination of employees, should the 2022 6mt be approved.

Dust

- Dust has been a component of the project that Baffinland has addressed over many years and understand that it will not just end in a year and is something that Baffinland is committed to working with the communities over the years. We have made improvements including an audit of dust sources in 2016 which generated several recommendations which we implemented. In the past 4 years we have implemented several mitigations including a dust spray which forms a crust over stockpiles, we have also been applying a trademarked product known as “dust blocker” on the road and will be entering our third year of application. Most important and of importance to the communities is the implementation of a dust audit in which we have engaged technical experts as well as community representatives from the 5 North Baffin communities who have visited the site twice and met on a bi-weekly basis and have evaluated/investigated the remaining sources of dust as well as controls that can manage those areas.
- The dust mitigations have been effective, but we are willing to take it further and have talked to suppliers about wind fencing which would encircle the Milne port stockpiles and would create

an added layer of protection so that if any dust escaped the wind fencing would protect it from going further. One thing in the north is that we are not certain how the fence would interact with the snow and is something that BIM will need to understand before implementation. We are expecting to receive the full report soon and are looking forward to reviewing it and providing an update to the NIRB and the dust audit committee with regards to implementation.

- We have so far added shrouds or hoods at the crusher site anywhere the ore is moving or dropping.

Training and Job Opportunities

- Baffinland is interested in continuing the work ready program.
- If we receive approval and can mine at the same rate we will continue looking at improving Inuit training and employment opportunities.
- The Mary River Project currently employs 388 Inuit directly and through contractors

Community Feedback and IQ

- We monitor the environment quite closely with consultants and western science experts but we also ensure that Inuit are included in all of our monitoring programs and are taking part in providing advice to us in what they see and observe while they are undertaking the work.
- We do listen closely to communities when they are sharing information with us and have altered our monitoring programs in response to that. It is further our intention to keep evolving and building in that way.
- We have also provided funding to the community based monitoring groups so that Inuit can do their own monitoring – and we would like to continue to do that.
- We have ensured that this year, our monitoring programs are inclusive of Inuit (as per pre-COVID-19) and will continue to ensure Inuit are involved in our monitoring.
- We have also made new commitments to expand the environment working groups to include more representation from the HTOs to strengthen the incorporation of IQ and community feedback in our monitoring program design, results and adaptive management practices.

Shipping and Marine Wildlife

- We do have new mitigations to directly target marine mammals and narwhal, the mitigations that we have committed to and already implemented are a direct response to the requests from MHTO in early May.
- We did not commence ice breaking to start the shipping season this year.
- We have reduced the request to approve the overall number of vessels which we previously had approval for.
- We are introducing a convoy system to reduce the frequency of transits and reduce overall sound exposure.
- When sending a convoy through the soundscape is similar to the impact of one going through.
- We know that the spring is an operational overlap between Narwhals so that is the premise for holding off on ice breaking acknowledging there are fewer Narwhals that we experienced in

2019, so in the absence of scientific uncertainty linking our project to that we are trying to do what we can to contribute to protecting / limiting impacts on Narwhal.

- The nature of ice is different at the beginning and end of season, despite being covered at the start it is thin, eventually it does get to the point where the ice gets thicker. Unlike the spring when you are dealing with the thickest ice conditions and they are getting better from a shipping point of view. In the fall you don't know what the conditions are going to be like from one week to the next. So in the fall its required for the insurance of allowing vessels to leave when they need to
- We conduct a number of surveys annually for the marine and terrestrial environments.
- We also run studies to assess the organisms found in the communities' waterbody to determine what they are and if they have been seen before in the region.
- In addition to that we have a program, the shipping monitor program which is based in Pond Inlet which uses an online software to track the vessels, their speed and the lanes that they are using, all of these studies are being developed and conducted with the participation of Inuit.
- Two forms of monitoring for convoys now. One is Intended to reduce noise over the season
- Passive acoustic monitoring currently in place has monitored convoys now
- In 2019 a program was started to start the shipping season where we were shipping through ice.
- When looking at benefits for acoustic monitoring in 2022, data could be looked back at. When look at data, when travel close to 10km apart there is a net benefit there. A reduction in amount of noise if you would have them travel separately. Data was looked at and recorded. Mentioned in June 15 supplemental package to the current application.
- Reporting by captains for how close they travel in convoy. Have found vessels are travelling 1 Nautical Mile from each other.
- Based on early observations, narwhal are appearing to return in greater numbers this year as compared to last, though we will have to wait for full results to confirm.
- Elaboration on an answer provided - We aim to use newer rather than older ships. Generally most bulk commodity ports in the world accept vessels up to 15 years old and others 20 years old. The average age of the ships we are using / plan to use this year is 6.6 years. The majority (80%) are 10 years of age or younger which is considered an excellent standard. 90% of our ships are 11 years or younger. And all are under 15 years of age. Compared to older ships, newer ones generally are of improved design, fuel efficiency, etc.

Caribou/ Terrestrial

- We have discussed implementing aerial caribou surveys in May and June and we have tentatively discussed carrying it out in October 2022 or Spring 2023, and are working with the Government of Nunavut and the TEWG to finalize plans.

Future Planning

- It is true that BIM is looking for 6mt for an extended period of time, a period of time running at 6mt was included in the Phase 2 proposal that we would remain at that level if Phase 2 were to be approved before or while the construction of the railway were to be constructed, and that remains the same.

- Have not gone over 4.2 mt yet, but will be over for trucking and shipping in the fall. If we are not approved for 6mt for remainder of year, then we will not have enough work for our employees and we will proceed with terminations.
- We have not approached the Minister or the NIRB about cancelling phase 2
- Currently we have 388 Inuit employees at site (including employees of contractors), and want to protect and keep providing those jobs.
- We would have to go back to 80 people on site if we scale back to 4.2 mt, and those 80 individuals would be working to continue to follow project certificate conditions, monitoring and maintenance of the equipment.

Other Topics

- Regarding the price of gas, this is one of the rising costs that we need to face right now, as well as other costs that we have seen over the years. These rising costs make it even more important for a larger production limit.
- Clarification that equipment isn't contaminated, and that dust is not causing harm to any local communities from scientific monitoring perspective. Haven't seen any changes in metal level in soil, water levels and fish. Made aware of avoidance issues, and are working to develop communications plans so people are comfortable consuming country foods.

August 18, 2022
Chairperson Kaluraq

Reference: Baffinland Final Reply to Technical Comment and CRT Submissions

Attachment 2

Baffinland Response to Comments on the Production Increase Proposal Renewal



Response to Comments on the Production Increase Proposal Renewal

Baffinland Iron Mines Corporation
Mary River Project
NIRB File No. 08MN053

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Appendix 1 MHTO Attachments

MHTO-01 Attachment 1: Marine Mammals 2022

MHTO-01 Attachment 2: Representative satellite imagery and photos showing ice concentrations at 3/10ths or less

Appendix 2 DFO Attachments

DFO-01 Attachment 1: Radashevsky et al. 2022

Appendix 3 Commitment List

Appendix 4 Disposition of QIA Commitment Table

Appendix 5 Summary of Engagement

POND INLET’S ELDERS ADVISORY COMMITTEE

ID#	Recommendations/Requests	Response
PI Elders-1	<p>When Mary River Projected started, those born between 1928 and 1945 were very much in support of Mary River Project, for they knew that through the Nunavut Agreement which was negotiated by Inuit, there would be opportunities for employment for Inuit and Inuit Businesses would also benefit, for these were already put in place so our future generations will have opportunities to have employment, and growth benefits to the communities. This would not only benefit Nunavut, but also Canada as a whole.</p> <p>In the years between 1923 and 1964, there was a seasonal coal mining in the vicinity of the now, community of Pond Inlet. This benefited a lot of families, living in the vicinity of Pond Inlet, Arctic Bay, Igloolik, and Clyde River. When Mary River started, there was expectations from the community that employment and benefits would flow as they did in the past.</p> <p>Therefore, when Baffinland started in 2000, the Elders were very happy that there would be more employment opportunities for the community. Qikiqtani Inuit Association then started negotiating and concluding the Inuit Impact Benefits Agreements, which identified what benefits would be forthcoming.</p> <p>Then recently the Nunavut Impact Review Board decision in not supporting Phase 2 of Baffinland Mine, there was sadness of our Elders, who had hoped to see a positive outcome. This came clear that employment opportunities, training opportunities, future business opportunities, and even future wildlife monitors around the project, that were anticipated, were not going to happen.</p> <p>Decision Statements by NIRB, that were announced in Pond Inlet and Iqaluit, this is what we heard that were misleading:</p> <p>Those that were not born in Pond Inlet stated that there were no more narwhales and that the hunters were not getting any narwhales. That is not true at all! In the year, 2020-2021, Inuit of Pond Inlet did go over the limit of their narwhale quota. The Fisheries and Oceans did in fact had to give them from previous year's quotas to make the difference. Pond Inlet residence over harvested that year, 2020-2021.Concerning seals, the numbers have not changed, those hunted have not decreased or have risen in numbers.</p> <p>Concerning caribou, Inuit have known that they have a cycle of migration, that usually takes about 50 years before they return to where they had left, following their migration routes. They would go far distances to other lands. We are now hearing that the caribou are now coming back as know in Inuit Qaujimagatuqangit. Environmental Impact Statements: There are comments and statements that mining affects wildlife both terrestrial and marine, but we, as Elders know, the truth. We know that both Department of Environment, and Fisheries and Oceans did not in their written submissions, present strong evidence, to believe, and like wise, those who are actual Nunavummiut did not present strong evidence of what we all heard to say that is the truth. NIRB decision not to approve Phase 2 was based on</p>	<p>Baffinland appreciates Pond Inlet's Elders Advisory Committee's participation in the review of this Production Increase Proposal Renewal application.</p> <p>We are grateful for the sharing of IQ and opinions on so many topics, including the importance of employment opportunities, hunting success over the period 2020-2021 concerning seals and narwhal, caribou recovery life cycles and the potential for impacts of mining on the environment.</p>

ID#	Recommendations/Requests	Response
	<p>assumptions of what the impact would be, and the opposers who came out so negative about our future was more prevailing than that of the truth.</p> <p>Where is the Truth?</p> <p>We believe that Nunavut Impact Review Board and the Minister know what is needed in Nunavut, Beneficiaries of Nunavut Agreement, and certainly for Canada, for growth.</p> <p>Elders believe that and looks forward, for Inuit and Mining Developments working hand in hand in our Territory,</p>	

HAMLET OF POND INLET

ID#	Recommendations/Requests	Response
HPI-1	The Hamlet of Pond Inlet wishes to inform you that it has passed a motion to support Baffinland's application to continue to mine and ship 6.0 million tonnes per year. The Hamlet also understands that the need for a decision for the 2022 shipping season is urgent.	Baffinland welcomes the Hamlet of Pond Inlet's support of the Production Increase Proposal Renewal at 6 mtpa.

HAMLET OF ARCTIC BAY

ID#	Recommendations/Requests	Response
Hamlet of Arctic Bay-1	<p>In the past the Hamlet of Arctic Bay supported Baffinland Iron Mines Corporation's Phase 2 Application. The Hamlet continues to support this application. The Hamlet of Arctic Bay is aware that N.I.R.B. final report and ministerial recommendations have been completed.</p> <p>Based on information from the report and the recommendations the Hamlet of Arctic Bay has and will continue to communicate with Baffinland regarding what will be the next actions required to continue to move the project in a position direction with a positive outcome.</p> <p>The Hamlet is of the understanding that Baffinland had requested support from the Federal Ministers to the Board to modify Project Certificate No. 005 to authorize the transportation and shipment of 6 million tonnes of iron ore per annum (mtpa), and that term and condition 179 (a) and (b) of the project certificate be updated to reflect this authorization.</p> <p>The Hamlet has also received a copy of the response from the Honourable Minister Daniel Vandal, P.C., M.P's dated May 20, 2022, in which he advised that" Baffinland can request from the Board a reconsideration of the Project Certificate pursuant to section 112 of the Nunavut Planning and Project Assessment Act"</p> <p>At a Council meeting held on June 9, 2022, a motion was passed in support of Baffinland's application, which read:</p> <p>"WHEREAS Baffinland Iron Mines Corporation (8./.M.) has indicated that they are applying to the Nunavut Impact Review Board (N.I.R.B.) to have permission to ship 6.0 million metric tons per annum (mtpa) through Milne Inlet continue for the 2022 shipping season." and"</p> <p>“WHEREAS” BIM is requesting that community organizations from impacted communities consider providing them with a letter of support for their application to N.1.R.B."</p> <p>"THEREFORE" it be moved that Hamlet Council authorize the mayor to sign a letter of support for 8.1.M.'s application to N.I.R.B.</p> <p>The Hamlet's understanding is that Baffinland requires a positive decision on their application to be able to continue to operate through to the end of this June and beyond. Therefore, Council and I would like to encourage the N.I.R.B. to review and make the decision as the situation is now urgent.</p> <p>The Hamlet of Arctic Bay has residents employed by Baffinland,16 Inuit employees that work for contractors and 27 that work for Baffinland Iron Ore Mine. The salaries they receive goes towards supporting their families. As one of the smaller</p>	<p>Baffinland welcomes the Hamlet of Arctic Bay's support of the Production Increase Proposal Renewal at 6 mtpa.</p>

ID#	Recommendations/Requests	Response
	<p>communities in Nunavut there are not many other opportunities for local employment. Arctic Bay views Baffinland Mining as a economic benefit to the community in the employment and training of its residents and the donations of funds and equipment to various charitable organizations and sporting groups.</p> <p>If the mine ends up in a care and maintenance position because a timely response was not received it will have a severe impact on the economy of Arctic Bay.</p> <p>In addition, the Hamlet's understanding is that Baffinland needs to invest a large amount of capital to construct the railway. This railway is essential to the future of Baffinland. Again, the impact of the mine, if it goes into a care and maintenance mode, would mean the ability to finance the cost of the railway may not materialize.</p> <p>As Mayor of Arctic Bay, I urge the N./R.B. to quickly approve the mine's ability to continue to produce and ship 6.0 million (mtpa) through Milne Inlet for the year 2022 and in future years</p>	

HAMLET OF CLYDE RIVER

ID#	Recommendations/Requests	Response
Hamlet of Clyde River-1	When the decision was originally made to move to 6 million tonnes, Clyde River was not meaningfully consulted or involved in the process.	<p>Baffinland notes that the Hamlet of Clyde River signed the community letter of support for the continuation of 6 mtpa in November 2019 (see NIRB Registry No 327657).</p> <p>NIRB held a community roundtable on August 16, 2022, which included participation of a representative from Clyde River appointed by the community. The representative generally spoke favorably about the 6 mtpa application and Baffinland answered questions regarding dust mitigation and job and training opportunities at Mary River.</p>

MITTIMATALIK HUNTERS & TRAPPERS ORGANIZATION

ID#	Recommendations/Requests	Response
MHTO-1	<p>(a) It remains the MHTO’s position that no substantive changes to the proposal or subsequent mitigation measures have been introduced or shown to be effective at mitigating impacts to marine mammals, caribou, and hunters.</p> <p>(b) MHTO is not confident that BIM’s commitment to various additional mitigation measures will be effective to mitigate impacts of sustained operations at 6MT. There is no evidence showing that BIM can operate Mary River at 6MT for the 2022 year in a manner that lessens or prevents impacts that are occurring from this level of operations.</p> <p>(c) Despite the MHTO having made submissions for years describing impacts that BIM’s activities have had on Inuit harvesting, BIM has still not undertaken an assessment of impacts of its current activities on harvesting rights, harvesting effort, or food security.</p> <p>MHTO notes that section E, item ii of BIM’s PIP Supplemental Information Package acknowledges that “the harvest data reported for caribou and narwhal do not account for harvesting effort...[but that] Through the Inuit Certainty Agreement, Baffinland agreed to fund in its entirety, regardless of the outcome of Phase 2, a Pond Inlet Country Food Baseline Report, led by the QIA and community of Pond Inlet. The results of this study have yet to be released by the QIA, however, Baffinland is committed to integrating the findings of this report into its own monitoring programs, annual reports, and adaptive management plans.”</p> <p>While it is encouraging that BIM commits to fund this work regardless of P2 approval, the MHTO is concerned that the ICA may not be binding on BIM if Phase 2 does not proceed. Furthermore, information around harvesting effort, success, and harvester experience should have been collected and considered by BIM directly, and should be informing Phase 2 and this current PIPR application. Using results from a study that was developed and conducted by a third party organization is not ideal, and often may not be adequate, to inform or address the needs of a particular project’s impact assessment. It is unacceptable to proceed without critical data around these indicators and potential impacts of the project and to consider allowing the proposed activities to continue for an additional season. MHTO submits that the NIRB should not and cannot rely on future possible results of this yet to be released study in order to address significant impacts to constitutionally protected Inuit harvesting rights.</p>	<p>MHTO’s comments do not provide any specific details regarding the impacts and so it is challenging to respond to these general statements without further description or information.</p> <p>(a) MHTO’s broad statement suggesting no substantive changes to the proposal have been implemented is incorrect. Since 2018 and again in relation to the 2022 application, per the attached Commitment List, Baffinland has made several changes to the operation and its monitoring programs. The 2021 and 2022 removal of spring icebreaking is a significant and substantive change which ultimately could impact Baffinland’s ability to ship the full 6 million tonnes in 2022. Despite this potentially significant operational impact, Baffinland implemented the mitigation as committed. Baffinland also has provided information regarding the effectiveness of mitigation measures. For example, JASCO’s “Convoy Technical Memo” filed on June 15, 2022 describes the effectiveness of convoying in reducing acoustic noise based on data collected during implementation of convoys in prior years. DFO (2017) evaluated a range of mitigation measures for the likelihood of reducing shipping related noise disturbance to Southern Resident Killer Whales in British Columbia waters. The assessment concluded that operation based measures showing the most potential included ship speed reductions, transit time restrictions, and convoying (DFO 2017). Baffinland has already implemented speed reductions, and the June 13, 2022 JASCO Memo ‘Vessel convoys as a means of noise mitigation’ submitted as Appendix B to the PIP Renewal Supplemental Information Package provides Project specific data that clearly supports the conclusion that, together with other mitigations (which Baffinland has implemented), convoying can help reduce cumulative acoustic noise from shipping. The MHTO response fails to acknowledge continued information showing improvements in dust management, many of which occurred while Baffinland operated at 6 mtpa between 2018 and 2021. For instance, in 2021 Baffinland’s remote sensing satellite based dust monitoring program clearly demonstrated the effectiveness of new mitigations implemented at Milne Port beginning in November 2020, specifically the application of DusTreat, a crusting agent that essentially forms a cover of the Milne Port stockpiles. Baffinland supplemented these findings with photos of seal breathing holes in Milne Inlet at that time, which documented local landscapes without red dust. In 2021, a third-party Dust Audit, which included the establishment of an Inuit led Dust Audit Committee comprising representatives from the five North Baffin communities was undertaken to identify potential tailored solutions for further reducing dust generated from Project-related activities. This important work continues in 2022 with recommendations to be presented to Baffinland in September 2022. Baffinland has confirmed it will implement the recommendations from the 2022 Dust Audit Report and at the Community Roundtable confirmed we have engaged with a supplier of wind fencing and are assessing the feasibility of placement around the Milne Port stockpiles in 2023.</p> <p>(b) The MHTO is incorrect, there is ample information that BIM can operate the Mary River in 2022 in a manner that lessens the effects of its operations, see June 13, 2022 JASCO Memo ‘Vessel convoys as a means of noise mitigation’ submitted as Appendix B to the PIP Renewal Supplemental Information Package, which provides Project specific data that clearly supports the conclusion that, together with other mitigations (which Baffinland has implemented), convoying can help reduce cumulative acoustic noise from shipping. Alternatively, the MHTO has not provided any IQ or other information on acoustics in water which contradicts the conclusions in the JASCO report. No information or details have been provided to substantiate its view that it is not confident in the effectiveness of the new mitigation measures. See (a) above for some further details on information showing the effectiveness of 2022 mitigations.</p> <p>(c) With respect to the MHTO request for Baffinland to carry out further studies on CRLU, please see also response to QIA-05, which expands on the commitment to Inuit led monitoring made in the PIP Supplemental Information Package. This is a direct commitment to NIRB which is not dependent on the ICA. It appears the “third party organization” collecting and considering this data is meant to refer to QIA. Given the role of QIA, we wish to clarify that we do not consider QIA to be a “third party organization”, we also understand work has already been undertaken by QIA on this topic.</p> <p>With respect to the MHTO reference to harvesting impacts, the MHTO submission does not address the information that details significant and continuing harvesting success for narwhal and caribou presented in Section D of the Production Increase Proposal Renewal Application Supplement, submitted by Baffinland on June 15, 2022 and also supported by the IQ shared by the Pond Inlet Elders Advisory Group (see comment PI-Elders-1 below). It is difficult to reconcile suggestions of significant negative impacts, when (for example) overall numbers reported by the MHTO to regulatory authorities clearly indicate that harvesters from Pond Inlet filled their 2021 summer narwhal quota and exceeded their 2021/2022 caribou quota. In addition, there are mechanisms</p>

ID#	Recommendations/Requests	Response
	<p>(d) MHTO understands that BIM has stated it would not engage in ice breaking shipping during the 2022 season, however MHTO remains opposed to this activity and has concerns that BIM plans to continue with the use of ice breaker support to facilitate shipping of ore in shoulder seasons. Without clear definitions of what constitutes ice breaking and when an ice breaker is required for support in open water, MHTO is concerned about the level of uncertainty around this activity. We saw BIM undertake ice breaking shipping for years without having had proper consideration or assessment of the activity. MHTO is concerned that shipping in 3/10 ice may still require the use of an ice breaker in support of those transits, but that this may not meet BIM’s own definition of “ice breaking” and the activity will again slip under the radar of impact assessment. The use of an ice breaker to support open water ship transits has serious impacts on marine wildlife and harvesting and must not be permitted without fulsome consideration of impacts and mitigations. Without an assessment of impacts to harvesting rights and proposed mitigation measures to address these most serious impacts, the consideration of ice breaking support cannot be properly undertaken.</p>	<p>available through IIBA Article 17.6 “Wildlife Compensation Through the Wildlife Compensation Fund”. The QIA manages and administers the Wildlife Compensation Fund. The QIA has indicated that two (2) claims were paid from the Wildlife Compensation Fund in 2020, totaling \$8,191. A total of 4 claims were submitted, however two (2) of the claims did not meet fund criteria and therefore were not fulfilled. Baffinland is not aware of any other claim since 2020.</p> <p>(d) Based on the information collected to date, the evidence does not support a conclusion that there has been a decrease in the “Eclipse Sound narwhal summer stock”, or that shipping is causing or contributing directly or indirectly to any significant decrease (see response to QIA-02 above). Inuit Qaujimagatuqangit (IQ) placed on the Phase 2 NIRB registry (see NIRB Registry No. 339608) as well as more recently in great detail at the Nunavut Wildlife Management Board in March 2022 (see https://www.nwmb.com/en/public-hearings-a-meetings/meetings/regular-meetings/2022/rm-001-2022-march-9-2022/english-19) also provide strong support for the view that narwhal move freely between both Eclipse Sound and Admiralty Inlet and that narwhal occurring in both areas during summer belong to the same stock. For these reasons, Baffinland started surveying both the Eclipse Sound and Admiralty Inlet stocks in 2019 to assess changes in the combined Eclipse Sound and Admiralty Inlet narwhal abundance. The combined narwhal abundance in Eclipse Sound and Admiralty Inlet was shown to be similar in 2020 to that observed in previous survey years (2013 and 2019); and was statistically higher in 2021 than in previous survey years (2013, 2019 and 2020). To date we have not identified a decrease in the combined stocks and what has been observed from 2013 to 2021 could be the continuation of a shift that began between 2004 and 2013.</p> <p>2022 marine mammal monitoring programs including marine mammal aerial surveys and the Bruce Head Shore-based Monitoring Program are now well underway. Preliminary data collected thus far in 2022 continue to show that marine mammals are present in Milne Inlet near Bruce Head and in Koluktoo Bay during the summer, overlapping with Baffinland’s shipping operations that began on July 30, 2022 (see Appendix 1, Attachment 2: 2022 Marine Mammal Monitoring Program Daily Observations for additional details).</p> <p>Marine mammals have been consistently observed from Bruce Head after the first day that vessels passed by Bruce Head (i.e., on July 31, 2022) including various species of marine mammals including narwhal, beluga, bowhead, ringed seal, bearded seal and walrus. This year has seen some of the highest counts of narwhal in the Bruce Head study area since the start of the 8-year Program (see Appendix 1, Attachment 1 for additional details including figures showing “Cumulative number of daily narwhal counts”). On August 14, the field team witnessed a herding event with over 3,200 narwhal counted in a single day in the Stratified Study Area (SSA), which is the second highest max narwhal count observed over a single day since 2014 when comparing similar range of dates, i.e., up to August 17 (3,811 on August 15, 2015; see figures in Appendix 1, Attachment 1).</p> <p>Baffinland intends to continue the implementation of convoys for the remainder of the season should approval to ship up to 6 mtpa (with up to 22 additional vessels from a 4.2 mtpa scenario but no more than 80 ore carriers) be granted.</p> <p>The MHTO (via the QWB) is requesting significant changes to the tagging system that are based on an overall consideration of the Baffin Bay narwhal stock, and strongly supports the view that there is no Eclipse Sound narwhal stock. No suggestion was made by the HTOs in the submission to the NWMB of March 2022 (https://www.nwmb.com/en/public-hearings-a-meetings/meetings/regular-meetings/2022/rm-001-2022-march-9-2022/english-19) that there were concerns about overall narwhal numbers in Eclipse Sound or elsewhere in the region. The MHTO submission notably is silent on this point.</p> <p>MHTO has suggested that impacts on hunting activities include the need to travel further and work harder. We have heard these statements, but there has been no details or comparative information provided in which Baffinland can work to provide further support or resolution (i.e. how much further? How much more time etc.?). Based on Baffinland’s understanding of social media posts and informal discussions with community members, Baffinland understands that the majority of narwhal harvested in 2021 were captured in proximity to Pond Inlet over a short period from the end of September until October. The MHTO is the holder of any information on this topic, but to date has declined to share any detail with NIRB or Baffinland and has asked Baffinland to provide it. To date, through the IIBA Baffinland provides funding through the Harvesting Enabling Program in the amount of \$1,690,000 to support hunters who may be travelling further as a result of numerous factors. To further address this request, Baffinland has also agreed to QIA’s proposed commitment to complete the Pond Inlet Country Food Baseline and Culture, Resource and Land Use Assessment (QIA-09), develop Inuit focused indicators</p>

ID#	Recommendations/Requests	Response
		<p>(Term QIA-07) and Inuit led monitoring programs (QIA-08). All of these terms will inform discussions related to harvesting impacts, and if required, additional compensation. Monies have been made available to contribute directly to Community Based Monitoring programs of priority and election from the MHTO, but to date these monies have not been fully utilized.</p> <p>Baffinland strongly believes the Inuit most affected by the Project are in the best position to monitor some aspects of the Project where Baffinland cannot, specifically in regard to harvesting. While the proposed Inuit led systems were originally developed with respect to the Phase 2 Proposal, Baffinland is advancing these commitments as part of the current proposal in good faith that the MHTO and Baffinland can work together effectively for the benefit of Inuit and all Nunavummiut.</p> <p>See response to QIA Term 2 in the Disposition of QIA’s Commitment Table (Appendix 4) for further information related to this topic.</p> <p>Icebreaking activities involve the use of a designated icebreaking vessel to facilitate the passage of lesser ice class vessels through prevailing ice conditions (i.e. ice escort services). Ice management is considered the act of preventing ice floes or icebergs from making contact with vessels and port infrastructure at Milne Port. Ice management will typically occur when there are icebergs or smaller ice floes in an area while icebreaking will be necessary to facilitate passage through much heavier ice concentrations.</p> <p>Since 2021, Baffinland has delayed the start of the shipping season until icebreaking is no longer required for vessels transiting towards Milne Port along the Northern Shipping Route. Baffinland implemented this new adaptive management measure despite the high degree of uncertainty linking Baffinland shipping to the Eclipse Sound survey results observed in 2020 and 2021. This decision aligns with one of Baffinland’s core values, Environmental Stewardship, which requires a conservative and collaborative approach to matters brought forward through engagement with Inuit and other stakeholders.</p> <p>Prior to this, and specifically between years 2018 and 2020, an icebreaker (MSV Botnica) was used by Baffinland to escort vessels transiting to Milne Port to ensure safe passage at the start and end of the shipping season (shoulder seasons). The need for icebreaker escorts in ice laden waters is considered a common practice in Canadian arctic waters as it allows for mariners to be safe during delivery of commercial goods and other vital services. For years 2019 and 2020, Baffinland developed tailored mitigation measures which relied on restricting the number of incoming and outgoing transits based on prevailing ice conditions. Under these conditions, only one transit was permitted for ice greater than 6/10ths (but not considered landfast ice) over a 24-hour period, while up to two transits were possible under ice conditions greater than 3/10ths but no greater than 6/10ths over a 24-hour period. Baffinland implemented these measures at the start of the shipping season in both 2019 and 2020.</p> <p>With a decision to avoid icebreaking at the start of the shipping season in 2021 and 2022, the trigger to commence the start of the shipping seasons requires the presence of a continuous path of 3/10ths or less ice concentration between the entrance of Eclipse Sound and Milne Port. Baffinland relies on the expertise of independent ice analysts to confirm ice concentrations, based on a combination of available data sources including Canadian Ice Services Daily ice charts, satellite imagery, aerial survey imagery, etc. Once it is determined that ice conditions are 3/10^{ths} or less, the shipping season may be initiated.</p> <p>It is noted that the 3/10ths ice concentration criteria was met on July 30, 2022, based on both satellite and aerial survey imagery. Upon this confirmation, Baffinland will provide instructions to its Port Captain to prepare for incoming transits to Milne Port from Baffin Bay. The ore carriers will remain at least 40 km to the east of the Nunavut Settlement Area until they are given the go-ahead to enter the Regional Study Area (RSA). Accordingly, a convoy consisting of 3 ore carriers and 2 tugs entered the RSA on July 30, 2022, arriving at Milne Port on July 31, 2022. Representative satellite imagery on first day of shipping and photos of 3/10ths or less ice concentrations are provided in Appendix 1, Attachment 2, noting that the satellite imagery had also been previously shared with the MHTO on via email during start of shipping season notifications sent to the MHTO, Hamlet of Pond Inlet and QIA.</p> <p>In 2022, the arrival of the MSV Botnica was delayed until August 12 since icebreaking escort was not required at the start of the shipping season based on the decision to not icebreak. The icebreaker can provide assistance in ice management and/or for other safety (e.g., oil spill response) requirements. For 2022, it remains to be determined whether the MSV Botnica will be required to escort vessels towards the end of the shipping season. Its escorting support will be determined at a later date based on prevailing ice conditions.</p>

ID#	Recommendations/Requests	Response
		DFO. 2017. Evaluation of the Scientific Evidence to Inform the Probability of Effectiveness of Mitigation Measures in Reducing Shipping-Related Noise Levels Received by Southern Resident Killer Whales. DFO Canadian Science Advisory Secretariat Science Advisory Report 2017/041.
MHTO-2	MHTO has submitted that the Terms and Conditions of PC 005 are not having the intended effect and that there are unmitigated impacts of current activities, yet the NIRB has not identified this as a rationale for reconsideration and has directed that this reconsideration be limited to focus only on conditions 179 and 180 which strictly address mine throughput and transportation of ore..	<p>Baffinland understands that the majority of MHTO’s procedural comments are directed at the NIRB, however, Baffinland can confirm that the NIRB did not isolate the reconsideration to terms and conditions 179 and 180. In the NIRB’s July 19, 2022 Notice and Procedural Guidance, the NIRB issued the following guidance with respect to the scope of the reconsideration:</p> <p>“parties are requested to focus on the reconsideration of term and condition 179(a) and (b) and the specific terms and conditions added to Project Certificate No. 005 under Amendment 2 and 3 associated with the Board’s prior assessment of the Production Increase Proposal (2018) and the Production Increase Proposal Extension (2020).”</p> <p>The specific terms and conditions added to Project Certificate No. 005 under Amendment 2 and 3 include Terms and Conditions 10, 179 (a), 179 (b), 179 (c), 183 and 184. These terms relate to dust, transportation limits, compliance with IIBA and Project Certificate terms related to effects from trucking and shipping, and marine mammal management via the Marine Environment Working Group. With respect to the MHTO’s comment regarding impacts to harvesting rights and key wildlife species, please see Baffinland's response to MHTO-1.</p>
MHTO-3	The continued and constant project changes introduced by BIM should warrant additional consultation and engagement to ensure the MHTO and general public fully understand the proposal before the NIRB. BIM has held no public engagements in relation to the PIPR application. This shortened assessment process and lack of opportunity for public engagement and Inuit participation has meant that adequate and meaningful consultation has not occurred in respect of the PIPR application. There was no participant funding allocated for this assessment; and without support, the MHTO does not have the capacity to adequately or fully consider the application. This, along with the abbreviated assessment process adopted by the NIRB, have significantly limited the opportunities for MHTO’s engagement and participation. The duty to consult has not been fully discharged in respect of this application.	<p>Baffinland respectfully disagrees with the MHTO assertion that BIM has held no public engagements in relation to current application. Baffinland has carried out extensive engagements with Inuit employees, Inuit contractors, community based organizations (Iliasaksiviq Society, Arctic Co-Ops), Hamlets, Hunters and Trappers Organizations, Elders, the Qikiqtani Inuit Association and the territorial and federal governments.</p> <p>[See enclosed Engagement Summary (Appendix 5) that includes a summary of Baffinland engagement efforts, including attempts to engage with the MHTO.]</p>

IGLOOLIK HUNTERS AND TRAPPERS

ID#	Recommendations/Requests	Response
Igloolik HTA-1	<p>With some consideration and deliberations by the HTA, it has been decided to issue support for Baffinland's request pending the following conditions.</p> <p>1st. As BIM is aware, one of the most significant issues for neighbours communities is the dust generated at the mine site, transportation corridor and the stockpiles near the port. BIM had committed to a dust audit and followed the suggestions if phase 2 was approved. Therefore, we request that BIM follows these suggestions ASAP as a condition for a 6M tones extension. If the communities see the dust issue has not been resolved at any time, that Baffinland halt project production and deal with dust from the project.</p> <p>2nd. BIM has said that it will be laying off employees. We request no Inuit employee be laid off from the project. And if an extension from current 4.2M is needed in any additional year outside of 2022, Igloolik HTA request that BIM Issue adequate time for interveners and communities to properly participate.</p> <p>3rd. We request that BIM do a baseline study in partnership with Igloolik/Hall Beach HTA's for marine, terrestrial and avian wildlife before construction begins for Phase 1.</p> <p>4th. We request that BIM engage with Igloolik HTA to develop community infrastructure commitments; The Igloolik HTA would like to see Benefits to businesses, Women, youth and Hunters in Igloolik, Along with significant infrastructures like paving of roads, youth and women centers.</p> <p>Mr. Penney, these are the conditions the Igloolik HTA has requested from BIM to support the 6Mt extension for 2022.</p>	<p>See the attached updated Commitment List. which reflects Baffinland’s acceptance of commitments. We welcome the support of the Igloolik HTA and look forward to our work together.</p> <p>1st Baffinland confirms that it is committed to full consideration of the dust audit suggestions, and will implement accepted recommendations from the Independent Dust Audit at its earliest opportunity. See also commitments No. 004 and 007 (Appendix 3) which address the topic of dust for 2022.</p> <p>2nd If approval is granted for 6 mtpa for 2022, Baffinland commits to not lay off any Inuit employees during this production year (excepting employment matters that could give cause for termination on an individual basis, should they arise). We also confirm future applications will give due consideration to the need for adequate time for procedural matters. See also commitment No.006 (Appendix 3).</p> <p>3rd Baffinland confirms it will work with Igloolik/Hall Beach HTAs to support collection of baseline environmental data for marine, terrestrial and avian wildlife in advance of major construction of the Steensby infrastructure components of the Mary River Mine. See also commitment No. 005 (Appendix 3).</p> <p>4th Baffinland confirms it will engage with Igloolik HTA to support the development of potential community infrastructure commitments that could apply in future. See commitment No. 008 (Appendix 3).</p>

IKAJUTIT HUNTERS AND TRAPPERS

ID#	Recommendations/Requests	Response
Ikajutit HTA-1	Our board of directors held member meeting at our community hall to discuss the request of Baffinland to mine extra 1.8 million metric tonnes. We heard some comments but did not receive any concerns from our members from the community and we have the members vote to support or not to support the request from Baffinland and all in attendance of the meeting showed in support for the request to mine extra 1.8 million metric tonnes for 2022.This letter will show our official stand that the community of Arctic Bay is in support for Baffinland's request.	Baffinland is grateful for the Ikajutit Hunters and Trappers Association's support of the Production Increase Proposal Renewal at 6 mtpa. We would welcome the opportunity to discuss any comments that are received from your community members at any time.

IUOE LOCAL 793

ID#	Recommendations/Requests	Response
IUOE LOCAL 793-1	<p>Thank you for permitting the International Union of Operating Engineers, Local 793 ("IUOE, Local 793") the opportunity to provide submissions on the Production Increase Proposal Renewal project proposal ("PIP Renewal Proposal"). Since April 2019, Local 793 has been the legal representative of approximately 1,000 production employees working at Baffinland's Mary River Mine. Approximately 200 of these production employees are Inuit and reside in the Qikiqtani Region of Nunavut. Other workers come from all across Canada to work at the mine. As their union, our primary responsibility to all these employees is to protect their employment and their welfare at and through their work.</p> <p>On behalf of our members, we support the PIP Renewal Proposal. Granting of the PIP Renewal Proposal is consistent with the mandate of the NIRB. The socio-economic impact of denying the PIP Renewal Proposal would be overwhelmingly negative for Nunavut and especially the impacted communities.</p>	<p>Baffinland welcomes IUOE Local 793's support of the Production Increase Proposal Renewal at 6 mtpa.</p> <p>We are grateful for IUOE Local 793’s support so that the 59 employees could provide their own detailed submissions to the NIRB. These accounts describe the employees’ experiences at the Mary River Mine in relation to participation in economic opportunities, financial compensation, cultural well-being, and social and personal well-being in their own words. We welcome all participation of our employees in the NIRB process and support the sharing of all employee views, whether positive or negative.</p> <p>Baffinland read with great interest the employee comments that directly link employment at the Mary River Mine with cultural maintenance:</p> <ul style="list-style-type: none">• <i>“Lots of locals need income so they can buy hunting stuff.”</i> (Salmo Inutiq, Arctic Bay)• <i>“The income is very helpful to buy [...] other needs such as hunting equipment.”</i> (Joshua Alorut, Igloolik)• <i>I [...] get what we need for going out hunting.”</i> (Helen Issigaitok, Arctic Bay)• <i>“I want to get hunting equipment, and supplies and support my family.”</i> (Necko Arreak, Pond Inlet)• <i>“I enjoy being able to be independent and having hunting gear such as snowmobiles and everything else needed for me to be a reliable hunter...the company helps with search and rescue when required and has built an emergency landing strip.”</i> (Albert Aglak, Pond Inlet)

GOVERNMENT OF NUNAVUT

ID#	Recommendations/Requests	Response
GN-1	<p>Caribou Monitoring</p> <p>The GN identified its submission on the 2021 Annual Report and is briefly summarized below:</p> <p>The Project’s current caribou monitoring programs, i.e., Height-of-Land (HOL) and Snow Track Surveys, are not yielding sufficient data to detect Project-related effects. The GN recommends resources be redirected to an enhanced incidental observations program and regional-scale monitoring until caribou numbers return to levels where HOL and Snow Track surveys can yield data with statistical power sufficient to detect Project-related effects.</p>	<p>See Baffinland’s Annual Report response to GN AR #01 (NIRB Registry No. 341226), reproduced for convenience below. We confirm that we are working towards a final research agreement and data sharing agreement with GN, and in future will provide financial and/or in-kind support towards research programs at levels commensurate with the financial status of the Project. To be clear, however, Baffinland has always worked to support GN led monitoring programs when asked, mostly through in-kind support in the form of fuel and accommodations.</p> <p>We also confirm advice shared with us by the GN, that their regional monitoring programs are not dependent on financial contributions from Proponents and will be run with or without such additional financial support.</p> <p><u>Baffinland 2021 Annual Report Response to GN AR # 01 – Caribou Monitoring:</u></p> <p>Regarding the Government of Nunavut’s (GN’s) comment:</p> <p><i>“Since 2014, these monitoring programs have recorded no caribou observations, thus leaving the Proponent unable to conclude whether impacts on caribou are occurring despite community concerns that they are witnessing impacts...”</i></p> <p>Baffinland is disappointed to see this statement given the number of times Baffinland has engaged with the GN to discuss the objective and intent of the current monitoring programs. Baffinland has been very clear that surveillance monitoring (e.g., Height of Land (HOL) and snow track surveys) is not meant to assess Project impacts but rather the presence of caribou in the area. A protocol to monitor and assess impacts of the Project on caribou was described in detail in the 2022 report, Caribou Monitoring Triggers and Recommendations and requires a larger number of caribou to be present in the Project area in order to effectively run the program. This does not indicate a deficiency in the existing program, which is running as intended, but rather a misinterpretation of the objective and intent.</p> <p>The GN is also aware that Baffinland has proposed to conduct aerial surveys of the Regional Study Area (RSA) in Fall 2022 or Spring 2023 to further quantify the distribution and density of caribou. Baffinland’s consultant has already submitted a research permit to the GN regarding this survey, and this survey has been discussed in the last two Terrestrial Environmental Working Group (TEWG) meetings held on April 28th, 2021 and June 23rd, 2022.</p> <p>Additionally, Baffinland has concern with the following comment:</p> <p><i>“Here the Proponent acknowledges the GN’s concerns about the limitations of the available collar data and expresses an interest in acquiring additional collar data. However, this contrasts with the Proponent’s lack of investment in collaring data since the Project started ore production, despite repeated GN recommendations to do so over the last 8 years.”</i></p> <p>This statement by the GN is misleading and disregards Baffinland’s efforts to collaborate. Most recently, Baffinland corresponded with GN representatives on May 19th, 2022 via email to request that the GN present information related to their collaring program at the June 23rd TEWG meeting. The GN offered to present a summary of their ongoing work, but proceeded to say that they could not guarantee their attendance and that the work is not relevant to the project. This claim contradicts GN’s comments in this response.</p> <p>We agree that incidental observations have played an important role in determining caribou presence in the RSA. Because they occur on a continuous basis, there will, of course, be a greater number of observations through incidentals than through formal surveys. Given that snow track and HOL surveys are not detecting caribou in the Project area, aerial surveys will be used to provide greater certainty about the distribution and density of caribou in the broader RSA (see above).</p> <p>We appreciate the update the GN has provided regarding recently collared caribou on north Baffin Island, as well as the maps demonstrating movement trajectories and helicopter flights. However, it is unclear how these observations change the helicopter mitigations already in place based on well-developed best practices. In the case of helicopter overflights, the potential mechanism for disturbance is quite clear (i.e., sensory disturbance), and mitigations are chosen based on this knowledge. Additionally, collaring more caribou within the vicinity of those collared in 2021 (i.e., farther east and south of the Project) would not provide any information to</p>

ID#	Recommendations/Requests	Response
		<p>support assessment of indirect habitat loss. The purpose of a Zone of Influence (ZOI) type analysis is to identify and test potential avoidance behaviour from observations. An identified ZOI would then warrant the investigation of a potential mechanism, followed by the implementation of mitigations based on our understanding of that mechanism.</p> <p>Baffinland requests that the GN explain how collaring would further inform on responses and mitigations related to helicopter overflights.</p> <p>Answers to the GN’s questions:</p> <ol style="list-style-type: none">1. The cost of snow track and HOL surveys is irrelevant to annual report review and effects monitoring. Baffinland is committed to conducting those surveys as identified in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP).2. Helicopter flight information has been provided in Terrestrial Environmental Annual Monitoring Report (TEAMR) reports. The helicopter flights are not summarized specific to surveys.3. While Baffinland appreciates the GN’s concern for the efficient allocation of resources to monitor caribou, it is unclear how relevant providing such costs (of snow tracks and HOL surveys) would be to addressing the GN’s concerns. Please see our response, below, for more details.<ol style="list-style-type: none">(a) Baffinland is considering enhancements to the incidental wildlife sightings log. This could include providing summaries of observations by helicopter as a rate of observation by helicopter hours. Mapping location may also be included if operationally feasible. These metrics may be included in future Terrestrial Environment Annual Monitoring Reports.(b) Baffinland has always supported and accommodated the Government of Nunavut Department of Environments (GNDoE’s) regional caribou monitoring efforts when those requests are made. The GN’s repeated request to collaborate on a collaring program is recognized by Baffinland. Baffinland first approached the GN with the idea of collaboration several years ago. The progress on this is the result of two factors:<ol style="list-style-type: none">i. The GN and Baffinland have yet developed a Memorandum of Understanding (MoU) or data use agreement that is acceptable to both Parties.ii. The GN’s disregard of an analytical study design that clearly outlines sample sizes required for a study of the Project’s potential effects on caribou. The GN has not provided valid arguments with regards to why that study is not a valid study design, and instead suggests that Baffinland should be supporting a collaring study now, regardless of where or how many caribou are collared. The approach seemingly suggested by the GN is neither robust nor scientifically valid. Baffinland will support the GN’s caribou collaring efforts if the GN and Baffinland are able to finalize an MoU that provides a reasonable guarantee of access to the data and freedom to analyse the data with current and valid analytical techniques (see answer to part i) above. <p>The GN states in their comment that they question the use of helicopters to access HOL sites and deem helicopters as a potential source of disturbance to caribou. However, the GN also states that Baffinland should implement a more in-depth caribou monitoring program, at a more intensive or regional scale. Baffinland seeks clarification as to what GN recommends as an alternative to helicopters given the limitations that result from terrain, and weather patterns that pose safety risks to field staff. Baffinland requests that GN share details related to their ongoing caribou monitoring with regards to the use of aircrafts.</p> <p>Additionally, Baffinland requests that the GN clarify how they calculated 0.4% with regards to the following statement: “These surveys observed no caribou and provided surveillance coverage for less than 0.4% of the time that caribou could have interacted with the Project in 2021.” Completion times for snow-track surveys are not recorded to allow for this calculation. Baffinland would also like to highlight that snow track surveys can only be completed within 24 hours of a fresh snow fall, to allow for differentiation between old and new tracks. It is therefore not justifiable for the GN to cite survey times as a percentage of total time due to limiting factors that affect staff’s ability to conduct surveys.</p>

ID#	Recommendations/Requests	Response																																							
		Baffinland commits to including an agenda item on the next TEWG meeting agenda as a placeholder for the GN to provide their clarifications on the above requested items and for Baffinland to respond. Baffinland will provide the NIRB a record of meeting minutes and resolution on this agenda item in the 2022 NIRB annual monitoring report.																																							
GN-2	<p>Socio-Economic Importance</p> <p>Increasing the production limit in 2018 from 4.2mtpa to 6mtpa was to avoid negative socio- economic effects caused by stopping operations once production limits were reached. Extending this production limit through 2022 will allow Mary River operations to continue without the sudden and detrimental impact to employment or economic activity in the North Baffin Region.</p> <p>The economic importance of the Mary River Project to the North Baffin and to Nunavut is significant. Baffinland indirectly employed more than 300 Inuit staff as of May 2022 and, prior to the pandemic, Inuit employment was on a steady increase. Baffinland has already set in motion the first steps of mass layoffs, including 209 Inuit employees, in preparation of reaching the production limits of 4.2mtpa and reducing operations, creating uncertainty for employees and their families. Reducing operations would also have a detrimental impact on business contracts, affecting Inuit businesses and employees.</p> <p>In addition, the GN determines that the Mary River Project contributed approximately 14% to the Nunavut GDP in 2021 (and as much as 23% in 2019, prior to Covid-19). Project revenue to the GN in 2021 was approximately \$9.5 million in employee payroll tax and \$5.5 million in fuel tax, and the Project contributes indirect positive effects on other sectors such as construction and transportation. Unanticipated interruptions to these economic benefits may have consequences to government revenue and to other sectors.</p> <p>Finally, the GN continues to emphasize the lack of alternative employment opportunities currently in the North Baffin region, and the positive impact that financial security from the Mary River Project has on its Nunavut employees, their families, and communities. Where appropriate, the GN continues to support the Production Increase Proposal at 6mtpa.</p>	<p>Baffinland welcomes the Government of Nunavut's continued support of the Production Increase Proposal at 6 mtpa. As the single largest private sector employer on Baffin Island, Baffinland has a significant impact on the economy of Nunavut, and specifically the economy of the North Baffin Region. Baffinland has, and continues to, invest heavily in support of its Inuit employees, their families, and communities. Baffinland understands that supporting the positive socio-economic development of communities impacted by the Mary River Project is the best way to continue operations at the mine. However, it is critical that operations continue at 6 mtpa in order to maintain our workforce, investor confidence, and customer contract commitments, and support our current and future business. Baffinland meets daily with its stakeholders and partners and affected communities and hamlets to ensure it hears suggestions and comments on continuing operations at 6 mtpa for 2022 and beyond. Baffinland is pleased to have received public support from several hamlets and associated hunter and trapper organizations for continued operations at 6 mtpa through this process. Baffinland recognizes that recently issued termination notices raise concerns over Baffinland's continued positive impact on the economy of Nunavut, especially in terms of the effects termination may have on Inuit employees, their families, and communities. However, upon approval for continued operations at 6 mtpa, Baffinland will rescind said termination notices.</p> <p>While much of the discussion surrounding the current circumstances has focused on employment terminations, there are documented and significant benefits associated with the 6 mtpa operation that cannot be taken lightly. Socio-economic monitoring results from the years between 2018 and 2021 when Baffinland was permitted to operate at 6 mtpa are impressive on their own, and in comparison to previous years’ operations, are objectively significant. Together these numbers clearly demonstrate the overwhelming socio-economic benefits of operating at 6 mtpa to date, and of sustaining the operation through the approval of the Production Increase Proposal Renewal. Baffinland recognizes the importance of the balance between socio-economic benefits and environmental impacts. We invest heavily in our environmental monitoring programs and the inclusion of Inuit in our monitoring efforts and have put in place stringent mitigations to minimize adverse impacts to the environment. Baffinland will continue to contribute to both the economy and environment in real and positive ways.</p> <table><tr><th rowspan="2">Benefit Highlights</th><th colspan="2">6 MTPA Operation</th><th>ERP</th><th>%</th></tr><tr><th>2018-2021</th><th>Average</th><th>2017</th><th>Increase</th></tr><tr><td>Payments to QIA</td><td>\$ 67,816,349.85</td><td>\$ 16,954,087.46</td><td>\$ 8,114,453.60</td><td>109%</td></tr><tr><td>Payments to GN</td><td>\$ 58,760,000.00</td><td>\$ 14,690,000.00</td><td>\$ 1,500,000.00</td><td>879%</td></tr><tr><td>Payments to Tasiuqtiit Working Group</td><td>\$ 730,000.00</td><td>\$ 182,500.00</td><td>N/A</td><td>N/A</td></tr><tr><td>Inuit Employee Payroll</td><td>\$ 74,680,962.00</td><td>\$ 18,670,240.50</td><td>\$ 8,313,898.00</td><td>125%</td></tr><tr><td>Inuit Contract Expenditures</td><td>\$ 610,900,000.00</td><td>\$ 152,725,000.00</td><td>\$ 116,000,000.00</td><td>32%</td></tr><tr><td>Inuit Training (Hours)</td><td>126000</td><td>31500</td><td>4000</td><td>688%</td></tr></table>	Benefit Highlights	6 MTPA Operation		ERP	%	2018-2021	Average	2017	Increase	Payments to QIA	\$ 67,816,349.85	\$ 16,954,087.46	\$ 8,114,453.60	109%	Payments to GN	\$ 58,760,000.00	\$ 14,690,000.00	\$ 1,500,000.00	879%	Payments to Tasiuqtiit Working Group	\$ 730,000.00	\$ 182,500.00	N/A	N/A	Inuit Employee Payroll	\$ 74,680,962.00	\$ 18,670,240.50	\$ 8,313,898.00	125%	Inuit Contract Expenditures	\$ 610,900,000.00	\$ 152,725,000.00	\$ 116,000,000.00	32%	Inuit Training (Hours)	126000	31500	4000	688%
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CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA

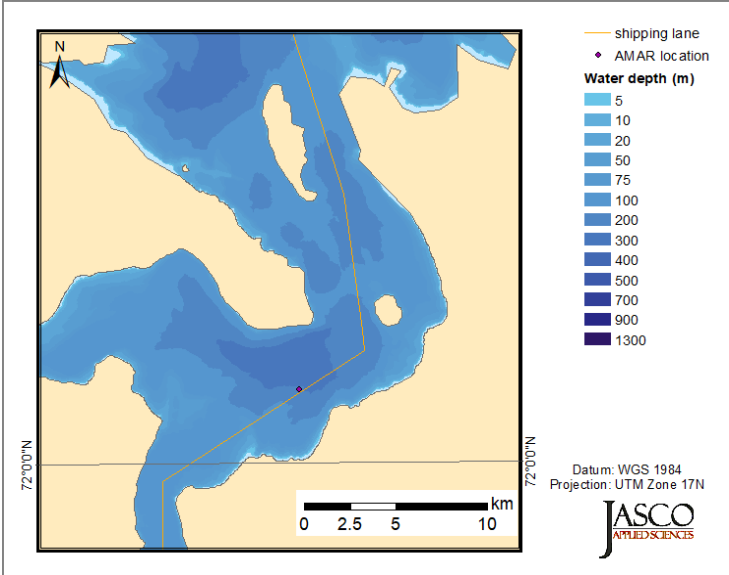
ID#	Recommendations/Requests	Response
CIRNAC-1	<p>Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) has not appended a separate submission, however CIRNAC wishes to indicate that it does not have outstanding concerns related to the assessment of biophysical and socio-economic effects for the Production Increase Proposal Renewal that require reconsideration of the terms and conditions of Project Certificate No. 005. CIRNAC would like to confirm that its previous interventions for the review of the Baffinland's Mary River project continue to apply.</p> <p>CIRNAC's previous concerns, as noted in its earlier interventions, can be addressed through ongoing discussions with Baffinland regarding the implementation of management decisions based on the assessment of monitoring program results. CIRNAC expects continued implementation of management plans to prevent, mitigate and monitor potential project- related impacts to the surrounding ecosystemic and socio-economic environments. CIRNAC will listen to the comments provided by Nunavut Inuit, including the residents of the North Baffin communities, to support its understanding of the project proposal.</p>	<p>Baffinland welcomes CIRNAC's comment and looks forward to working with CIRNAC in the continued review of the Mary River Project. Baffinland confirms that management plan implementation will continue in accordance with previously committed timelines in order to appropriately continue to prevent, mitigate, and monitor potential Project-related impacts to surrounding ecosystemic and socio-economic environments.</p>

ENVIRONMENT AND CLIMATE CHANGE CANADA

ID#	Recommendations/Requests	Response
ECCC-1	<div><div>1.</div><div>ECCC recommends that the Proponent assess and discuss the impacts of marine shipping convoys on air quality at Milne Port for acute (1-hour) time scales.</div></div> <div><div>2.</div><div>ECCC recommends that the Proponent indicate which of the three anchorages is in relatively shallow water, hence most likely to be used, and also that the Proponent clarifies whether one or two anchorages would only be used on an emergency basis. Further, ECCC recommends that the Proponent indicate the incremental air quality impacts from having one or two ships at anchorages as compared to having just a docked ship in port.</div></div>	<div><div>1.</div><div>Convoys only affect the flow of shipping traffic, vessels at anchorage positions remain unchanged. In other words, the same amount of vessels will be at anchor at Milne Port with or without convoys. As a result, the implementation of convoys does not change air quality at Milne Port for acute (1-hour) time scales, and air quality is expected to remain within Nunavut Ambient Air Quality Standards (AAQS) and FEIS predictions as previously reported to the Nunavut Impact Review Board. Baffinland will continue to monitor air quality at Milne Port as required under Project Certificate Term and Condition No. 8.</div></div> <div><div></div><div>It is worth noting that while convoys will not change vessel emissions at Milne Port, Baffinland has committed to reducing the maximum number of vessels needed to transport 6 mtpa from 86 to 80. This reduction in vessels would have a corresponding reduction in emissions as that many less vessels will be present in Milne Port during the shipping season.</div></div> <div><div>2.</div><div>The three anchorage locations and depths are as follows:<ul style="list-style-type: none">Anchorage 1 - Lat. 71 53.90 North, Long. 080 55.00 West (Depth 70-75 m);Anchorage 2 - Lat. 71 54.30 North, Long. 080 54.00 West (Depth 90-95 m); andAnchorage 3 - Lat. 71 54.00 North, Long. 080 52.20 West (Depth 85-90 m).</div></div> <div><div></div><div>Anchorages 1 and 2 are regularly occupied, while Anchorage 3 is reserved for emergencies and/or other operational requirements as they arise. Having ore carriers at anchor at Milne Port is required to ensure continuous vessel loading through the short shipping season. Ore carriers cannot arrive at Milne Port and immediately begin loading, they must undergo inspection, including for ballast water exchange. Following inspections vessels must also undergo deballasting. Unexpected and adverse weather may also prevent ore carriers from transiting to Milne Port. For all these reasons anchoring is an essential component of the Project that was outlined in the Early Revenue Phase. As Baffinland is not proposing a change to its anchoring activities, there are no incremental air quality impacts to evaluate.</div></div>

FISHERIES AND OCEANS CANADA - FISH AND FISH HABITAT PROTECTION PROGRAM

ID#	Recommendations/Requests	Response
DFO-1	<p>The proponent should continue with the existing monitoring programs and expand to a broader suite of indicators that are reported and assessed on an annual basis as a suite of indicator analysis that provide information to the adaptive management process with interested parties.</p> <ul style="list-style-type: none">DFO Recommends the following EWI in addition to the current EWI:<ul style="list-style-type: none">Reproductive hormonal change in femalesGlucocorticoid Stress Level Hormones <p>Continue working with DFO and the Marine Effects Working Group for the development and implementation of effective EWIs.</p>	<p>Baffinland confirms its commitment to continue with existing marine mammal monitoring programs, and to continue to progress its approach towards adaptive management. As part of the 2022 Narwhal Adaptive Management Response Plan, Baffinland formally applied the draft MMP indicators, thresholds, and responses developed through the Phase 2 Proposal to the 2022 marine monitoring programs on an interim basis while it works with the MEWG to develop a final MMP. This approach to adaptive management is based on the original concept of Early Warning Indicators, where each indicator has a series of thresholds identified that correspond to low, moderate and high risk scenarios.</p> <p>With respect to DFO’s request to continue working with the Marine Environmental Working Group (MEWG), of which DFO is a member, for the development and implementation of effective EWI’s, Baffinland proposes to hold a special meeting of the MEWG to identify, evaluate, and select additional adaptive management indicators, thresholds, and responses to integrate into a final MMP to apply should there be a 2023 shipping season and beyond. To prepare for this meeting, Baffinland requests that any Member proposals on adaptive management indicators and thresholds (EWIs) provide detailed written recommendations, including available baseline data, sampling methodology to ensure statistical power in comparing yearly collected data to baseline data, and proposed thresholds for identifying change.</p> <p>Baffinland appreciates the two additional EWIs proposed by DFO in their submission, however, without further information Baffinland must stress that multiple external environmental factors can result in changes to reproductive hormone levels and stress levels in narwhal. Observed changes cannot be distinguished from a general change in environmental quality (e.g., climate change, change in prey availability, change in predation pressure, change in ice conditions) rather than a result of behavioural disturbance following exposure to vessel noise (i.e. project effect). This approach is consistent with DFO’s own reasoning, in its response to the Golder Review of a study that examined cortisol levels in narwhal harvested near or in the Regional Study Area (the “Watt Study”) (see NIRB Registry No. 337076). That DFO response says:</p> <p><i>“As stated in the paper, the data presented in Watt et al. (2021) show the results of cumulative sources of stress, thus the increase in blubber cortisol levels, post-commencement of shipping, cannot be directly attributed to Baffinland’s shipping activities.</i></p> <p>[...]</p> <p><i>Although cortisol may be a sufficient indicator of cumulative and combined stress in narwhal, there are other indicators that may be better suited to detect early warning signs of specific project-related impacts. These indicators should be selected based on discussions with the MEWG and Inuit.”</i></p> <p>Given the interest in these topics, Baffinland continues to advocate for a regional approach towards health monitoring that should be led by DFO and relevant community-based organizations, with support provided by Baffinland as appropriate. This topic can be revisited over time, should methods that could distinguish between observed changes become available in future.</p> <p><u>References:</u> BIMC. 2021. Marine Monitoring Plan (MMP). Marine Mammal TARP and Action Toolkits. NIRB File # 334146. BIMC. 2022a. 2022 Narwhal Adaptive Management Response Plan (NAMRP). Document # BAF-PH1-830-P16-0024. Rev1. 19 July 2022. BIMC. 2022b. Marine Shipping and Vessel Management Report to the Nunavut Impact Review Board. 19 July 2022. 301 p.</p>
DFO-02	<p>We recognizes that due to the length time period of the current shipping activities proposed under the PIP Renewal (shipping season will cease much before December 2022) and with the current shipping season underway, implementation of the commitments may present a challenge. However, we recommend continued engagement with DFO and other parties on the development and implementation of AIS commitments to ensure continued protection of the Arctic aquatic environment.</p>	<p>For clarity, there is no challenge applying the existing stringent mitigations to the 2022 shipping activities. Baffinland will continue to apply these commitments, and will continue to engage with DFO and other parties on the development and implementation of aquatic invasive species commitments to ensure continued protection of the Arctic aquatic environment.</p> <p>In June 2022, Baffinland confirmed that the Marenzelleria first identified through its monitoring program in 2019 is indigenous to the Arctic. This further verifies the initial determination that the species was non-invasive. The repeated verification testing that was carried out in this case is not an example of uncertainty or delay, it is</p>

ID#	Recommendations/Requests	Response
	<p>Radashevsky et al. 2022 paper is not attached as part of the supplemental info, please provide.</p> <p>Continue to work with DFO on the identification of Marenzelleria Wireni and Arctia, to determine source of origin.</p>	<p>evidence of conservatism. The recent publication by Radashevsky et al. (2022) which provides a comprehensive review of the distribution of Marenzelleria has been attached to this submission (Appendix 2, Attachment 1).</p> <p>Baffinland will continue to work with DFO and other qualified external experts regarding Marenzelleria specimens recorded in the Project area, and specifically on the identification of Marenzelleria wireni and Marenzelleria arctia, to determine source of origin. Baffinland also proposes that it continue to conduct genetic barcoding on aquatic samples and DFO conduct population genetic analysis as a complementary monitoring measure to Baffinland’s ongoing genetic barcoding on aquatic samples.</p>
DFO-03	<p>a. Effective acoustic monitoring must be conducted to confirm predictions that underwater noise from convoys will reduce impacts to narwhal.</p> <p>b. If stationary passive hydro acoustic monitoring stations are not possible, acoustic monitoring from small vessels should be utilized, or an equally effective alternative.</p> <p>c. Inform DFO of location acoustic monitors prior to implementation.</p>	<p>a. Agreed, and this recommendation is being implemented. An acoustic recorder (stationary bottom-mounted acoustic monitoring station) will be deployed in Milne Inlet in 2022 to monitor sounds from vessels (including vessel convoys), to detect and characterize marine mammal vocalizations and vocal behaviour in the study area, and to characterize the overall soundscape. The recorder will be deployed along the nominal shipping route southeast of Bruce Head and will be equipped with four hydrophones in an array configuration, to allow for localization of narwhal calls.</p> <p>b. Per the above, Baffinland confirms that a stationary, autonomous acoustic monitoring station will be deployed to allow for long duration recording (1.5 months) in a manner that will provide data of sufficient quality for comparison with prior measurements. Data collected with a dipping hydrophone from a small vessel would not be of sufficient quality to allow a comprehensive analysis of the noise from convoys, or to allow a comparison of the total noise exposure in a year with convoys compared to prior years. These types of measurements would be impacted by non-acoustic noise, and would only allow data collection for short time periods. These alternative methods would not be a viable replacement for the quality of recordings that are obtained from stationary autonomous recorders.</p> <p>c. Agreed. The acoustic recorder will be deployed at 72° 02.187’ N, 80° 33.366’ W at a water depth of approximately 275 m.</p> <div><p>The map displays the Milne Inlet area with water depth contours ranging from 5m to 1300m. A yellow line indicates the shipping lane, and a purple dot marks the AMAR location. The map includes a north arrow, a scale bar (0 to 10 km), and coordinates (72°00'N, 72°00'N, 72°00'N). The datum is WGS 1984 and the projection is UTM Zone 17N. The JASCO APPLIED SCIENCES logo is present.</p></div>

HEALTH CANADA

ID#	Recommendations/Requests	Response
HC-1	No comments related to the Production Proposal Increase Renewal.	Baffinland appreciates Health Canada's participation in the review of this Production Increase Proposal Renewal application.

NATURAL RESOURCES CANADA

ID#	Recommendations/Requests	Response
NRCan-1	No comments related to the Production Proposal Increase Renewal.	Baffinland appreciates Natural Resources Canada's participation in the review of this Production Increase Proposal Renewal application.

PARKS CANADA

ID#	Recommendations/Requests	Response
PCA-01	Parks Canada believes there are information gaps in the current project monitoring program and as a result, uncertainty in conclusions related to the potential impacts of the PIPR project proposal on the marine environment. Parks Canada does not have specific recommendations to mitigate the decrease in the Eclipse Sound narwhal stock however, we recommend that NIRB consider the precautionary principle and the protected area context when making any further decisions and recommendations related to the PIPR project proposal.	<p>Parks Canada has indicated on numerous occasions that it does not have independent subject matter expertise on the topics addressed in this comment. We also note that Parks Canada has not shared any detail on what it perceives the “information gaps” referenced in this comment to be, what monitoring program is of concern, explained how these result in “uncertainty in conclusions on potential impacts”, or offered any specific recommendations to address their concerns, making it challenging to respond in any substance to this comment.</p> <p>Where Baffinland has received specific examples of information gaps and/or recommendations, Baffinland has been and continues to remain extremely flexible and responsive. Baffinland has enacted numerous examples of adaptive management, expanded or altered the design of multiple monitoring programs, and welcomes Parks Canada’s continued participation in the MEWG as an interested party in the Regional Study Area (RSA). For additional information supporting Baffinland’s precautionary approach to adaptive management in the marine area, please see Baffinland’s response to ON-2.</p> <p>It is also worth noting that Parks Canada continues to refer to their role under the TINMCA, however, this area has not yet been designated by the federal government as a “Marine Conservation Area” under the Canada National Marine Conservation Area Act. There are a number of steps outstanding, including the circulation of an interim management plan for the area for public comment https://www.pc.gc.ca/en/amnc-nmca/cnamnc-cnnmca/tallurutiup-imanga/chronologie-timeline. It is acknowledged in Parks Canada materials that marine transportation activities will continue in TINMCA should it be ultimately established.</p> <p><u>References:</u></p> <p>BIMC. 2022a. 2022 Narwhal Adaptive Management Response Plan (NAMRP). Document # BAF-PH1-830-P16-0024. Rev1. 19 July 2022.</p>

TRANSPORT CANADA

ID#	Recommendations/Requests	Response
TC-1	No comments related to the Production Proposal Increase Renewal.	Baffinland appreciates Transport Canada's participation in the review of this Production Increase Proposal Renewal application.

NUNAVUT TUNNGAVIK INCORPORATED

ID#	Recommendations/Requests	Response
NTI-1	Baffinland, in its June 15, 2022 memo, proposes additional environmental mitigation measures including for reducing the impacts of dust and implementing the recommendations from a dust audit. NTI recommends that concrete mitigation actions that substantially reduce the impacts of dust be included in Term and Condition No. 10 to the satisfaction of community members, Inuit hunters and QIA.	<p>Baffinland takes the issue of dust very seriously and has made dustfall mitigation and monitoring a priority since operations began. Although monitoring results to date indicate no long-term effects of dustfall on vegetation, aquatic environments, wildlife or human health, Baffinland recognizes that dustfall continues to be an important source of concern for local communities. Since the Production Increase Proposal was approved in 2018, Baffinland has implemented the following additional mitigation and monitoring measures, which include:</p> <ul style="list-style-type: none">• application of DustBlokr to project roadways including the Tote Road (this is a glycol based product approved by the GN and has also been trialed in several Nunavut communities);• application of DusTreat to Milne Port stockpiles, a product that forms a crust around the stockpiled ore, effectively covering and containing potential fugitive dust;• development of a new remote sensing monitoring program to characterize the extent and concentration of dustfall, utilizing satellite imagery Snow Darkening Index values; and• expansion of the existing passive dust monitoring program, including the installation of several collectors at below standard heights to address community and TEWG requests. <p>The above is in addition to the ongoing implementation of existing dust mitigation measures, which include, but are not limited to:</p> <ul style="list-style-type: none">• installation of hoods and shrouds on crusher plant equipment (stackers and conveyors) to minimize fugitive dust generation during crushing operations as well as rubber bellows to control the fall of the ore and reduce the distance the ore freefalls to the pad;• application of EK-35, a known dust suppressant is applied once annually following freshet to the airstrip to reduce dust generation from the airstrip;• application of dust suppressants (calcium chloride, water) to the pads, laydown and parking areas at the Mine Site and Milne Port, as well as along the Tote Road; and• resurfacing and recontouring some sections of the Mine Haul Road with competent aggregate that reduces exposure to weathering and vehicle wear and tear. <p>Further, mitigations at Milne Port are numerous and include:</p> <ul style="list-style-type: none">• redesigning the ore pads to position fines in the centre and lump ore around the margins;• proper positioning of the conveyors to minimize ore drop distances when stockpiling;• installation of rubber bellows at the end of each stacker to minimize dispersion of dust generated as the material drops;• installation of chutes on the shiploader to prevent windblown dust during loading operations;• installation of shrouding at the discharge end of the ore stackers to reduce the effect of windblown fugitive dust during stacking activities;• installation of downwind fencing; and• removal of dust impacted snow at strategic locations at the Project. <p>Despite the extensive monitoring programs in place and the numerous mitigations that have been implemented, Baffinland understands that the management of dust will always be a matter of continuous improvement. To this end, in late 2021 Baffinland initiated an independent audit of dust sources across the Project, and helped form a Dust Audit Committee, composed of representatives from each of the five North Baffin communities. Baffinland expects the draft Report to be released in September 2022, which will include a list of recommendations developed between the independent auditor and the Dust Audit Committee. As of August 11, 2022 Baffinland also received a copy of QIA’s 2021 Dust Investigation for the Mary River Project, which also contains several recommendations for consideration.</p> <p>Rather than confining Baffinland’s responses to additional dust mitigation through specific edits to a Term and Condition, Baffinland has suggested a path forward that allows Terrestrial Environment Working Group (TEWG) Members time to review recently released and forthcoming reports, and meet for the purpose of reconciling any differences between the reports and consolidating a final list of feasible recommendations. Baffinland appreciates that NTI is not a member of the TEWG, however, we would support NTI joining this special meeting as an observer, subject to the process agreed to in the Terms of Reference for adding observers to meetings.</p>

ID#	Recommendations/Requests	Response
NTI-2	<p>NTI recommends that Terms and Conditions Nos. 183 and 184 be amended to ensure that:</p> <ul style="list-style-type: none">the MEWG is functioning in a manner that is acceptable to all MEWG members;the collection of both Inuit Qaujimajatuqangit and scientific knowledge takes place to ensure the monitoring of impacts;there are requirements for the use of specific indicators and mitigation thresholds;and there are requirement for the use of specific mitigation measures to address potential impacts on marine mammals.	<p><i>MEWG Functioning</i></p> <p>Baffinland has initiated revisions to the Marine Environment Working Group (MEWG) Terms of Reference (ToR) to reflect commitments outlined in the Production Increase Proposal Supplementary Information Package, filed with the NIRB and circulated with Interveners on June 15, 2022. On August 4, 2022 Baffinland held a meeting with the MEWG to provide an overview of the 2022 Narwhal Adaptive Management Response Plan and took that opportunity to also provide an update on the revisions to the MEWG ToR. Baffinland expects to release the revised draft ToR for both the MEWG and Terrestrial Environment Working Group (TEWG) by August 19, 2022, and will also release a draft to the NIRB for posting on the registry at that time. The revisions to the ToR and the subsequent process to approve them between MEWG and TEWG Members adequately addresses each of NTI’s proposed considerations.</p> <p><i>Collection of Inuit Qaujimajatuqangit (IQ)</i></p> <p>Baffinland confirms its commitment to incorporating IQ and scientific knowledge in monitoring, and the significant proposed expansion of the working groups to include HTOs from the five North Baffin communities is a new commitment that will help address this issue.</p> <p><i>Specific Indicators</i></p> <p>Once specific indicators and mitigation measures are included in an approved plan, Baffinland is required to take the related actions described in that plan. In this way, indicators and mediation measures are enforceable. Indicators and thresholds already exist within Baffinland’s monitoring programs as well as more explicitly in the draft TARPs that will be attached to the Adaptive Management Plan. However, specific details of indicators, thresholds, and mitigations should not be added to Terms and Conditions 183 and 184. Baffinland, as well as the MEWG and TEWG, require flexibility to achieve overall Term and Condition objectives, especially when it relates to adaptive management and monitoring program design. Including specific details in the terms and conditions would require an amendment process should they require adjustment, which is not supportive of a timely and responsive adaptive management framework.</p>

THE QIKIQTANI INUIT ASSOCIATION

ID#	Recommendations/Requests	Response
QIA-01	<p>Summary</p> <p>The amount Project-related dust and sediment entering aquatic environments along the tote road directly or in runoff from surrounding areas is still unknown. The fates and effects of these materials, and associated dust suppressants and rubber tire particulates on the ecology of fish-bearing streams and lakes along the tote road are also unknown. Neither the amount of sediment nor its effects are monitored and both are unlikely to decrease if truck traffic continues at the 6 Mt/year level. Dustfall modelling should be updated and monitoring conducted to assess the magnitude, composition, and effects of sediment loading on aquatic receiving environments and inform adaptive management. Validation of a sediment impact threshold for Arctic char egg survival is also needed for this assessment.</p> <p>Commitment 24</p> <p>(a) That 2018 NIRB monitoring recommendation 2 related to dust management be stringently applied to fish-bearing streams and lakes along the tote road.</p> <p>(b) QIA requests that the Proponent commit to establishing long-term monitoring sites to assess Project impacts on the water quality, sediment deposition, and biota in Phillips Creek.</p> <p>(c) QIA recommends that future DFO permitting for this Project consider the potential impacts of elevated dustfall and eroded sediment from Project activities on juvenile Arctic Char in Tote Road streams, and require studies be conducted should the information prove to be inadequate for impact assessment.</p> <p>(d) QIA recommends that the Proponent establish a meaningful sedimentation threshold based on mortality rates of Arctic Char eggs exposed to Project-generated dust sediment.</p>	<p>a. Agreed. Baffinland confirms it will continue to apply the 2018 NIRB Monitoring Recommendation 2 along the Tote Road.</p> <p>b. The Aquatic Effects Monitoring Program (AEMP) collects all information required by Project Certificate Condition 21. Baffinland’s AEMP includes a lake sedimentation monitoring program, and a core receiving environment monitoring program (CREMP). The lake sedimentation monitoring program has been implemented since 2013. Sheardown Lake NW was selected for monitoring since it is the freshwater waterbody most affected by dust and runoff from the current operations (including the tote road operation). Sheardown Lake and its tributaries are subject to dust deposition originating at the crusher pad, from the volume of traffic that is experienced on the tote road, from the airstrip, as well as runoff from areas affected by dust deposition. Again, this is the most impacted area across the Project including Phillips Creek. The sediment traps measure seasonal deposition rates (i.e., open water and the ice-covered period). The chemical composition of the dustfall has been characterized from dustfall gauges located near the crusher pad and north of the airstrip at the mine, along the tote road, and at Milne Port. Baffinland has also been implementing a Tote Road Monitoring Program for several years now that has continued to be refined in consultation with the QIA. In 2021, 310 samples were collected and analyzed as part of that program. To conclude, Baffinland believes the existing Mine Site CREMP and Tote Road Monitoring Program adequately monitors Project related aquatic effects, and that through the long-term monitoring sites that assess Project impacts on the water quality, sediment deposition, and biota in the most impacted lake is sufficient to determine if and when modifications are required at other Project locations, including along the Tote Road and Phillips Creek.</p> <p>Baffinland notes that QIA has suggested monitoring rubber tire residue as part of the PIP Renewal, as well as through its annual reporting comments. Baffinland understands rubber tire residues affecting aquatic biota is an emerging water quality issue identified in urban areas with warm climates (California, Japan) where stormwater systems collect runoff from road areas with significant levels of traffic. Baffinland reviewed a cold-climate example by Popick et al. (2022) from Saskatoon and PAHs were detected in stormwater runoff, but from stormwater outfalls associated with urban catchments >100 km2 in size. Nonetheless, Baffinland is willing to commit to adding additional parameters to its current Tote Road Monitoring Program for two years to understand if this is a potential concern at the Project. This will be implemented in consultation with QIA.</p> <p>c. This recommendation is directed at DFO.</p> <p>d. Baffinland has already integrated a precautionary threshold for lake sedimentation into the Aquatic Effects Monitoring Plan (AEMP) Rev 2, which was submitted to the Qikiqtani Inuit Association (QIA), the Nunavut Water Board (NWB) and Nunavut Impact Review Board (NIRB) on March 31, 2022. The sedimentation threshold is taken directly from a proposal by the QIA under the Phase 2 Proposal technical review, which is the lake sedimentation rate predicted in the FEIS of 0.54mm (this is about half the previous threshold of 1 mm). Baffinland has further committed that any exceedance of the 0.54 mm moderate risk level will trigger additional study to validate the thresholds relative to impacts on arctic char eggs. A low risk threshold of 0.15 mm will also be applied that will trigger corresponding low risk response actions.</p> <p>Reference:</p> <p>Popick H, Brinkmann M, McPhedran K., 2022. Assessment of stormwater discharge contamination and toxicity for a cold-climate urban landscape. Environ Sci Eur. 2022;34(1):43. doi: 10.1186/s12302-022-00619-x. May 13.</p>
QIA-02	<p>Summary</p> <p>The successful mitigation of Project-related impacts to marine mammals such as narwhals and seals is needed for a sustainable mining Project, and the significant declines in narwhal abundance in Eclipse Sound indicates that mitigation employed during the Production Increase was not successful. The Proponent has proposed</p>	<p>General Response</p> <p>Based on the information to date, the evidence does not support a conclusion that there has been a decrease in “Eclipse Sound narwhal stock”, or that shipping is causing or contributing to any decrease. The surveys that Baffinland has conducted in recent years countless animals in Eclipse Sound in 2021 as compared to 2020 and 2019. However, the surveys indicate the overall Baffin Bay narwhal population is stable at around 75,000 individuals. IQ has been shared that indicates that</p>

ID#	Recommendations/Requests	Response
	<p>vessel convoys as a new mitigation tool for 2022, but there has not been enough information provided to assess the likelihood of this being successful.</p> <p>Commitment 15</p> <p>(a) That Baffinland provide scenario planning exercises to better quantify the costs/benefits of ship convoys.</p> <p>(b) To conduct a study to see assess the simple seasonal average observer data from Bruce Head and the Leg 2 surveys correlates with the photo estimates for all the years to assess whether these metrics could provide an EWI for the year’s results that would be applied in future to increase or decrease shipping at the end of summer.</p> <p>(c) To resource Inuit-led monitoring, updated EWIs, Inuit OITRs, etc.</p> <p>(d) To conduct a sampling program to assess cortisol levels in narwhal and morphometric measurements. This would be a systematic program working with harvesters to gather samples, and observations on what they are experiencing and comparing to previous years.</p>	<p>there is no separate Eclipse Sound stock, and the population should be considered holistically. There are other contributing factors that have been identified, including changes to ice coverage (which could act as a barrier to entering Eclipse Sound in some years), predation, hunting and other activities in the area.</p> <p>However, in the face of this uncertainty and as requested by some Inuit and Inuit groups, Baffinland has implemented mitigations in 2021 and 2022 which eliminate icebreaking in the Spring season.</p> <p>This adaptive management measure eliminated the possibility of acoustic disturbance to narwhal from icebreaking during the timing of narwhal migration into Eclipse Sound in 2021. However, narwhal numbers in the Regional Study Area (RSA) were not shown to increase in 2021 despite the suspension of icebreaking in that year. Narwhal disturbance from icebreaking was therefore not considered to be an influencing factor on the observed decline in narwhal abundance in Eclipse Sound during the 2021 season. It also provides additional confidence that the observed decline in 2020 was likely not a result of early shoulder season icebreaking in 2020.</p> <p>Open-water shipping was not identified as a likely contributing factor to the observed decline in 2021 for several reasons. Firstly, open-water shipping levels were slightly lower in 2020 and 2021 compared to 2019. In 2019, narwhal numbers in the RSA were shown to be stable relative to baseline (2013) and previous survey years when shipping was occurring (2016). Therefore, it is considered unlikely that open-water shipping in 2020 and 2021 would suddenly trigger a high severity response in narwhal (such as a large-scale displacement from the RSA) when shipping levels were in fact slightly reduced that year. Additionally, during the 2021 surveys which ran consecutively for six weeks from 18 July to 26 August, no evidence of displacement was observed, that is to say that narwhal numbers were low throughout the six-week period which ran over the period of time when no shipping was taking place into the commencement of shipping without the use of an ice-breaker and into the open water shipping season.</p> <p>Secondly, the type of behavioural responses observed in narwhal to date from open-water shipping suggests that this is not the cause of the observed decrease in 2020 and 2021. Behavioural responses to shipping have been limited to temporary and localized disturbance effects at close range to vessels (up to 5 km distance). These observations are reflective of empirical data collected as part of several multi-year narwhal behavioural response studies conducted in the RSA (i.e., 2017-2018 Narwhal Tagging Program, 2014-2021 Bruce Head Shore-based Monitoring Program) and from IQ shared by Inuit through their direct involvement on the Bruce Head Shore-Based Monitoring Program (Elijah Panipakoochoo, transcript from NIRB Community Round Table - 16 August 2022). Baffinland’s scientific monitoring results and IQ are aligned on the types of observed behavioural responses demonstrated by narwhal when exposed to shipping. These effects, when present, last for a short duration with animals quickly returning to their pre-response behaviour following exposure. These are considered to be low to moderate severity responses that are not thought to result in any significant biological consequences on reproduction or survival, and hence on the stock or population. In comparison, narwhal responses to killer whales in the RSA consist of rapid dispersal to shallow water nearshore areas, freeze behaviour and suspension of vocal activity, with effects persisting for periods well beyond the exposure event (Remnant and Thomas 1982I Gonzalez 2001; Laidre et al. 2006; Breed et al. 2017; QIA 2019). A review of the available literature and IQ indicate that western science and IQ are aligned on the higher severity behavioural response narwhal exhibit to killer whales. Narwhal responses to killer whale would be considered high severity responses with potential significant biological consequences (Finneran et al. 2017; Southall et al. 2021). To date, no similar anti-predator response has been demonstrated by narwhal to shipping as part of Baffinland’s monitoring programs.</p> <p>Again, despite evidence linking lower narwhal numbers in the RSA with shipping, Baffinland has introduced enhanced mitigation measures for implementation in 2022, in light of the precautionary principle. These measures were discussed in detail with MEWG members during four separate MEWG meetings in May and June 2022 (14 hours total – 03 May, 14 June, 22 June, 29 June). A 2022 shipping update with mitigation measures was provided to MEWG members by Baffinland during the 14 June meeting. These enhanced measures for 2022 are also outlined in Baffinland’s 2022 Narwhal Adaptive Management Response Plan (NAMRP) (BIMC 2022a) and include:</p> <ul style="list-style-type: none">no icebreaking to commence the 2022 shipping season;use of convoy throughout the 2022 season to further reduce total sound exposure (see JASCO Applied Sciences Memo as Attachment 2 to Baffinland’s 2022 NAMRP [BIMC 2022a]); andno more than 80 ore carriers will be chartered during the 2022 season to transport 6 Mtpa, if approved. <p>Response to Recommendations</p>

ID#	Recommendations/Requests	Response
		<p>(a) Baffinland has completed this request. A technical memorandum was prepared by JASCO Applied Sciences (JASCO) that discusses the use of vessel convoys as a means of noise mitigation for marine mammals in the Regional Study Area (JASCO 2022). It uses existing site-specific (Milne Inlet/Eclipse Sound) acoustic monitoring data (Austin and Dofher 2020; 2021) to describe and quantify how the implementation of vessel convoys can serve as a mitigation measure to reduce cumulative noise exposure from shipping on marine mammals in the Regional Study Area, including reductions in the spatial and/or temporal extent of noise exposure directly resulting from shipping. The memo confirms the benefits of convoys even as an addition to an already robust suite of marine mammal mitigations, including Baffinland’s industry leading speed restrictions.</p> <p>Baffinland plans to engage with the Marine Environment Working Group to review the implementation of convoys based on the 2022 shipping season, which could benefit from scenario planning exercises. If feasible improvements are identified, they will be considered in a revised Operational Guide for Ore Carrier Convoys, should this activity continue in future years. Baffinland notes that it deployed one recorder near the defined Northern Shipping Route near Bruce Head on August 14, 2022 at 72° 02.187’ N, 80° 33.366’ W (277 m water depth) and that Baffinland is also aware that Oceans North deployed underwater recorders in July 2022, thus it is anticipated that this data may also be shared for MEWG discussion.</p> <p>(b) With respect to QIA’s proposed EWI, Baffinland recommends holding a special meeting of the Marine Environment Working Group (MEWG) of which QIA is a Member, to identify, evaluate and select additional adaptive management indicators, thresholds and responses to integrate into a final MMP to apply should there be a 2023 shipping season and beyond. To prepare for this meeting, Baffinland requests that any Members proposals on EWIs provide detailed written recommendations, including available baseline data, sampling methodology to ensure statistical power in comparing yearly collected data to baseline data, and proposed thresholds for identifying change.</p> <p>(c) Baffinland agrees to resource Inuit-led monitoring and involvement in adaptive management planning, including the development of EWI’s and Inuit objectives, indicators, thresholds and responses (OITR’s). See Baffinland response to QIA Commitment List Items #5, #8 and #9 (Appendix 4).</p> <p>(d) Baffinland is open to working with harvesters in Pond Inlet to collect additional samples and observations related to cortisol levels and morphometric measurements of narwhal, respectively. While Baffinland is supportive of this program being undertaken at a community based level, our concerns remain regarding using cortisol levels or morphometric measurements as a Project-based indicator. This is largely due to the fact that multiple external environmental factors can affect cortisol levels and body condition in narwhal. Observed changes in cortisol levels and body condition may be the result of a general change in environmental quality (e.g. climate change, change in prey availability, change in predation pressure, change in ice conditions) rather than a result of behavioural disturbance following exposure to vessel noise. Baffinland continues to advocate for a regional approach towards narwhal health and body condition monitoring that should be led by Fisheries and Oceans Canada (DFO) and relevant community-based organizations, with support provided by Baffinland.</p> <p>References:</p> <p>Austin, M and T. Dofher. 2020. Technical Memorandum - Vessel Source Level Estimates for the 2018 and 2019 Shipping Seasons: Baffinland Mary River Project. Document 02235, Version 2.0. Technical Memorandum by JASCO Applied Sciences for Golder Associates Ltd.</p> <p>Austin, M.E. and T. Dofher. 2021. Underwater Acoustic Monitoring: Baffinland Iron Mines Shoulder Season Shipping 2019–2020. Document 02330, Version 1.0. Technical report by JASCO Applied Sciences for Golder Associates, Ltd.</p> <p>BIMC. 2021. Marine Monitoring Plan (MMP). Marine Mammal TARP and Action Toolkits. NIRB File # 334146.</p> <p>BIMC. 2022a. 2022 Narwhal Adaptive Management Response Plan (NAMRP). Document # BAF-PH1-830-P16-0024. Rev1. 19 July 2022.</p> <p>BIMC. 2022b. Marine Shipping and Vessel Management Report to the Nunavut Impact Review Board. 19 July 2022. 301 p.</p>

ID#	Recommendations/Requests	Response
		<p>Breed, G.A., C.J.D. Matthews, M. Marcoux, J.W. Higdon, B. LeBlanc, S.D. Petersen, J. Orr, N.R. Reinhart and S.H. Ferguson. 2017. Sustained disruption of narwhal habitat use and behavior in the presence of Arctic killer whales. PNAS. 114(10): 2628-2633.</p> <p>JASCO Applied Sciences (JASCO). 2022. Vessel convoys as a means of noise mitigation. Technical Memorandum. 13 June 2022. Prepared by Melanie Austin. 7 p.</p> <p>Gonzalez, N. 2001. Inuit Traditional Ecological Knowledge of the Hudson Bay Narwhal (Tuugaalik) Population. Department of Fisheries and Oceans, Iqaluit, Nunavut, Canada. pp. 1-26. Iqaluit, Nunavut.</p> <p>Laidre, K.L., M.P. Heide-Jorgensen and J. Orr. 2006. Reactions of narwhals, Monodon monoceros, to killer whale, Orcinus orca, attacks in the Eastern Canadian Arctic. Canadian Field Naturalist. 120: 457-465.</p> <p>Qikiqtani Inuit Association (QIA). 2019. Tusaqtavut Study for Phase 2 Application of the Mary River Project. 14 June 2019.</p> <p>Remnant, R. and M. Thomas. 1992. Inuit traditional knowledge of the distribution and biology of High Arctic narwhal and beluga. North/South Consultants, Winnipeg, Manitoba. pp. 104.</p> <p>Finneran, J., E. Henderson, D. Houser, K. Jenkins, S. Kotecki, and J. Mulsow. 2017. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical report by Space and Naval Warfare Systems Center Pacific (SSC Pacific). June 2017. 194 pp.</p> <p>Southall, B.L., D.P. Nowacek, A.E. Bowles, V. Senigaglia, L. Bejder, and P.L. Tyack. 2021. Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioral Responses to Human Noise. Aquatic Mammals. 47(5): 421-464.</p>
QIA-03	<p>Summary</p> <p>Impacts of dust from the Project have been higher than predicted within the FEIS. Improved monitoring programs and mitigation measures are needed to reduce the effects of dust on culture, rights and land use, and caribou use of vegetation in the Project area.</p> <p>Commitment 22</p> <p>(a) That within 3 months of the receipt of the approvals for the 2022 PIP, Baffinland implement all recommendations for improving their dust monitoring programs, including improved locations of monitoring sites to ensure that stations are not in the “lee” of the wind; alignment of dustfall monitoring with existing vegetation monitoring programs so that the two programs can inform each other; use of passive vertical monitoring in addition to the current isopropyl monitors; continuous monitoring of dustfall at PDA boundaries; finalize methods for bi-weekly regional dustfall extent monitoring using satellite imagery; and other recommendations for dust monitoring improvements contained within the final Dust Audit Report. These improved methods will be included in a revised version of the Air Quality and Noise Abatement Management Plan. Dust monitoring will be used to reassess the impacts of dust from the Project on key receptors, determine the efficacy of existing mitigation measures, and determine if additional mitigation measures are needed.</p>	<p>(a) Baffinland appreciates the efforts of the QIA to bring informed recommendations forward for consideration but it is premature to commit to mitigation when Baffinland has only been in receipt of the QIA’s 2021 Dust Investigation Report since August 11, 2022. Further discussion is required to align both parties understanding of the full scope and history of Baffinland’s monitoring programs. An initial review of the Report already indicates there may be some misunderstanding of the current monitoring programs that likely already address some of the report’s concerns. For example, the dustfall and vegetation programs are aligned; additional passive dustfall stations were added around Milne Port in 2021, and complimentary vegetation (including lichen) data was collected in 2022. Additional sampling was conducted in response to our current monitoring and response protocol.</p> <p>In addition to the QIA’s 2021 Dust Investigation Report, Baffinland is expecting the release of its own commissioned 2022 Dust Audit Report in early September 2022. Baffinland recommends a practical approach would be to hold a dedicated Terrestrial Environment Working Group (TEWG) meeting on dust management once all the reports are released and Members have had an opportunity to review all the recommendations and their supporting rationale. This would include Baffinland’s commissioned Dust Audit Report and QIA’s 2021 Dust Investigation Report. The objective of the meeting would be to reconcile any differences and consolidate a final list of feasible recommendations. We can also use the strength of a newly implemented Terms of Reference for the TEWG that provides for all five HTO members to participate, an independent Chair to manage the meeting, and a consensus based decision making process.</p> <p>(b) Baffinland is willing to commit to identify high risk days for dust dispersion, based on weather. Please see above for our recommended approach to address other requests for implementation of QIA recommendations.</p> <p>(c) Baffinland is willing to commit to further discussions with QIA to understand what the QIA is suggesting regarding a remote sensing program for determining lichen health. Baffinland has always welcomed input from the TEWG in ways to improve monitoring and mitigation. Baffinland is currently in consultation with NRCan scientists to further develop the existing remote sensing program to ensure the monitoring program provides the most accurate measurement of dustfall extent and magnitude possible. Therefore QIA’s concerns may already be addressed.</p> <p>(d) Baffinland will consider any recommendations brought forward by TEWG Members, including QIA and the MHTO, following Members reviews of the QIA’s Dust Investigation Report and Baffinland’s Dust Audit Report, and a subsequent meeting of the TEWG. Baffinland has implemented many of the</p>

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	<p>(b) That within 3 months of the receipt of approvals for the 2022 PIP, Baffinland will implement all recommendations of the draft Final Dust Audit Report. Furthermore, Baffinland will implement the following additional mitigation measures:</p> <ul style="list-style-type: none">Improved dust control at all locations where ore is moving or being handled at the mine and port sites;Identify high risk days for dust dispersion;Implement additional mitigation measures for ore movement on high risk days, including reduced truck speed on high risk days; avoiding truck use of the Tote Road on the highest risk days, and use of additional dust suppressants as needed. <p>(c) That within 3 months of the receipt of approvals for 2022 PIP, Baffinland initiate a remote sensing monitoring program to investigate the impacts of dust on lichen health in the Project area. This remote sensing monitoring program will be designed with input by the TEWG. This information will be used to inform the zone of influence re-estimation for caribou.</p> <p>(d) That within 6 months of the receipt of approvals for 2022 PIP, Baffinland implement all recommendations from the TEWG and/or QIA and the MTHO for improving their vegetation monitoring programs to ensure that metal uptake by vegetation is properly considered.</p> <p>Additional QIA Recommendations</p> <p>Given that all of the concerns raised to date related to dustfall are in reference to either the 4.2 mtpa or 6.0 mtpa production limits, it is imperative that additional mitigation measures are included in a revised Project Certificate Condition to reduce these existing impacts at the Production Increase Proposal scale of 6.0 mtpa. QIA recommends that the revised Project Certificate include requirements for the proponent to take immediate steps to cover locations where the ore is moving or being handled at the mine and port sites, that dust monitoring is improved to allow for (1) better monitoring site locations; (2) passive vertical monitoring in addition to the current isopropyl monitors, which depend on dust settling and getting entrained; that the Proponent start a daily process for identifying and addressing times of high risk for dispersion to reduce impacts on those days; that the Proponent initiate a program for monitoring resting dust entrained on snow, to determine whether it meets water testing criteria.</p>	<p>recommendations provided by TEWG Members related to our vegetation monitoring program. If QIA has a specific recommendation to put forward on the topic of metals uptake that it believes has not been addressed by Baffinland, we would be pleased to discuss those topics further. However, as a general comment the NIRB should be cautious about mitigation requests that apply to future years beyond 2022.</p> <p>Response to Additional QIA Recommendations</p> <p>Baffinland is committed to supporting the implementation of an additional monitoring program focused on dust on snow. This may be an ideal candidate for an Inuit-led monitoring program. Whether it makes sense to introduce water testing criteria into this program should be the subject of further discussion. Baffinland is not clear on the objectives and what decisions will be made based on such a program. Runoff reporting to a given stream is a function of the snowpack across the entire catchment (ie there are many influences independent of the project), so obtaining representative data will be challenging. Further, windblown snow means that conditions in the snowpack are fluid over time; only the snowpack immediately before freshet would be potentially representative (if variability across a given catchment could be adequately addressed through sampling). Lastly, Baffinland monitors water quality in the local streams during freshet, which is reflective of what is actually reporting to streams. In summary, it is not clear that a snowpack monitoring program will have the intended outcome QIA is seeking to achieve but is willing to discuss this further with the QIA to better understand its thinking and consider adjustments to programming.</p>
QIA-04	Summary	<p>a. Baffinland agrees that Inuit Qaujimagatuqangit (IQ) must inform any initiative to re-estimate the Project’s Zone of Influence, however, we are uncomfortable with a commitment obligating other parties to perform studies with indeterminate scopes and without any indication that this proposed study has the</p>

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	<p>At current production levels, impacts to caribou have been higher than predicted within the FEIS, with Inuit reporting a steady decline in caribou and avoidance of the Project area due to the activity associated with the mine. Given the importance of the Project area for caribou and concerns raised by Inuit at the current production levels, immediate efforts must be made to properly identify the zone of influence around the Project based on Inuit Qaujimajatuqangit and scientific information, conduct a full IQ study of caribou to determine priority areas for Caribou Protection Zones within the Project area, and enact additional mitigation measures based on input from Inuit. Furthermore, the sensitivity of caribou on North Baffin at low population levels requires that a precautionary approach be taken to reduce the likelihood that caribou will continue to avoid the Project area. Under these circumstances, it is imperative that the Proponent be compelled to enact additional mitigation measures to protect caribou until these studies can be completed.</p> <p>Commitment 23</p> <p>a. That within 3 months of receipt of approvals for the 2022 PIP, Baffinland will provide funding to QIA to conduct a full study of caribou on North Baffin based on Inuit Qaujimajatuqangit, to identify areas within the vicinity of the Project that are highly sensitive for caribou (Caribou Protection Zones) and to gather data to support the re-estimation of the Zone of Influence around the Project. This Study will be led by QIA in conjunction with the HTOs. The results will be used by QIA to re-estimate the Zone of Influence around the Project and will inform the enactment of additional mitigation measures for caribou.”</p> <p>b. That within 12 months of receipt of approvals for the 2022 PIP, Baffinland will work with QIA to re-estimate the Zone of Influence for caribou around the Project, using both Inuit Qaujimajatuqangit and western science to determine the extent of reduced habitat suitability around the mine and the likely impacts to caribou at a regional scale. This re-estimated Zone of Influence will be monitored over time as caribou numbers increase, to assess the effectiveness of mitigation measures.</p> <p>c. That within 18 months of receipt of approvals for the 2022 PIP, Baffinland will implement all mitigation measures for caribou identified by QIA and the HTOs, to ensure that impacts to North Baffin caribou—which are highly sensitive at low points in their population cycles and must be supported to recover—are reduced to the extent possible. QIA and the HTOs may choose to involve the TEWG as an advisory group for the development of appropriate mitigation measures.</p> <p>d. That immediately following the receipt of approvals for the 2022 PIP, Baffinland will implement the following additional mitigation measures for caribou:</p>	<p>support of the involved communities. Baffinland is also concerned with the QIA’s ability to complete the proposed work in addition to the other important initiatives QIA and Baffinland have agreed to carry forward, including the development of the Inuit Stewardship Plan and the completion of a CRLU Assessment and the Pond Inlet Country Food Baseline Report. These are significant undertakings that must be prioritized by the QIA with meaningful engagement from communities to ensure their completion.</p> <p>b. Baffinland is concerned with the QIA’s marginalization of the Terrestrial Environment Working Group (TEWG) in the process to re-estimate the Project’s Zone of Influence and to develop additional mitigation measures, if needed. Baffinland has agreed to important modifications to the TEWG Terms of Reference, including the addition of the remaining four HTOs of North Baffin Island as Members, with expenses to be covered by Baffinland (MHTO is already a Member). Baffinland believes that under the new Terms of Reference the TEWG will be well positioned to receive and discuss a proposal from QIA to carry out its proposed work in a manner that involves all interested Parties. Baffinland also notes that it has presented its approach towards the re-estimation of the Project’s Zone of Influence at two TEWG meetings, where a draft of the study design was provided to the QIA for comments, and a final version was issued and submitted as part of the 2021 Annual Report to the NIRB. During that review, the QIA did not provide any practical input on how IQ was expected to be incorporated within that or parallel studies. Regardless, Baffinland has always welcomed reasoned, informed, and justified input from the TEWG in ways to improve monitoring study design, such as those presented in the Caribou Monitoring Triggers and Recommendations Report as part of the 2021 annual report to the NIRB.</p> <p>c. Baffinland cannot commit to implementing mitigation measures without the ability to review, discuss and rationalize such mitigations. Further the QIA’s request far exceeds the current scope of the assessment (i.e. the current assessment considers the year 2022 only) and it is not practical for Baffinland to agree at this time. However, Baffinland would expect to look to the TEWG, which includes the QIA and HTOs (as proposed) if and when a new study on Caribou is developed to determine if new adaptive management measures are required.</p> <p>d. Caribou calving areas have been identified in multiple areas throughout the Project area. Protection measures were identified early in engagement meetings going back to 2008 when caribou-focused workshops were held with knowledge holders. Baffinland committed to reducing disturbance where caribou were present, which triggers our Height of Land surveys – looking for caribou presence in the Project area during the calving season. Post-calving areas were never specifically identified by the knowledge holders because that was not recognized as a specific time important for caribou distribution.</p> <p>Baffinland is unaware of any science or traditional knowledge informing the QIA’s “no blasting” distance and flight guidelines. Further, Baffinland pays particular attention to all other protection measure research presented in numerous NIRB hearings and follow-up programs which do not align or support the requested flight height restriction. Risk-based and supported reasoning behind protection measures is a key component of responsible project management. In this instance, the QIA is not making a sound and credible case that a risk of serious or irreversible harm exists. Therefore there is no justification that the proposed measure would be a mitigation technique. Baffinland welcomes the QIA’s contributions through the TEWG to share any relevant IQ or scientific knowledge for the group’s consideration. As per the draft Terms of Reference, the QIA is welcome to bring this recommendation forward for the group to consider and vote on.</p> <p>Baffinland confirms that the QIA’s suggestion is already implemented. Baffinland has a QIA approved traffic response protocol in place. That protocol has been used on the Tote Road since 2012 and incorporates the QIA’s suggestion regarding stoppage of vehicles. As a reminder of what is included in that protocol, vehicles stop when caribou are near the road. Vehicles will not begin moving again until caribou have either crossed the road, or clearly show visible signs of not being disturbed (e.g., resting, feeding) before vehicles will proceed slowly.</p> <p>Cited:</p> <p>Baffinland Iron Mines Corporation. 2022. Baffinland Response to Comments Received for Baffinland’s Production Increase Proposal Extension 2021 Annual Monitoring Report. NIRB Document ID No. 341226. 128 pp.</p>

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	<ul style="list-style-type: none">no blasting within 5 km of all suitable caribou calving and post-calving habitat during the caribou calving period and immediately post-calving, with these dates to be determined by the MHTO;helicopters to maintain a 2 km horizontal distance from all suitable calving and post-calving habitat during the caribou calving period and immediately post-calving, with these dates to be determined by the MHTO;when caribou are observed along the Tote road, immediate stoppage of hauling for a suitable period of time to be determined in collaboration with the MHTO and the TEWG.	EDI Environmental Dynamics Inc. 2022. Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board Appendix G.23: Caribou Monitoring Triggers and Recommendations Report. NIRB Registry No. 338492. Prepared for Baffinland Iron Mines Corporation. 28 + app. pp.
QIA-05	<p>Summary</p> <p>Despite extensive evidence brought forward by Inuit parties of existing serious adverse effects on Inuit Culture, Resources and Land Use (CRLU, including food security), from operations at both 4.2 mtpa and 6.0 mtpa, the Proponent continues to proposed to operate the Mary River Mine without recognizing that these impacts have and are continuing to occur, without the completion of a credible, Inuit-centred and verified assessment of impacts on Inuit food security and overall CRLU, and in the absence of an implemented, meaningful monitoring system for Inuit Culture, Resources and Land Use.</p> <p>This is likely to perpetuate and deepen existing impacts reported by Inuit, unless additional Project Certificate Conditions are adopted that can require and enforce the required improvements.</p> <p>Commitment 13</p> <p>That, within 18 months of receipt of approvals for the 2022 PIP, Baffinland provide to the NIRB a copy of both:</p> <p>a. The ongoing Pond Inlet Country Food Baseline Study; and</p> <p>b. A CRLU Assessment that has been verified by QIA and the Project-affected communities; and</p> <p>That these documents must be provided along with an Action Plan for monitoring, mitigation and accommodation of impacts on CRLU, including Inuit food security, with evidence that this has been subject to consultation and verification with QIA and the Project-affected communities.</p>	<p>Since June 2020 Baffinland and the QIA have worked towards the implementation of various commitments contained within the Inuit Certainty Agreement (ICA), many of which are specifically designed to elevate the role of Inuit Qaujimajatuqangit (IQ) and Inuit observations in Baffinland’s environmental management system. As the Regional Inuit Association, the QIA assumed responsibility for the majority of the work related to IQ and Inuit led monitoring, which has been financially supported by Baffinland.</p> <p>The above arrangement applies to both the Pond Inlet Country Food Baseline Study and the Culture, Resource and Land Use (CRLU) Assessment. We understand that through the Inuit Certainty Agreement, Baffinland has already provided funding to initiate/complete both reports being referenced and that work has already been undertaken by the QIA. It is unclear why the QIA has inferred a leading role for Baffinland in this work, or that it would be required for Baffinland to verify work carried out by QIA, with the QIA. Regardless, Baffinland is committed to fund the completion of the Pond Inlet Country Food Baseline Study and the CRLU Assessment with QIA’s renewed commitment to complete them, should additional funds be required, and to assist in any other way requested by either the QIA or Project-affected communities. Once complete, Baffinland will work with the QIA and Project affected communities to develop an Action Plan that will guide the integration of relevant findings into the Project's monitoring and mitigation plans.</p>
QIA-06	<p>Summary</p> <p>BIMC has not proposed any additional mitigations for the crushing facility, one of the primary sources of fugitive dust at the Mary River Site, despite fugitive dust</p>	<p>It appears this comment is based on a misunderstanding regarding crusher mitigations for the current project. The current controls at the Mine Site Crusher facility include hoods and shrouds on the conveyors and discharge points. Further controls are being evaluated for implementation in 2022 to focus on material handling points and providing enclosure at key areas.</p> <p>Additional changes to dust management at the crushing facility should be considered through the process proposed by Baffinland in QIA-03.</p>

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	<p>predictions presented within the Final Environmental Impact Statement (FEIS) being routinely exceeded as recently as 2021.</p> <p>No related commitment</p> <p>On P2/61 of the supplemental PIP memo, BIMC states that “On June 7, 2022 the NPC issued a positive conformity determination for the PIPR Proposal and referred the proposal to NIRB. In their conformity determination (consistent with previous determinations in 2018 and 2019), the NPC confirmed that the PIPR Proposal continues to not be considered a significant modification of the Mary River Project under NuPPAA”. We agree that the proposed activities reviewed by the NPC are within the scope of that which is currently permitted. However, the actual impacts of those activities were not assessed by the NPC and do not conform to those presented within the FEIS.</p> <p>We note that the 2021 terrestrial annual report indicates the fugitive dust generated from the Mary River Mine Site has “extended beyond the modelled isopleths [in both distance and concentration], as it did in 2019” (P100/328), and the report concludes that “dustfall levels have been consistently higher than FEIS predictions” (P113/328). While the report goes on to suggest that “dustfall associated with the Project... remains primarily an aesthetic effect, rather than a biophysical concern”, this conclusion does not consider deflection of land use practices by local Inuit, nor does it consider the cumulative effects of successive excess dust deposition on the tundra over time. Further, current monitoring efforts do not appear to be sufficient to characterize the full extent of dust related effects to the tundra.</p> <p>Fugitive dust may also be impacting water and sediment quality despite the conclusion of the terrestrial monitoring report. The 2021 CREMP report (P161/209) indicates that water and sediment quality has increased above Aquatic Effects Monitoring Program (AEMP) benchmarks in both project area lakes as well as the reference lake. We disagree with the proponent’s conclusion that this suggests the effects are not Project related as the reference lake is downwind of the project and may have been influenced by fugitive dust; we suggest that an alternate conclusion is that both the Project lakes and the reference lakes may have been influenced by the Project activities at the Mary River site.</p> <p>We are therefore concerned BIMC indicates that there will be “no change” to the mitigation measures proposed for Ore Extraction and Processing following approval of the PIP by the NIRB. BIMC suggests that “Specific actions that have been implemented, or could be further implemented [underline for emphasis] by Baffinland for dust management at the crushing facility include... Moving and enclosing secondary crushing facilities to Milne Port.” (p27/61).Enclosing crushing facilities would be a significant reduction in the dust generated but has not been completed at this time; this activity has been proposed for Phase 2 and only at the</p>	

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	Port. The proposed enclosing of crushing facilities does however indicate that BIMC is able to enclose crushing facilities.	
QIA-07	<p>Summary</p> <p>BIMC has not proposed any additional mitigations for the Tote Road despite the fugitive dust predictions presented within the FEIS being routinely exceeded as recently as 2021 at the majority of Tote Road dustfall monitoring stations.</p> <p>Commitment 19</p> <p>(a) That Baffinland commit to increasing the frequency for application of DustBlok® or similar product along the Tote Road as a condition of receiving approval from the NIRB for the PIP Renewal, and document the frequency of use of dust suppressants applied to the road in the 2022 annual report and make a direct comparison to 2021.</p> <p>(b) That Baffinland leave a minimum of a 31 m buffer but ideally a 100 m buffer in the application of dust suppressants along the Tote Road on either side of water crossings.</p>	<p>(a) DustBlok® application is as per the manufacturer of the product as identified through a site visit to test the specific site conditions and road materials in 2019. The procedure for application consists of an initial application followed by maintenance applications throughout the season. It should be noted that the amount of dust suppression applied is influenced by a number of factors (e.g., precipitation, wind speeds etc.). Therefore, increasing the frequency of the application of the product may not have a direct correlation to reduction of dust. Refinement of the application rates in accordance with the manufacturer’s instructions are a more reliable solution to improved dust suppression performance, and Baffinland is willing to make this commitment in relation to the 2022 6 mtpa application.</p> <p>(b) Due to the importance of dust suppression efforts and applying dust suppression along the entire length of the Tote Road, the proposed buffers are not appropriate. Applying a buffer of 100 m on either side of the Tote Road to approximately 200 water crossings would result in the exclusion of 40 kilometers of the Tote Road from dust suppression. The Tote Road from Mary River to Milne Port is 100 km in length and this results in 40% with no dust suppression applied. This is counter to effective dust suppression along the Tote Road.</p> <p>Dust Blok® is an approved substance by the Government of Nunavut for application on roadways in the territory. In order to use a dust suppressant in the territory, the manufacturer must demonstrate that it meets all requirements outlined in the Government of Nunavut’s Environmental Guideline for Dust Suppression which includes a provision that the suppressant be non-acutely toxic. The SDS and relevant application protocols was previously shared with QIA.</p> <p>Additional changes to dust management for the Tote Road can be considered through the process proposed by Baffinland in QIA-03.</p>
QIA-08	<p>Summary</p> <p>Fugitive dust migrating from the Milne Port facility continues to routinely exceed FEIS predictions despite the application of additional mitigations in 2021. It is unclear from PIP Renewal memo and supporting documentation how existing measures are currently being applied, and whether the proposed mitigation measures will be implemented.</p> <p>Commitment 20</p> <p>(b) That Baffinland minimize drop distances (i.e., using adjustable stackers) for stockpiling activities. BIMC to further define the drop distances used and provide evidence in subsequent annual reports that they have been applied.</p> <p>(c) That Baffinland provide an evaluation of where wind fencing would limit dust migrating from the ore stockpiles at Milne Port (and at the Mary River site), and construct them within 60 days of the first sealift/resupply ship arriving at Milne Port in 2023 in order to permit the materials to be shipped.</p> <p>(d) That Baffinland define what other operational practice improvements will be made to minimize dust from Milne Port, and clarify how those measures</p>	<p>(a) The stacking units that BIM uses at the Milne Port ore stockpiles are already adjustable. They have sensors at the discharge end to maintain a specific drop distance during stockpiling activities. This eliminates operator error and the system optimizes this control as the stockpile is developed. This equipment ensures drop distances are minimized. The specific drop distances used would not be useful data for an Annual Report, but Baffinland would include a statement in the 2022 annual report should the stacking unit sensors malfunction (which is not anticipated).</p> <p>(b) Baffinland is evaluating installation of wind fencing around the Ore Stockpile pad at Milne Port. Part of the evaluation will consider important factors such as engineering inputs, procurement of materials and seasonal constraints on installation. For this reason, the 60-day recommendation is not feasible but Baffinland commits to work with the QIA and other interested parties on moving this project forward.</p> <p>(c) Additional changes to dust management at Milne Port can be considered through the process proposed by Baffinland in QIA-03.</p>

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	will be implemented. Changes requiring additional infrastructure or materials should be implemented within 60 days of the first sealift/resupply ship arriving at Milne Port in 2023 while operational changes should be implemented immediately.	
QIA-09	<p>Summary</p> <p>The monitoring currently in place and proposed within the PIP Memo is insufficient to characterize the extent and magnitude of dustfall associated with the Project. Current monitoring in place is only sufficient to indicate that dustfall within the project area and in its vicinity is routinely exceeding predictions as outlined in the FEIS.</p> <p>Commitment 21</p> <p>That Baffinland adopt the following recommendations outlined within QIA’s investigation of the spatial extent dustfall from the Project is impacting the surrounding receiving environment to better characterize the magnitude and extent of those effects:</p> <ol style="list-style-type: none">1. Dustfall isopleth modelling should be updated with real project data (including vehicle traffic patterns, point sources, and dust monitoring data), and the spatial extent of the model should be expanded until Project impacts are indistinguishable from background deposition;2. Snowpack water quality should continue to be monitored annually at the 20 sites sampled in 2021 to determine if there are spatial-temporal trends in water quality guideline exceedances, indicating priority areas of concern for aquatic and terrestrial receptor effects from metals, TDS and TSS;3. Dustfall and soil/lichen metals monitoring sites should be expanded at a minimum to include locations identified as Areas of Community Concern, and the areas where the highest dustfall was identified in the 2021 assessment (We direct BIMC to Section 5.3 of HESL 2022 for site locations);4. Seasonally monitored dustfall sites should be compared with FEIS predictions to confirm that they meet their current low isopleth zone ranking, and to determine the spatial extent and magnitude of dust dispersion beyond the project area;5. Additional dustfall monitoring locations will help in comprehensively evaluating long-distance dust dispersion. The locations of additional sites should be determined based on results of the updated and expanded isopleth modelling recommended above;6. A snow quality metric (and associated action level triggers) should be developed, integrating traditional knowledge on acceptable snow quality on the land with western science numerical indicators. The metric should be applied to dustfall monitoring to track snow changes related to dust	Additional changes to Baffinland’s dust monitoring program can be considered through the process proposed by Baffinland in QIA-03.

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	<p>before adverse effects occur. Mitigation strategies to prevent snow quality degradation, based on this metric, should also be developed;</p> <p>7. Dustfall monitoring sites should be added along Milne Inlet to investigate increasing dust extent documented by satellite imagery from 2014 to 2020;</p> <p>8. Satellite imagery analysis should be expanded to include areas beyond 20 km of the Project Development, to cover the locations used in our 2021 field monitoring;</p> <p>9. The potential influence of local topography on wind patterns and dust dispersion should be investigated, and the results used to inform dust dispersion modelling and assumptions; and</p> <p>10. A desktop study on dust duration on the land should be designed to identify locations likely to experience longer-term dustfall effects. The study should describe the relative role of runoff and wind in dispersing dust from the land, and consider site-specific factors, such as wind, precipitation, topography, snowpack conditions, and vegetation.</p> <p>These modelling and monitoring recommendations should be implemented by BIMC as a condition of receiving approval from the NIRB for the PIP Renewal.</p> <p>Further, that Baffinland investigate a “threshold” wind speed associated with mobilizing dust from the Project (Mary River, Tote Road and Milne Port), and implement an operational staged decrease in dust generating site activities once that wind speed is met or exceeded. The staged decrease in activities should be clearly outlined in an appropriate plan (e.g., the Environmental Protection Plan).</p>	
QIA-10	<p>Summary</p> <p>Baffinland stated that to alleviate concerns with existing approaches towards Baffinland’s adaptive management framework and administration of the environmental working groups, an interim version of the Adaptive Management Plan developed through the Phase 2 Proposal review process will be applied to the remainder of 2022.</p> <p>Commitment 12</p> <p>(a) That Baffinland provide data on which indicators within the draft adaptive management plans have been triggered within the low, medium, and high response levels.</p> <p>Recommendation/Request in Addition to QIA Commitment Table</p> <p>QIA requests clarity on if the full Phase 2 Adaptive Management Plan will be implemented in 2022 or if it will only be implemented in part. If in part, QIA requests details on which provisions may be omitted. Further, QIA requests Baffinland’s commitment that this plan will proceed beyond 2022.QIA requests Baffinland confirm which, if any, indicators within their DRAFT Adaptive Management plans</p>	<p>The data required to determine if any exceedances have occurred against the draft indicators and thresholds established to date is available in Baffinland’s 2021 annual reports to the NIRB, NWB, TEWG and MEWG of which QIA is a recipient. Any elevated monitoring results are discussed within those reports, inclusive of discussions regarding the need for adaptive management.</p> <p>In some cases, Baffinland has specifically evaluated current monitoring results against draft indicators and thresholds, as was the case in the 2022 Narwhal Adaptive Management Response Plan. In that circumstance Baffinland can confirm that even though no threshold has been passed, it has not prevented Baffinland from implementing precautionary measures to mitigate its potential contributions towards broader regional effects. Baffinland suggests the QIA and Baffinland carry out an evaluation of monitoring results to date against draft indicators and thresholds as part of the Adaptive Management Working Group as work continues to finalize the Adaptive Management Plan. This evaluation could include the completion of the table outlined by the QIA.</p> <p>As identified by the QIA, Baffinland has committed to implement an interim version of the Adaptive Management Plan developed through the Phase 2 Proposal review process (NIRB Registry No. 326518) and apply it to relevant 2022 monitoring programs. Baffinland did not intend for the wording of its commitment to mean the interim Plan could not apply beyond 2022. On the contrary, Baffinland plans to continue its work with the QIA to develop a final Plan, which would replace the interim version once complete.</p> <p>Baffinland will provide the interim Adaptive Management Plan within 30 days of Ministerial approval of the PIP Renewal. The interim Adaptive Management Plan will reflect the commitments to the QIA and other Parties in this submission respecting adaptive management (see attached updated commitment list).</p>

ID#	Recommendations/Requests	Response
	have been triggered with the low, medium or high impact area. Specifically, QIA requests Baffinland complete the below table. (For table refer to original document)	
QIA-11	<p>Summary</p> <p>Given Baffinland’s statement that 4.2 mtpa is not financially viable and the need for continuing PIP renewals or project expansions should this application proceed, QIA requests the Interim Closure and Reclamation Plan (ICRP) be progressed to a more final state. Specifically, development of a “DRAFT” final grading plan alongside creation of the Mine Closure Working Group, which is described in Section 2.3 of the ICRP as being created two to three years prior to closure.</p> <p>No related commitment</p> <p>Baffinland will need to enter Temporary Care and Maintenance should the proposal not be approved. Given Baffinland has stated the approved project of 4.2 mtpa per year is not financially viable, it is assumed Baffinland will need to rely on continued project approvals/PIP extensions to avoid a closure scenario as outlined in the Interim Closure and Reclamation Plan (ICRP). However, closure criteria – and more concerningly, development of a final grading plan has not commenced. QIA is requesting Baffinland commence discussions to develop a “DRAFT” final grading plan alongside creation of the Mine Closure Working Group, which is described in Section 2.3 of the ICRP as being created two to three years prior to closure. Implementation of this request is not an acknowledgement of a closure scenario but rather a proactive step given the realities of the situation. Should the financial situation of Baffinland improve this work could be postponed.</p>	<p>If the 6 mtpa application is approved, Baffinland will not be entering care and maintenance in 2022. With respect to the Mine Closure Working Group, Baffinland is committed to the establishment of a group and has had several discussions with QIA on this topic. QIA has not prioritized this task recently, but Baffinland is open to re-engaging with QIA on the topic and further examining reclamation considerations. Baffinland suggests a meeting between both parties on this topic as early as the first week of September 2022, should this be of interest to the QIA.</p> <p>Further, Baffinland is clarifying that pursuant to Baffinland's Type A Water License 2AM-MRY1325 - Amendment No. 1, a final Closure and Reclamation Plan is required to be developed and submitted to the Nunavut Water Board no later than one (1) year before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days). Baffinland will continue to plan for closure and reclamation in accordance with its Approved License.</p>

ARCTIC CO-OPERATIVES LIMITED

ID#	Recommendations/Requests	Response
Co-op-1	<p>Key additional direct measurable benefits through Baffinland contracting:</p> <ul style="list-style-type: none">• Approximately 78 tons of Food delivered to Kaniqtugaapik Food Bank and Iliqsaqsivik Society in Clyde River• Food/contributions of \$67,600 in the amount of approximately 21 tons provided to Qajuqturvik Food Centre in Iqaluit• Food/contributions of \$75,000 in the amount of almost 22.5 tons of food provided to school foodbanks at Nakasuk and Joamie schools in Iqaluit• Over 15 tons of water valued at more than \$50,000 contributed by BIM to the Iqaluit DEA during the water crisis October 2021• \$10,650 contributed to the Nunavut Kamtsiaqtut Helpline• \$5,250 contributed to the REACH Program in Iqaluit• \$18,850 to sponsor Iqaluit New Year’s Eve Fireworks 2020 & 2021 through Go• Freight for Foodbanks Canada “After the Bell” program of almost \$6,100• Country Food donation to Elder’s Centre in Iqaluit valued at over \$1,600• Christmas Food Hampers delivered to over 1,500 households in impacted communities• Two separate cleaning/sanitation kits delivered to each of over 1,500 households in impacted communities during the pandemic valued at approximately \$300,000-Contribution of an ATV and freight valued at over \$22,000 to the school in Grise Fiord Co-op Members and their families in the communities have long suffered from a lack of employment, training and business opportunities, contributing to economic and social inequities. In addition to the positive impacts of contracting activity to support responsible development, there are enormous opportunities for employment available to Nunavummiut either directly with Baffinland or because of the spin-off benefits of the project. <p>Research commissioned by the Nutrition North Canada program highlights an inverse relationship between household income and reported household food insecurity. “Nationally, almost half of households with no more than \$10,000 annual income are food insecure, with that incidence dropping to about 10% among households with incomes between \$30,001 and \$40,000.” (Phillips & Associates, 2017) and “...the fact that food prices area indeed higher in the North erodes the buying power of a given household income, exacerbating the effects of poverty.” (Phillips & Associates, 2017). Anecdotally, Member Co-ops note increases in disposable income in the community when seasonal or temporary construction projects are employing community residents. Because of the estimated life-of-mine for this project, the employment opportunities can be transformational and multi-generational for the communities of the region, and significant Territorially.</p>	<p>Baffinland appreciates Arctic Co-operatives Limited's participation in the review of this Production Increase Proposal Renewal application, and in particular, the new evidence shared on the relationship between paid employment and food security. This is consistent with the information shared with us by our employees.</p>

OCEAN NORTH

ID#	Recommendations/Requests	Response
ON-1	<p>1. Term and Condition 110 (Cumulative Effects Monitoring): Validating the impacts of cumulative effects should begin with the integration of the results of the presently separate marine mammal and acoustic monitoring programs. The current approach stands as a failure to appropriately incorporate consideration of cumulative effects into this process and represents a major flaw in the impact assessment’s conclusions.</p>	<p>What follows addresses the misunderstandings that form the basis for ON’s comment.</p> <p>Project Certificate Condition No. 110 states that: “The Proponent shall immediately develop a monitoring protocol that includes, but is not limited to, acoustical monitoring, to facilitate assessment of the potential short term, long term, and cumulative effects of vessel noise on marine mammals and marine mammal populations. The Proponent is expected to work with the Marine Environment Working Group to determine appropriate early warning indicator(s) that will ensure rapid identification of negative impacts along the southern and northern shipping routes.”</p> <p>Baffinland is in full compliance with this condition.</p> <p>Monitoring protocols have been developed by Baffinland in collaboration with the Marine Environmental Working Group (MEWG) for the purpose outlined in PC Condition No. 110.</p> <p>Baffinland, in collaboration with the MEWG, has also developed and implemented a primary EWI into its monitoring programs (proportion of immatures), in addition to numerous other EWIs including a series behavioural response indicators for narwhal. These are summarized in the marine mammal Trigger, Action and Response Plan (TARP) which is integrated in Baffinland’s Marine Monitoring Plan (MMP) (BIMC 2021). This information has and continues to be available to the NIRB and to members of the MEWG. These are also summarized in Baffinland’s 2022 Narwhal Adaptive Management Response Plan (NAMRP) (BIMC 2022a), which was submitted to the NIRB (and MEWG members) as part of its Marine Shipping and Vessel Management Report (BIMC 2022b – see Appendix D).</p> <p>Cumulative effects are considered based on a holistic analysis of results of our monitoring programs and IQ made available to us (see NIRB Registry No. 08MN053 (Baffinland Post-Hearing Question Responses Phase 2 Proposal – Mary River Project) page 7 (BIM response to NIRB-71), Page 12 (BIM Response to QIA-07) and Page 77 (BIM Response to ON-4) for examples)). ON is flagging a “deficiency” to NIRB that does not exist.</p> <p>References</p> <p>BIMC. 2021. Marine Monitoring Plan (MMP). Marine Mammal TARP and Action Toolkits. NIRB File # 334146.</p> <p>BIMC. 2022a. 2022 Narwhal Adaptive Management Response Plan (NAMRP). Document # BAF-PH1-830-P16-0024. Rev1. 19 July 2022.</p> <p>BIMC. 2022b. Marine Shipping and Vessel Management Report to the Nunavut Impact Review Board. 19 July 2022. 301 p.</p>
ON-2	<p>2. Terms and Conditions 99-128: Full application of the precautionary principle to this set of terms and conditions, with particular attention to terms and conditions 109- 112, directed at protection of marine wildlife and habitat. Adaptive management plans and early warning indicators, which remain incomplete, should be created and fully reviewed prior to increasing the rate once again to 6 mtpa.</p>	<p>As above, this response aims to correct the misunderstandings that form the basis for ON’s comment.</p> <p>Adaptive management plans currently in place are detailed and robust. By their very nature AMPs must continue to be updated and develop over time. This does not make the current AMP “incomplete” – it is part of the continuous improvement that must be part of the adaptive management process. The current AMP is clear that scientific uncertainty will not be used as a reason to delay the implementation of cost effective measures (per the precautionary principle as worded in NIRB guidelines and reflected in federal legislation, which is the standard applicable to this Project). The icebreaking mitigations applied in 2021 and 2022 are a clear example of this approach.</p> <p>Since the results of the 2020 marine mammal aerial surveys were received in 2021, Baffinland has used the draft Marine Monitoring Plan (MMP) indicators, thresholds, and responses to guide its subsequent investigation. To be clear, however, low narwhal abundance alone is not a moderate or high risk threshold which requires the implementation of moderate or high risk actions. Nonetheless, Baffinland has implemented moderate and high risk responses, including the suspension of icebreaking to begin the shipping season, reduction in the maximum amount of ore carriers to call on Milne Port, and the development of a convoy system for vessels to use en route to Milne Port. Baffinland’s actions also recognize the value of the Eclipse Sound summer narwhal stock to the residents of Pond Inlet, and that there are a number of anthropogenic and natural factors outside of Baffinland’s control that may continue to affect narwhal abundance in Eclipse Sound in 2022.</p> <p>For additional information on EWIs, see response to QIA-02 and DFO-01.</p>

ID#	Recommendations/Requests	Response
ON-3	<p>3. Term and Condition 179(a) and (b): Based on the process deficiencies and the observed impacts of this project on narwhal and corresponding impacts on Inuit harvesting, we recommend the NIRB return the Mary River project certificate to permit 3.5 mtpa production with the operational contingency to 4.2mtpa, transportation via Milne Tote Road, and shipping via Milne Inlet. This will provide all parties with additional time to (1) provide input on the PIP Renewal project, (2) monitor ongoing impacts of production and shipping, and (3) develop and implement technical amendments that can improve the monitoring program, including early warning indicators.</p> <p>Oceans North has historically supported the responsible development of this resource and recognizes its prominence in the land selection process in the context of the Nunavut Agreement. We continue to believe that the mineral deposits at and adjacent to Nuluujaat have the potential to bring positive transformational change to the region and its inhabitants.</p>	<p>As above, this response aims to correct the misunderstandings that form the basis for ON’s comment.</p> <p>Per our comments in the cover letter on process, Baffinland does not agree that there are process deficiencies. The NUPPAA explicitly provides for the availability of prioritized and expedited processes where appropriate, and Baffinland agrees with the Minister and the NIRB that the current situation calls for this approach. The consequences of the delay ON is suggesting is the same as denying the application for 6 mtpa for 2022. There would not be “additional time to provide input”, as the PIP renewal application would become moot.</p> <p>ON’s comments also ignore the IQ of Pond Inlet Elders which support the view that successful harvesting has taken place in tandem with Project activities to date. The clear connection between wage employment and food security highlighted by the Arctic Co-Op’s submission is also dismissed. See responses to PI-Elders-1 and Co-op-01 below.</p> <p>In recommending the NIRB return the Mary River project certificate to permit 3.5 mtpa production with an operational contingency to 4.2 mtpa, Oceans North is effectively supporting the issuance of mass termination notices to Baffinland’s existing workforce. Baffinland has repeatedly noted that continued production at 4.2 mtpa is not financially viable and would inevitably result in ceasing operations at the Mary River Mine. In light of this reality, Oceans North's recommendation demonstrably ignores the crucial link between a 6 mtpa operational limit and the continued employment of Baffinland's workforce at the Mary River Mine, and shows little regard for the submissions of Inuit workers at Mary River, 59 of which have issued letters of support to the NIRB in this 6 mtpa process via their union.</p> <p>Overall, Oceans North's suggestion that a return to a mtpa limit lower than 6 mtpa will result in additional time for parties to provide input, monitor ongoing impacts, and develop and implement technical amendments is misguided and inaccurate. The mine has been operating at the 6mtpa limit since 2018, this would be the fifth year of operation at this limit and has received support from four Hamlets and three HTOs to date. Instead, a return to a mtpa limit lower than 6 mtpa will result in the inevitable closure of the Mary River Mine and, in turn, a substantial loss to Nunavut's economy and labour force and a devastating impact to the local communities, employees, and their families.</p> <p>The lessons learned during the Phase 2 process will provide valuable input and momentum on topics such as EWI development. Continuing with the project will grant all parties interested in constructive engagement the opportunity to continue developing the monitoring program – if the project goes into immediate care and maintenance, the opportunity to meaningfully advance this work will be lost.</p>

WORLD WILDLIFE FUND-CANADA

ID#	Recommendations/Requests	Response
WWF-1	<p>For example, we cannot find any evidence to indicate that shipping in convoys is an effective noise mitigation strategy. Baffinland has not provided examples from previous projects where this strategy has been implemented successfully. Moreover, will there be other unintended consequences from such an approach? Would travelling in convoys result in more ships idling in Milne Inlet, which is likely to further displace Narwhals?</p> <p>As we have previously noted in our past submissions, many Narwhals have already been pushed out of the region by Baffinland’s shipping operations at current levels (6 Mtpa). Over the past years in the Regional Study Area, Inuit Qaujimajatuqangit has observed significant decreases in Narwhal populations, and recorded detrimental health impacts such as reduced body mass. Changes have also been observed throughout Nunavut. Since Baffinland began shipping 6 Mtpa, research shows that there has been a decline from an estimated 10,500 Narwhal in 2013 to 2500 in 2021. Specifically, there is no research or data to support Baffinland’s proposed use of vessel convoys as an effective sound mitigation measure. WWF-Canada recognizes that convoying will decrease the amount of time ship noise is present, therefore increase the periods where the soundscape is considered more ‘natural’. This may mitigate marine mammal disturbance (e.g., reduce interference with communication and navigation) during these quieter periods, but the intensity of noise will be increased over the period of convoying. Understanding the impact of this increased intensity, mitigation effectiveness and the residual effect requires further assessment by modelling the existing soundscape, levels of traffic and noise exposure in relation to target species, particularly Narwhal. Other convoying concerns include vessel safety and port capacity. All concerns should be carefully assessed with consideration of alternatives, such as use of quieter vessels built to the highest standards. This proposal also has not been assessed in any of the impact assessments to date.</p> <p>Similarly, Baffinland’s commitment to not begin any vessel transits through Milne Inlet until 3/10ths or less ice is present along the entire shipping route needs to be carefully assessed. It is important that NIRB allow for a public process through which the measures suggested in Appendix A of Baffinland’s submission can be reviewed and questioned appropriately.</p>	<p>WWF has not presented any credentials which indicate that the organization has any expertise to offer on the topics canvassed in this comment, and therefore these comments should be given little weight by NIRB. However, we will correct the errors in this comment, in order to ensure accurate information is made available to the public and to NIRB.</p> <p>With respect to the comment regarding convoys, see MHTO-1 response above and ECCC-1 response above.</p> <p>The first documented narwhal “decline” in Eclipse Sound (noting due respect must be given to conflicting IQ on this topic, as described below) was not between 2013 and 2021, but rather between 2004 and 2013 (Richard et al. 2010; Doniol-Valcroze et al. 2015), which was a period before Project shipping or icebreaking first occurred in the Regional Study Area (RSA). Narwhal numbers in the RSA decreased by 50% from 20,225 animals in 2004 to 10,489 animals in 2013. In this occurrence, DFO proposed that natural exchange between the two summering areas was a possible reason for this observed decline in 2013 (implying that the “missing” animals in Eclipse Sound in 2013 may have been present in Admiralty Inlet at the time of the Eclipse Sound aerial survey).</p> <p>Inuit Qaujimajatuqangit (IQ) placed on the Phase 2 NIRB registry as well as more recently in great detail at the Nunavut Wildlife Management Board in March 2022 (see https://www.nwmb.com/en/public-hearings-a-meetings/meetings/regular-meetings/2022/rm-001-2022-march-9-2022/english-19) also provide strong support for the view that narwhal move freely between both Eclipse Sound and Admiralty Inlet and that narwhal occurring in both areas during summer belong to the same stock. For these reasons, Baffinland started surveying both the Eclipse Sound and Admiralty Inlet stocks in 2019 to assess changes in the combined Eclipse Sound and Admiralty Inlet narwhal abundance. The combined narwhal abundance in Eclipse Sound and Admiralty Inlet was shown to be similar in 2020 to that observed in previous survey years (2013 and 2019); and was statistically higher in 2021 than in previous survey years (2013, 2019 and 2020). To date we have not identified a decrease in the combined stocks and what has been observed from 2013 to 2021 could be the continuation of a shift that began between 2004 and 2013.</p> <p>The precautionary and temporary adaptive management measure applied in 2021 eliminated the possibility of acoustic disturbance to narwhal from icebreaking during the timing of narwhal migration into Eclipse Sound in 2021. However, narwhal numbers in the RSA were not shown to increase in 2021 despite the suspension of icebreaking in that year. Narwhal disturbance from icebreaking was therefore not considered to be an influencing factor on the observed decline in narwhal abundance in Eclipse Sound during the 2021 season. It also provides additional confidence that the observed decline in 2020 was likely not a result of early shoulder season icebreaking in 2020.</p> <p>Open-water shipping was not identified as a likely contributing factor to the observed decline in 2021 for several reasons. Firstly, open-water shipping levels were slightly lower in 2020 and 2021 compared to 2019. In 2019, narwhal numbers in the RSA were shown to be stable relative to baseline (2013) and previous survey years when shipping was occurring (2016). Therefore, it is considered unlikely that open-water shipping in 2020 and 2021 would suddenly trigger a high severity response in narwhal (such as a large-scale displacement from the RSA) when shipping levels were in fact slightly reduced that year. Additionally, during the 2021 surveys which ran consecutively for six weeks from 18 July to 26 August, no evidence of displacement was observed, that is to say that narwhal numbers were low throughout the six-week period.</p> <p>Secondly, the type of behavioural responses observed in narwhal to date from open-water shipping suggests that this is not the cause of the observed decrease in 2020 and 2021. Behavioural responses to shipping have been limited to temporary and localized disturbance effects at close range to vessels (up to 5 km distance). These effects, when present, last for a short duration with animals quickly returning to their pre-response behaviour following exposure. These are considered to be low to moderate severity responses that are not thought to result in any significant biological consequences on reproduction or survival, and hence on the stock or population. In comparison, narwhal responses to killer whales in the RSA consist of rapid dispersal to shallow water nearshore areas, freeze behaviour and suspension of vocal activity, with effects persisting for periods well beyond the exposure event. This would be considered a high severity response with potentially significant biological consequence. To date, no similar anti-predator response has been demonstrated by narwhal to shipping as part of Baffinland’s monitoring programs.</p>

ID#	Recommendations/Requests	Response
		<p>Despite the high degree of uncertainty linking Baffinland shipping to the Eclipse Sound survey results observed in 2020 and 2021, Baffinland implemented the precautionary principle in developing a new adaptive management measure and did not carry out spring icebreaking in 2021 and 2022. This is an example of our conservative and collaborative approach to these matters.</p> <p>References</p> <p>Austin, M and T. Dofher. 2020. Technical Memorandum - Vessel Source Level Estimates for the 2018 and 2019 Shipping Seasons: Baffinland Mary River Project. Document 02235, Version 2.0. Technical Memorandum by JASCO Applied Sciences for Golder Associates Ltd.</p> <p>Austin, M.E. and T. Dofher. 2021. Underwater Acoustic Monitoring: Baffinland Iron Mines Shoulder Season Shipping 2019–2020. Document 02330, Version 1.0. Technical report by JASCO Applied Sciences for Golder Associates, Ltd.</p> <p>Doniol-Valcroze, T, Gosselin, J.F., Pike, D., Lawson, J., Asselin, N., Hedges, K., and S. Ferguson. 2015. Abundance estimates of narwhal stocks in the Canadian High Arctic in 2013. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/060. v + 36 p.</p> <p>Richard, P., J.L. Laake, R.C. Hobbs, M.P. Heide-Jørgensen, N.C. Asselin and H. Cleator. 2010. Baffin Bay narwhal population distribution and numbers: Aerial surveys in the Canadian High Arctic, 2002-04. Arctic. 63: 85-99.</p> <p>JASCO Applied Sciences (JASCO). 2022. Vessel convoys as a means of noise mitigation. Technical Memorandum. 13 June 2022. Prepared by Melanie Austin. 7 p. Memo</p>
WWF-2	<p>Finally, one of the ongoing issues for communities, which has been repeatedly expressed at public hearings, is the issue of iron dust at the mine site, along the Tote Road and at the loading dock. Baffinland has stated in its submission that there will be a “potential increase of Project- generated dust deposition” with a renewal of the production increase application. The company has proposed a series of mitigation measures in Appendix A of their PIP Renewal submission including the application of a specialized crusting agent (DusTreat) to the ore stockpile.</p> <p>While WWF-Canada supports measures to mitigate the problem of iron ore dust, they must be proven effective and not have any unintended deleterious consequences. For instance, communities need to know about the effectiveness of DusTreat and the safety of its use for humans and wildlife. Again, we are requesting a public process be undertaken to assess the research and data supporting the proposed mitigation options properly and thoroughly. This should include an independent assessment of whether dust management and mitigation measures are functioning as intended and sedimentation impacts on surface water are being reduced.</p>	<p>WWF has not presented any credentials which indicate that the organization has any expertise to offer on dust or dust mitigations. Further, it does not appear the WWF is familiar with the extensive reporting by Baffinland to date with respect to dust management as DustTreat has been applied to the Milne Port stockpiles since November 2020.</p> <p>Further, DustTreat is an approved substance by the Government of Nunavut. In order to use a dust suppressant in the territory, the manufacturer must demonstrate that it meets all requirements outlined in the Government of Nunavut’s Environmental Guideline for Dust Suppression which includes a provision that the suppressant be non-acutely toxic.</p> <p>Please also see response to NTI-1 for additional information on how Baffinland has reported on the effectiveness and success of use DustTreat to date.</p>
WWF-3	<p>The previously assessed project used 120 dB as the threshold for Narwhal disturbance, yet Baffinland’s own monitoring program has shown that the disturbance threshold is actually much lower. The experience, knowledge and data accumulated over the course of the past two production years at 6 Mtpa should be integrated into the review and assessment process, as per the Minister’s recommendation from September 30, 2018. This proposal needs to be assessed with the best current information available to determine the impact on cetaceans, cumulative impacts over time, and the mitigation required.</p>	<p>WWF’s statement regarding thresholds is unsubstantiated and incorrect. Again, it is not clear what expertise WWF possesses as an organization on the expert topic of marine mammal disturbance thresholds. Baffinland’s monitoring programs have not shown that marine mammals respond to sound levels lower than 120 dB. Baffinland’s data indicate that narwhal react to vessels at distances between 1 and 5 km. The onset of the behavioural responses tends to occur within 1-2 km of vessels and the behavioural responses continue until the vessel reaches at most 5 km past the narwhal. Underwater sound levels from ore carriers at these distances are typically at or above 120 dB.</p>

APPENDIX 1

MHTO ATTACHMENTS

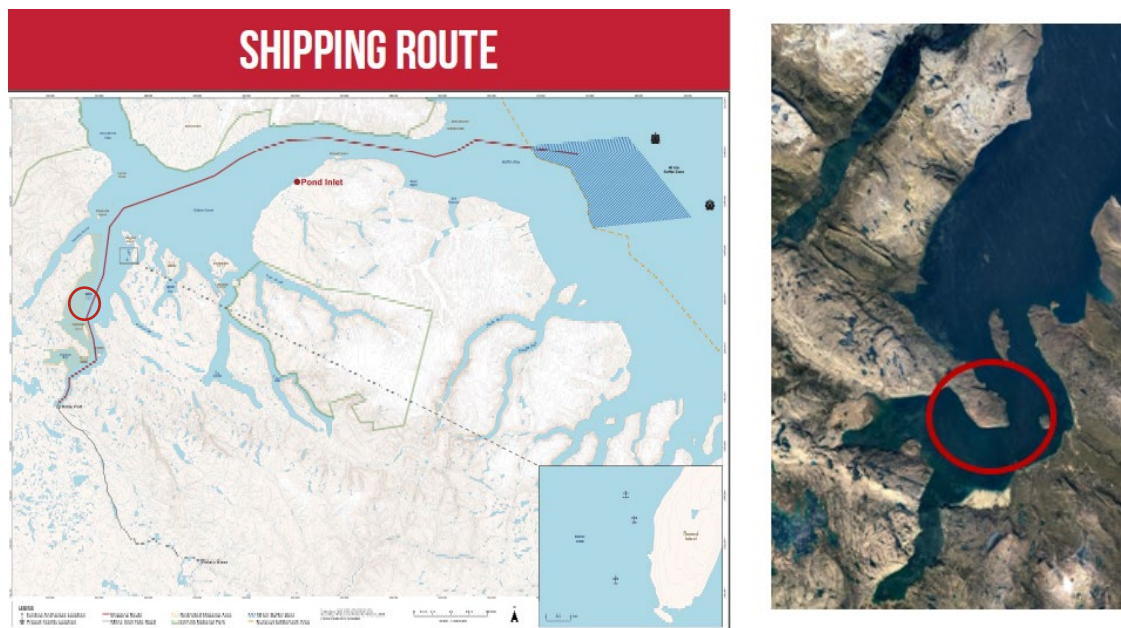
MHTO-01 ATTACHMENT 1: MARINE MAMMALS 2022

MHTO-01 ATTACHMENT 1: 2022 MARINE MAMMAL MONITORING PROGRAM DAILY OBSERVATIONS – PRELIMINARY DATA


Baffinland has been running the Bruce Head Shore-based Monitoring Program (Figure 1) since 2014, following a pilot project in 2013; 2022 represents the 8th year of monitoring from Bruce Head. This program was designed to evaluate potential disturbance of marine mammals from shipping activities along the Project's Northern Shipping Route in Milne Inlet. Our field team, composed of Inuit researchers and WSP Golder marine mammal biologists, has recorded various species of marine mammals in the study area in 2022 (with observations from Bruce Head commencing on July 29) including narwhal, beluga, bowhead, ringed seal, bearded seal and walrus. Other observations were made of beluga within Assumption Harbour on July 27, 2022 by Baffinland staff.

This year we have seen high counts of narwhal relative to previous survey years (see figures throughout daily updates). On August 14, the field team witnessed multiple herding events with up to over 3,200 narwhal sightings observed in a single day in the Stratified Study Area (SSA).

Figure 1. Location of Bruce Head Shore-based Monitoring Program in Milne Inlet including shipping route.



2022 Marine Mammal Monitoring Program Daily Observations

27 July 2022	<p>Highlights: Before Start of Shipping</p> <ul style="list-style-type: none"> Over 200 beluga observed in Assumption Harbour in proximity to Milne Port infrastructure and near mouth of Phillips Creek. <p>Photo 1: Over 200 belugas observed in Assumption Harbour, July 27, 2022.</p> 
28 July 2022	<p>Highlights: Before Start of Shipping</p> <ul style="list-style-type: none"> No vessels Beluga still at Phillips Creek mouth – no beluga or narwhal observed elsewhere in Assumption Harbour or Koluktoo Bay.
29 July 2022	<p>Highlights: Before Start of Shipping</p> <ul style="list-style-type: none"> No vessels ~120 beluga were observed passing by Bruce Head heading north (over 200 beluga noted on July 27, 2022 in Assumption Harbour, in proximity to Milne Port infrastructure near Phillips Creek. Southbound narwhal herding event past Bruce Head (59 narwhal recorded)
30 July 2022	<p>Highlights: Day 1 of Shipping</p> <ul style="list-style-type: none"> Incoming convoy transit of 3 ore carriers and 2 tugs entered the Regional Study Area from Baffin Bay. Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design): <ul style="list-style-type: none"> Behavioural Study Area (BSA) = 6 Stratified Study Area (SSA) = 0

2022 Marine Mammal Monitoring Program Daily Observations

31 July 2022

Highlights: Day 2 of Shipping

- First incoming convoy passing through Milne Inlet past Bruce Head
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 0
 - Stratified Study Area (SSA) = 0

Photo 1. Convoy of 3 ore carriers and 2 tugs transiting south towards Milne Port, 31 July 2022



Photo 2. Ore carrier transiting south towards Milne Port, 31 July 2022



Photo 3. Close-up of ore carrier Nordic Qinngua, 31 July 2022



2022 Marine Mammal Monitoring Program Daily Observations

1 Aug 2022

Highlights: Day 3 of Shipping

- High narwhal activity in the Stratified Study Area (SSA)
- 1 southbound-moving fuel tanker and 1 northbound ore carrier
- 18 Focal follows completed (3 with ore carrier present in SSA).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 44
 - Stratified Study Area (SSA) = 740

Photo 1. Narwhal group south of Bruce Head, 1 Aug 2022_21h37




Photo 2. Narwhal mixed ages, 1 Aug 2022_21h51



Photo 3. Narwhal mixed ages , 1 Aug 2022_21h54



2022 Marine Mammal Monitoring Program Daily Observations

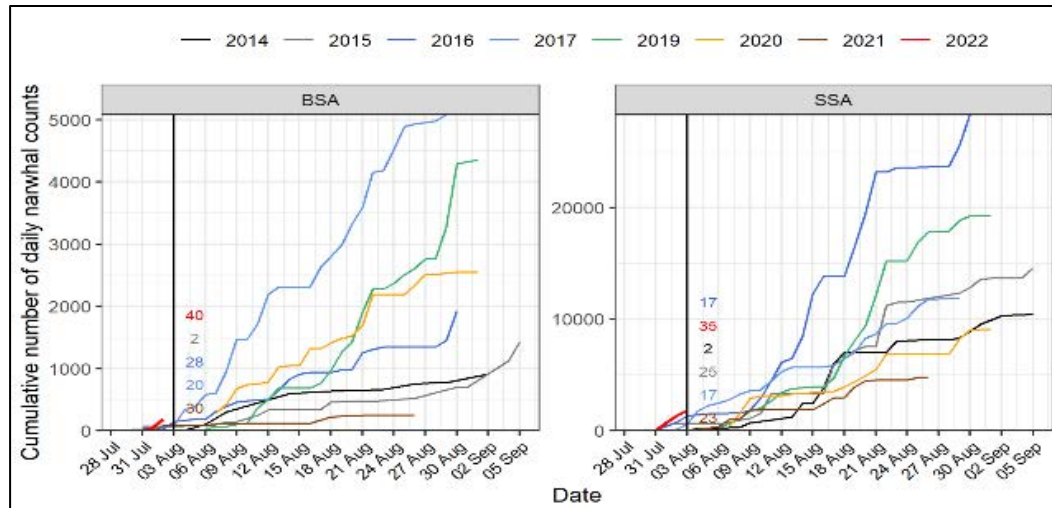
	<p>Photo 4. Juvenile narwhal south of Bruce Head, 1 Aug 2022</p> 
2 Aug 2022	<p>Highlights: Day 4 of Shipping</p> <ul style="list-style-type: none"> • 121 narwhal travelled from Koluktoo north through the Stratified Study Area • No vessel transits • 4 Focal follows completed • Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design): <ul style="list-style-type: none"> ○ Behavioural Study Area (BSA) = 135 ○ Stratified Study Area (SSA) = 610
3 Aug 2022	<p>Highlights: Day 5 of Shipping</p> <ul style="list-style-type: none"> • Large ships – two transits by ore carriers (1 each, north and south) • 5 Focal follows completed (2 with a northbound ore carrier in the SSA). • Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design): <ul style="list-style-type: none"> ○ Behavioural Study Area (BSA) = 44 ○ Stratified Study Area (SSA) = 740

2022 Marine Mammal Monitoring Program Daily Observations

Photo 1. Narwhal group south of Bruce Head, 3 Aug 2022_13h17



Figure 1. Cumulative number of daily narwhal counts



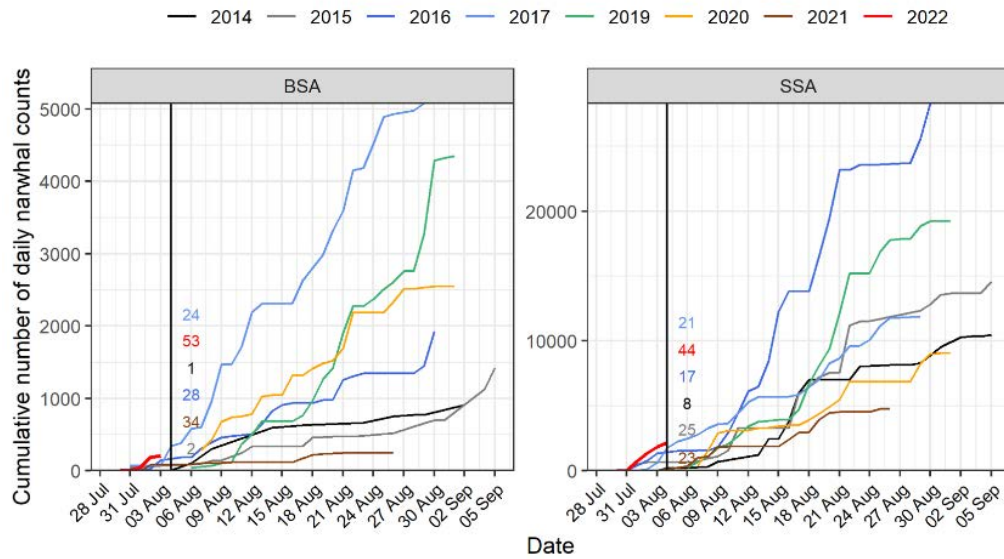
4 Aug 2022

Highlights: Day 6 of shipping

- Large ships – two transits by ore carriers (1 each, north and south)
- 10 Focal follows completed (9 with a southbound ore carrier in the SSA).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 5
 - Stratified Study Area (SSA) = 338

2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts



5 Aug 2022

Highlights: Day 7 of shipping

- Three transits by large ships: north and southbound ore carriers and a northbound fuel tanker.
- 18 Focal follows completed (3 with a northbound ore carrier in the SSA).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 78
 - Stratified Study Area (SSA) = 769

Photo 1. Two male narwhal, 5 Aug 2022_09h03



2022 Marine Mammal Monitoring Program Daily Observations

Photo 2. South of Bruce Head, 5 Aug 2022_ 12h02

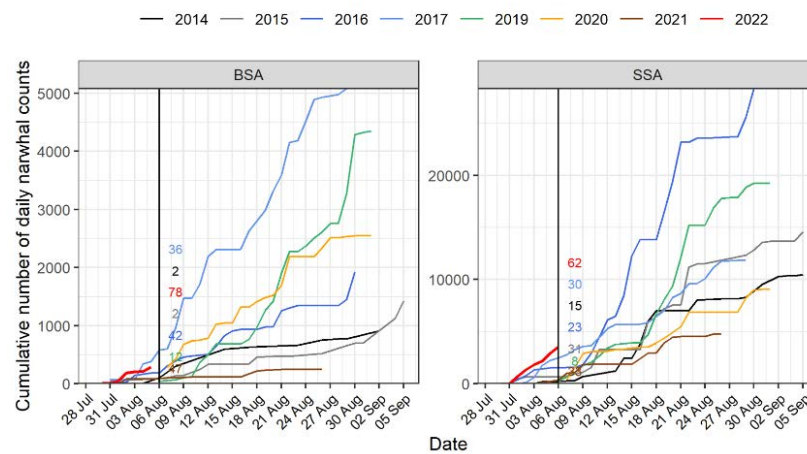


6 Aug 2022

Highlights: Day 8 of shipping

- Two transits by large ships: north and southbound ore carriers.
- Southbound herding event of 161 narwhal through the Behavioural Study Area (BSA)
- 17 Focal follows completed (7 with a southbound ore carrier in the SSA).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 318
 - Stratified Study Area (SSA) = 616

Figure 1. Cumulative number of daily narwhal counts



7 Aug 2022

Highlights: Day 9 of Shipping

- Two transits by large ships: north and southbound ore carriers.
- 8 Focal follows completed (all during ore carrier transits in the SSA).
- One bowhead whale sighted in the SSA
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 3

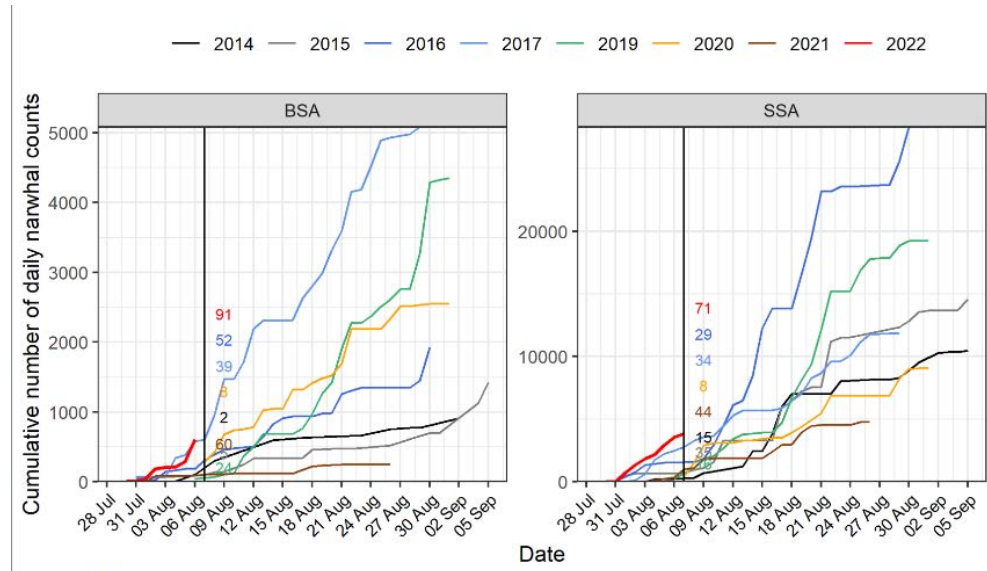
2022 Marine Mammal Monitoring Program Daily Observations

- Stratified Study Area (SSA) = 284

Photo 1. Bowhead: South of Bruce Head, 7 Aug 2022_12h37



Figure 1. Cumulative number of daily narwhal counts



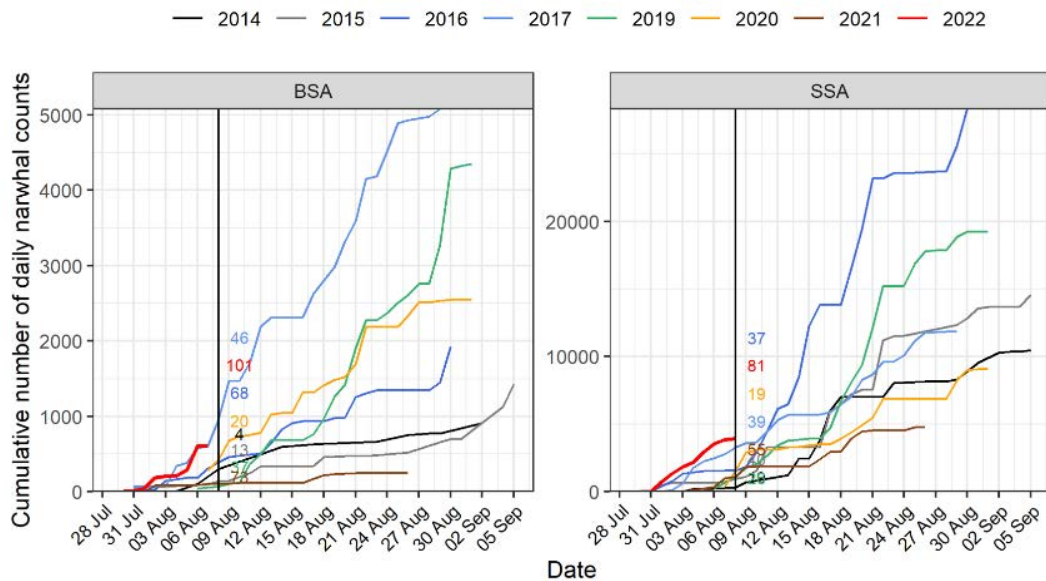
8 Aug 2022

Highlights: Day 10 of Shipping

- Two transits by large ships: north and southbound ore carriers.
- 6 Focal follows completed (all during ore carrier transits in the SSA).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 0
 - Stratified Study Area (SSA) = 74

2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts

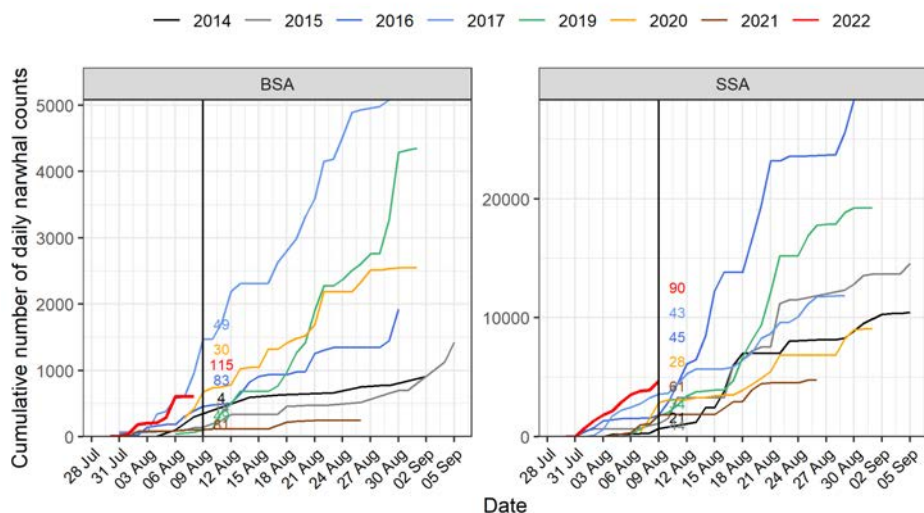


9 Aug 2022

Highlights: Day 11 of Shipping

- Single bowhead and beluga sightings in the SSA in the morning.
- Two transits by large ships: north and southbound ore carriers.
- No narwhal in the BSA during surveys.
- 2 Belugas sighted in BSA during surveys in the evening.
- 10 Focal follows completed (none in presence of ships).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 0
 - Stratified Study Area (SSA) = 793

Figure 1. Cumulative number of daily narwhal counts



2022 Marine Mammal Monitoring Program Daily Observations

10 Aug 2022

Highlights: Day 12 of Shipping

- Sporadic beluga sightings the SSA during the day, single bowhead sighting in evening.
- Activity across SSA during southbound herding event in evening.
- Sporadic beluga sightings the SSA during the day, single bowhead sighting
- Two transits by large ships: north and southbound ore carriers.
- Large south-bound herding event in the evening.
- No narwhal in the BSA from 08:00-19:00. Large south-bound herding event in the evening.
- Belugas and bowhead sighted in BSA during surveys in the evening.
- 7 Focal follows completed (none in presence of ships).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 375
 - Stratified Study Area (SSA) = 320

Photo 1. Beluga north-bound observed from viewing platform, 10 Aug 2022_20h00

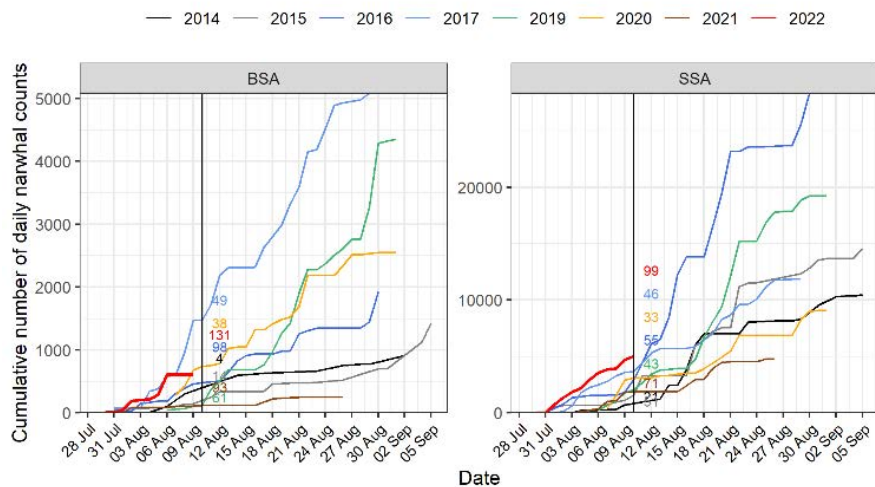


Photo 2. Bowhead south-bound observed from viewing platform, 10 Aug 2022, ~21:00:



2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts



11 Aug 2022

Highlights: Day 13 of Shipping

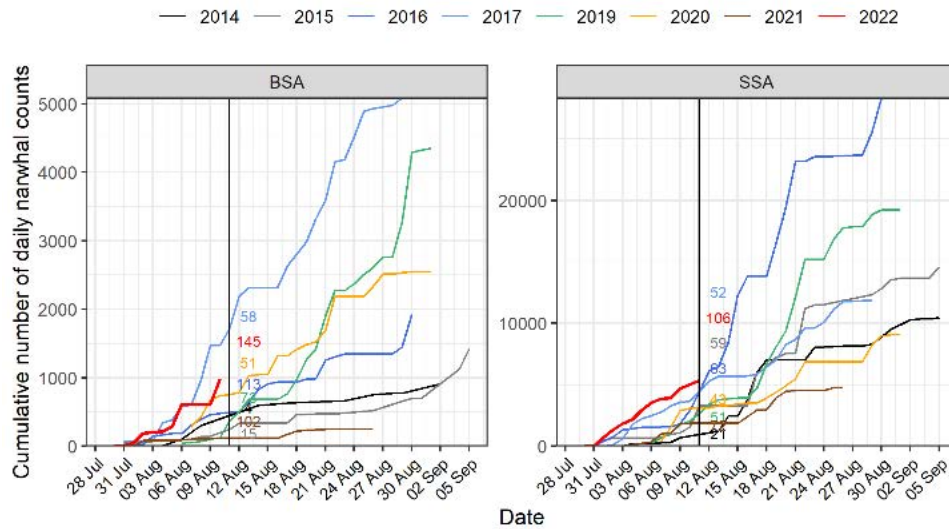
- Two transits by large ships: north and southbound ore carriers.
- Southbound herding event through the BSA from 09:00-10:00. Sporadic narwhal sightings in the BSA between 14:00 and 18:00
- 9 Focal follows completed (6 in presence of ships).
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 194
 - Stratified Study Area (SSA) = 315

Photo 1. Three males tussling in presence of calf, 11 Aug 2022_10h10



2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts



12 Aug 2022

Highlights: Day 14 of Shipping

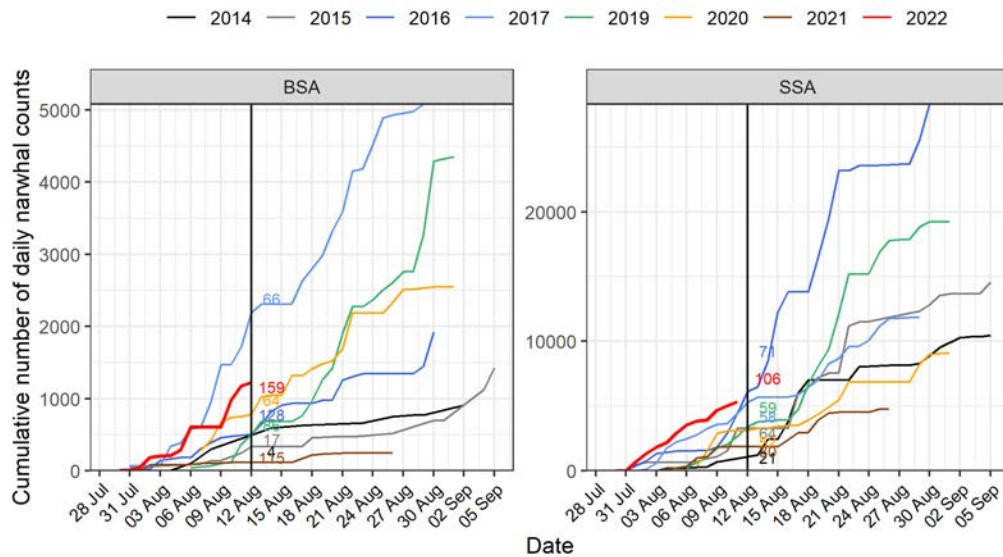
- Walrus observed in BSA around 20h30.
- No Relative Abundance and Distribution (RAD) surveys or focal follows conducted due to weather
- Two ship transits (1 northbound, 1 southbound) during the day, but not during surveys.
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 47
 - Stratified Study Area (SSA) = no data; weather

Photo 1. Walrus observed off Bruce Head point, 12 Aug 2022, ~20:30



2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts

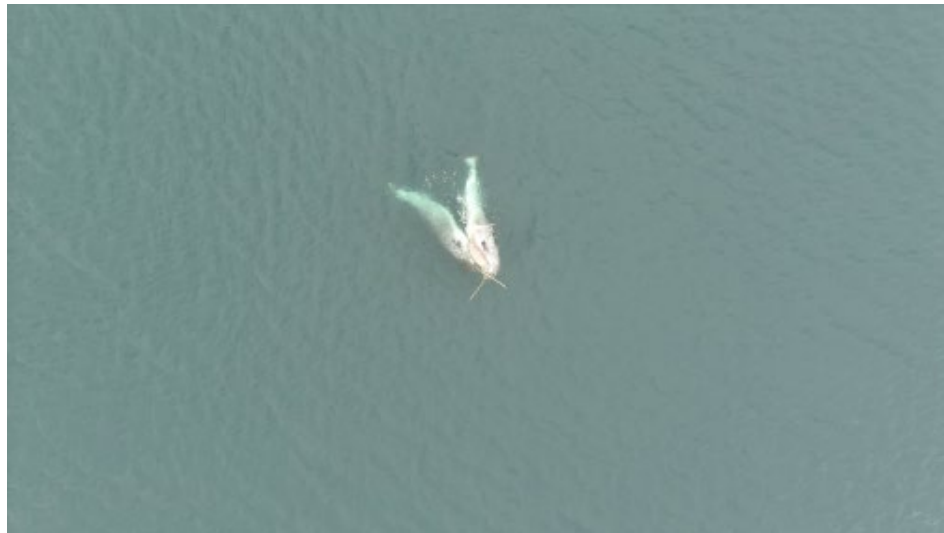


13 Aug 2022

Highlights: Day 15 of Shipping

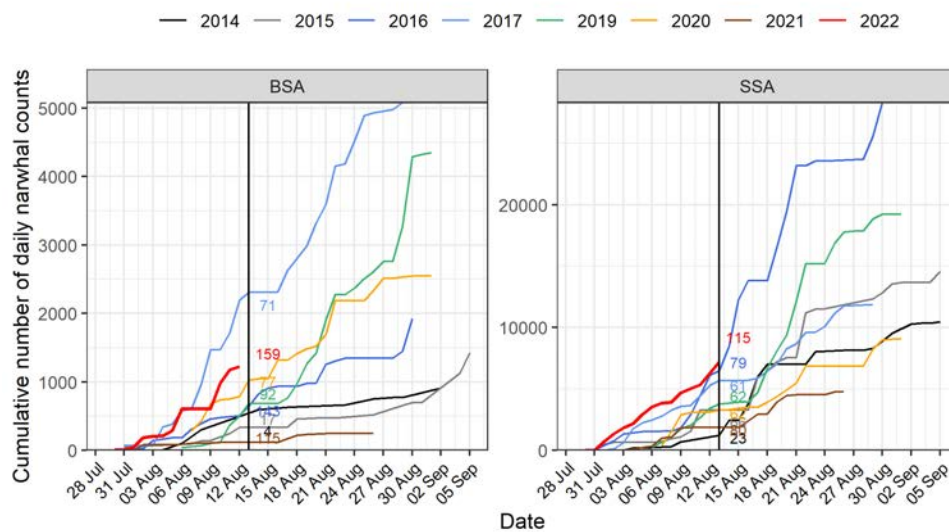
- High narwhal activity in the inlet between 06:00 and 22:00: the field team witnessed a herding event with over 1,800 narwhal counted in a single day!
- Four transits by large ships: north and southbound ore carriers; and Botnica traveling to and from port.
- Conducted 15 focal follows over 7 flights. 9 follows were in the presence of shipping.
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 982
 - Stratified Study Area (SSA) = 1,871

Photo 1. 2 adult males and calf, 13 Aug 2022, ~16h00



2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts



14 Aug 2022

Highlights: Day 16 of Shipping

- High narwhal activity throughout the day: the field team witnessed a herding event with over 3,200 narwhal counted in a single day!
- Southbound herding event observed around noon. Smaller southbound herding event around 16:30.
- Two transits by large ships: north and southbound ore carriers.
- Conducted 12 focal follows over 8 flights. 7 follows were in the presence of ships
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 643
 - Stratified Study Area (SSA) = 3,227

Photo 1. Group of 21 narwhals, mixed age and sex, 14 Aug 2022_~15h30:

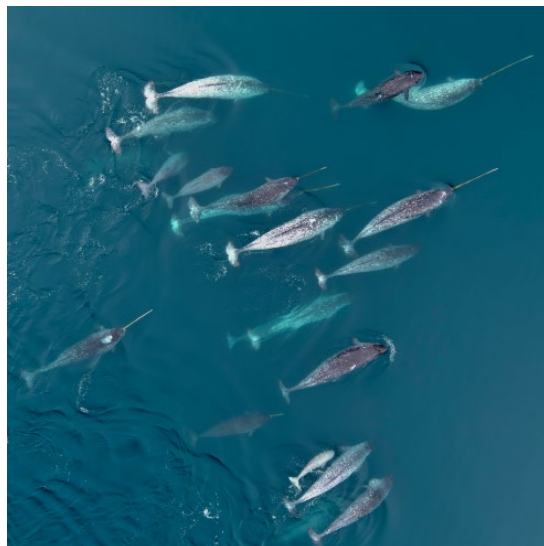
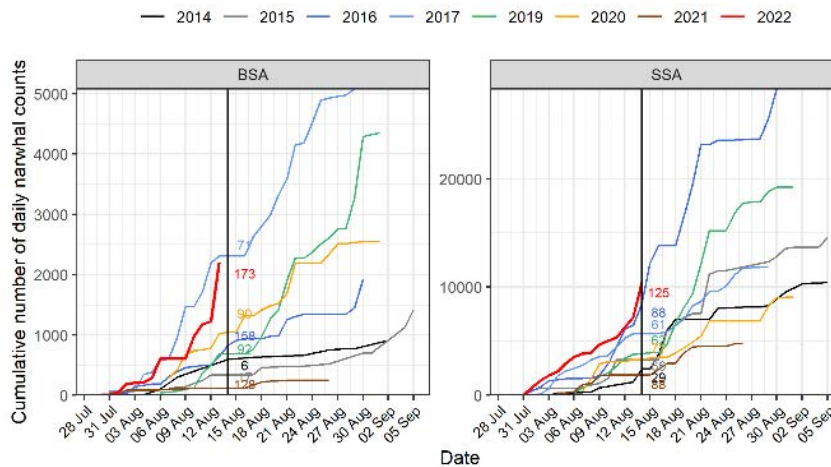


Photo 1. Group of male narwhals (2 adults & 3 juveniles), 14 Aug 2022, ~10h00



Figure 1. Cumulative number of daily narwhal counts



Marine Mammal Aerial Survey

- Entire grid flown for Admiralty Inlet.
- Narwhals were dispersed from shore to shore in the southern portion of the north strata. In the southern strata narwhals were concentrated along the western shore.
- Five polar bears sightings were observed in the north strata and one in the southern strata. Multiple bowhead sightings seen throughout Admiralty Inlet.
- Approximately 30 beluga were observed in close

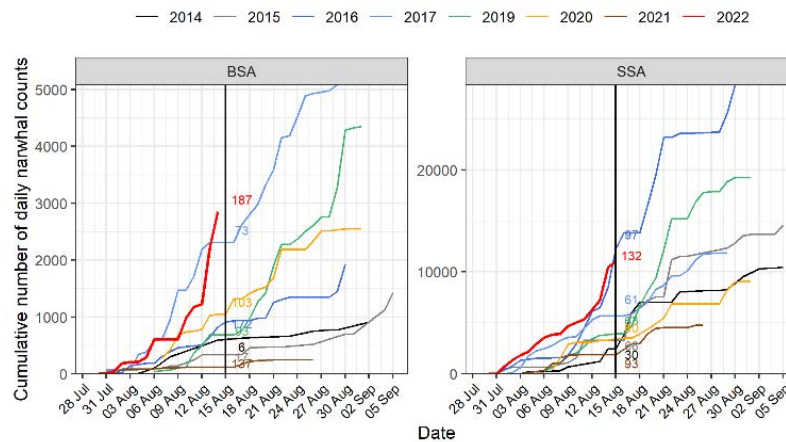
2022 Marine Mammal Monitoring Program Daily Observations

15 Aug 2022

Highlights: Day 17 of Shipping

- Sporadic narwhal activity throughout the morning. Little to no narwhal activity in the afternoon and evening.
- Two transits by large ships: north and southbound ore carriers.
- Conducted 2 focal follows over 2 flights. Both in the presence of ships.
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 109
 - Stratified Study Area (SSA) = 552

Figure 1. Cumulative number of daily narwhal counts



16 Aug 2022

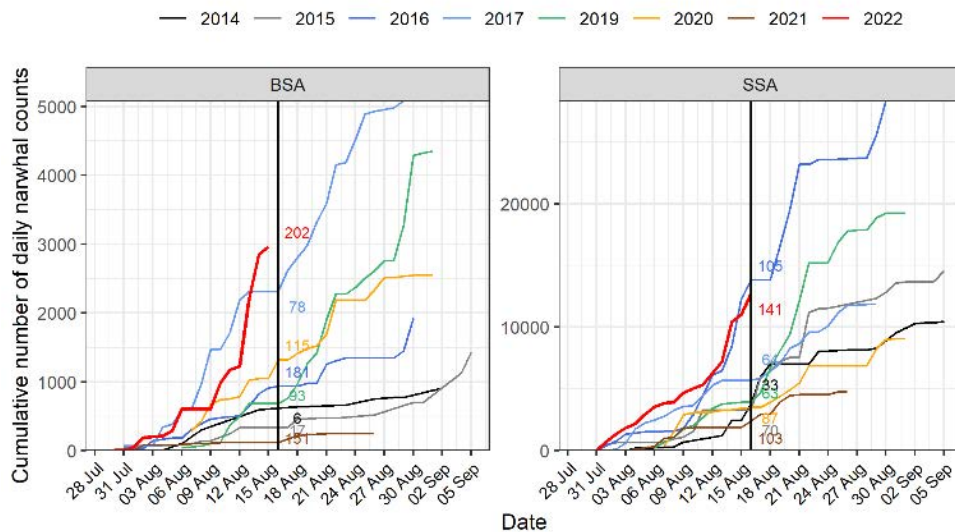
Highlights: Day 18 of Shipping

- Little to no narwhal activity in the morning. Lots of narwhal activity in the afternoon and evening, including a ~ 2h herding event that involved over 1,000 narwhals observed.
- Three transits by large ships: north and southbound ore carriers; and one northbound cargo vessel.
- Eight follows were conducted, none of which were in the presence of shipping as vessels passed in the morning when no narwhal were present.
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 1,180
 - Stratified Study Area (SSA) = 1,719

Photo 1. Group of male narwhal, 16 Aug 2022, ~14h30



Figure 1. Cumulative number of daily narwhal counts



Marine Mammal Aerial Survey:

- Polar bear sightings in Navy Board
- Three bowhead in Tremblay Sound and 3 near Tremblay Sound.
- Four flights flown and entire survey grid colored.
- Narwhals were concentrated in the three photographic areas; in Tremblay they were in the middle third (approx. 400 counted); in Milne Inlet North they were in the southern portion of Koluktoo Bay to the northern end of Assumption Harbour (approx. 500 counted); and in Milne Inlet North they were in the southern portion east of Stevens Island (approx. 600 counted). Four narwhal sighted in Tay Sound. Three bowhead sightings seen in Milne Inlet South. Three polar bear sightings in Navy Board Inlet. One beluga sighted in Navy Board Inlet.

2022 Marine Mammal Monitoring Program Daily Observations

17 Aug 2022

Highlights: Day 19 of Shipping

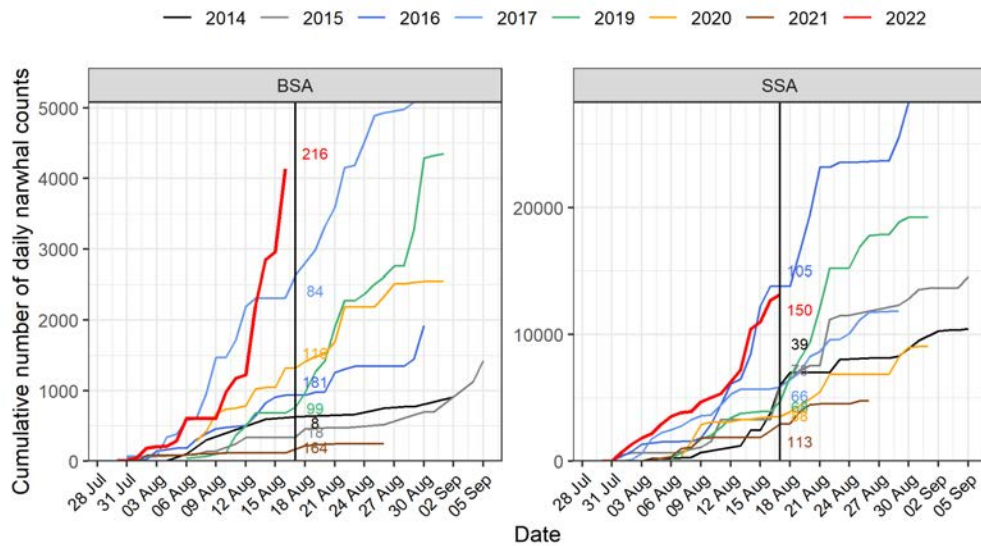
- Sporadic narwhal activity throughout day. One herding event during the 21:00 survey.
- One southbound ore carrier in morning.
- Two focal follows were conducted. One flight in the presence of shipping but was cut short due to the aerial team surveying.
- Bowhead spotted in SSA travelling south around noon.
- Daily Max Narwhal Counts (may include potential resightings of the same individuals based on survey design):
 - Behavioural Study Area (BSA) = 0
 - Stratified Study Area (SSA) = 478

Photo 1. Group of adult narwhals, mixed male and female, 17 Aug 2022, ~15:00



2022 Marine Mammal Monitoring Program Daily Observations

Figure 1. Cumulative number of daily narwhal counts



Marine Mammal Aerial Survey:

- Four flights flown today in Eclipse Sound Grid with two aircrafts. Entire survey grid was completed. Dedicated photographic surveys were flown in Milne Inlet South, Milne Inlet North and Tremblay Sound.
- Narwhals were concentrated in the three photographic areas:
- Tremblay Sound they were in the middle third (approx. 400 counted); i
- Milne Inlet North they were in the southern portion of Koluktoo Bay to the northern end of Assumption Harbour (approx. 500 counted); and
- Milne Inlet North they were in the southern portion east of Stevens Island (approx. 600 counted).
- Four narwhal sighted in Tay Sound. Three bowhead sightings seen in Milne Inlet South.
- Three polar bear sightings in Navy Board Inlet.
- One beluga sighted in Navy Board Inlet.

*MHTO-01 ATTACHMENT 2:
REPRESENTATIVE SATELLITE IMAGERY AND
PHOTOS SHOWING ICE CONCENTRATIONS AT
3/10THS OR LESS*

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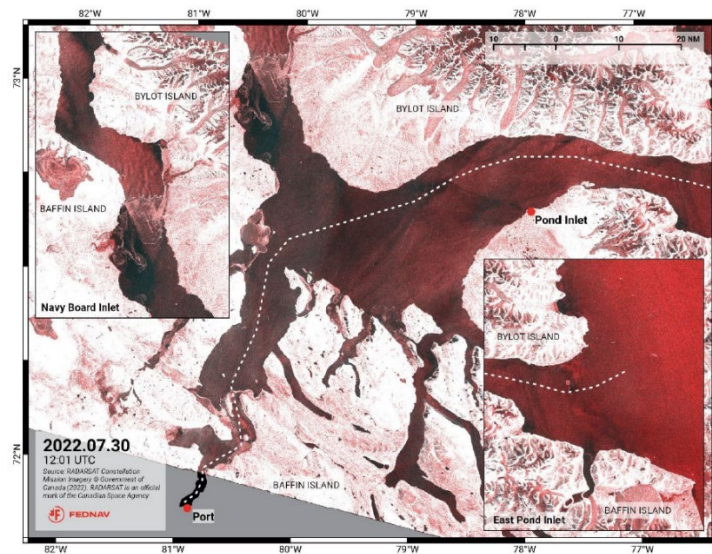
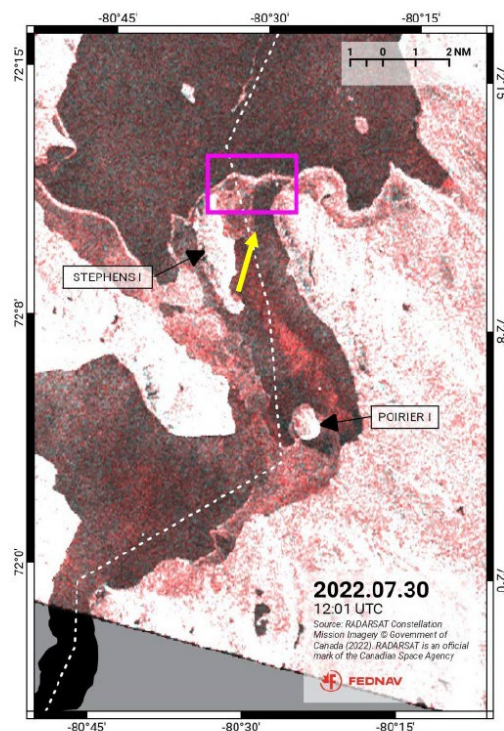


Figure 1: Satellite image with recommended route overlaid. Source: CSA

Figure 1. Satellite imagery from July 30, 2022



Closeup of satellite image with recommended route overlaid.
Remaining ice along the route is highlighted in pink. Source: CSA

Figure 2. Satellite imagery showing Milne Inlet on July 30, 2022.



Closeup of remaining ice along the route, abeam Stephens Island.
Aerial survey done July 30th 2022, AM. Source: BIM

Photo 1. Aerial image of ice conditions showing an ice strip that is considered to be no more than 3/10ths ice concentrations, July 30, 2022.



Photo 2. Convoy of 3 ore carriers transiting to Milne Port, July 31, 2022 showing open water conditions (3/10ths or less) and an iceberg.



Photo 3. Photo taken from Nordic Siku on first passage to Milne Port, July 31, 2022 showing ice conditions less than 3/10ths ice concentrations. Open water conditions were observed over 99% of shipping route with the exception of two small stripes at 1/10ths ice concentrations. Some icebergs and grovels were along the route.



Photo 4. Photo taken from deck of Nordic Siku on first passage to Milne Port, July 31, 2022 showing less than 3/10ths ice concentrations. Open water conditions were observed over 99% of shipping route with the exception of two small stripes at 1/10ths ice concentrations. Some icebergs and grovels were along the route.

APPENDIX 2

DFO ATTACHMENTS

DFO-01 ATTACHMENT 1:
RADASHEVSKY ET AL. 2022

Research Article

Canals and invasions: a review of the distribution of *Marenzelleria* (Annelida: Spionidae) in Eurasia, with a key to *Marenzelleria* species and insights on their relationships

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Abstract

Recent invasions of the North and Baltic Seas by three *Marenzelleria* species have extensively altered benthic communities in the region. Despite several studies on the morphology and biology of the worms, their morphological identifications are often challenging. Here we summarize and map the available records of *Marenzelleria* from Eurasia, distinguishing those based on morphology versus molecular data. Based upon the genetic similarity ($p = 0.08\%$ for *COI*) between individuals from the Baltic Sea and individuals from the Barents and White Seas we propose, for the first time, a possible route for the invasion of the Baltic Sea by *M. arctica* from the White Sea through the White Sea–Baltic Sea Canal. At the same time, our analysis of the sequences of *COI* fragments showed a significant genetic distance ($p = 4.28–4.29\%$) between individuals identified as *M. arctica* from the Baltic, Barents and White Seas and those from the Kara Sea. This genetic distance, as well as the isolated estuarine habitats of these Arctic worms, and the large geographic distance between the type locality of *M. arctica* in the Beaufort Sea (Alaska) and northern Europe, raise doubts about the conspecificity of North American, North European and Northwest Pacific populations. We report *M. neglecta* for the first time for the British Isles (River Thames). We also review the evidence for the role of the Baltic Sea–Volga Canal and the Volga–Don Canal in facilitating the dispersal of *M. neglecta* to the Caspian Sea and the Sea of Azov, respectively. We further provide new insight on the phylogeny of *Marenzelleria*, an updated diagnosis of the genus and a key for morphological identification of *Marenzelleria* adults greater than 1.2 mm wide.

Key words: Polychaete, *Marenzelleria arctica*, *Marenzelleria neglecta*, *Marenzelleria wireni*, molecular analysis, biological invasion, ballast water

Introduction

Marenzelleria Mesnil, 1896 is a small group of spionid polychaetes that likely evolved in estuaries bordering the Arctic Ocean (Sikorski and Bick 2004; Bick 2005; Blank and Bastrop 2009). Subsequent dispersal, population isolation, and regional adaptation in isolated habitats on the Atlantic coast of North America apparently led to additional speciation in the Northwest

Atlantic Ocean. Two basal species, *M. wireni* Augener, 1913 and *M. arctia* (Chamberlin, 1920), have been considered indigenous in the Arctic region, and three derived species are regarded indigenous in the Northwest Atlantic: *M. viridis* (Verrill, 1873), *M. bastropi* Bick, 2005 and *M. neglecta* Sikorski and Bick, 2004 (Blank and Bastrop 2009; Radashevsky et al. 2021). The age of *Marenzelleria* has not yet been determined, but the high morphological similarity of larvae and adults of different species indicates a relatively recent divergence in this group.

In North European waters (North and Baltic Seas), alien *Marenzelleria* first appeared in the late 1970s–early 1980s (Atkins et al. 1987; Elliott and Kingston 1987; Essink and Kleef 1988, 1993; Bick and Burckhardt 1989). The rapid growth of the populations of these worms in the 1990s–2000s and their impacts on local benthic communities stimulated abundant studies on their distribution, morphology, reproductive biology, physiology, ecology, bioturbation and genetics (reviews by Bastrop et al. 1997; Blank et al. 2008; Blank and Bastrop 2009). Genetic analyses using either allozyme electrophoresis, PCR/sequencing (fragments of the mitochondrial *16S*, *COI* and *Cytb* genes) or combined PCR/RFLP analysis distinguished three species: *M. viridis*, *M. neglecta* and *M. arctia* (Bastrop et al. 1995, 1997; Röhner et al. 1996a, b; Bastrop and Blank 2006; Blank et al. 2008; Blank and Bastrop 2009). *Marenzelleria viridis* and *M. neglecta* are considered to have been introduced into European waters from the Atlantic coast of the United States. *Marenzelleria arctia* is only known in Northern Europe from the Baltic Sea, where its precise origin remains unclear.

The phylogenetic relationships of *Marenzelleria* species have been explored by the analyses of mitochondrial DNA by Blank and Bastrop (2009), Syomin et al. (2017), and Radashevsky et al. (2021). Worldwide records of *M. viridis* and records of *Marenzelleria* spp. from North America were recently summarized and mapped by Radashevsky et al. (2021). The purpose of the present study was to further explore the phylogeny of *Marenzelleria* based on an analysis of a larger set of data, including nuclear genes. We also review earlier reports, provide new records of *Marenzelleria* spp. (except *M. viridis*) from Eurasia, and, using molecular data, verify conspecificity of disjunct populations of *M. arctia*. In so doing, we update and refine our knowledge of the distribution of *Marenzelleria* species. Our additional purpose was also to hypothesize a possible route along which *M. arctia* could have been transported from the Arctic into the Baltic Sea, and to review the role of canals in facilitating the dispersal of *Marenzelleria* worms in Eurasia.

Materials and methods

Material

Collections were made in the intertidal in the Kandalaksha Gulf (White Sea, Russia). Sediments collected for this study were washed in the field on

a 500- μ m mesh sieve, and *Marenzelleria* worms retained in the residue were removed and examined alive under light microscopes in the laboratory. For molecular analysis, worm fragments were preserved in 95% ethanol. After morphological examination, worms were fixed in 10% formalin solution, rinsed in fresh water, transferred to 70% ethanol, and then deposited in the polychaete collections of the Museum of the A.V. Zhirmunsky National Scientific Center of Marine Biology (MIMB), Vladivostok, Russia, and the White Sea Branch of the Zoological Museum of the Lomonosov Moscow State University (ZMMU_WS), the White Sea Biological Station, Poyakonda, Russia.

We also examined museum samples of *Marenzelleria* spp. collected by recent expeditions of the Russian Academy of Sciences to the Arctic and Northwest Pacific. Ethanol-fixed specimens of *M. arctia* from the Kara Sea (Russia) were provided by Alexandra N. Stupnikova, and *M. neglecta* from Taganrog Bay (Sea of Azov, Russia) were provided by Vitaly Syomin. To map the distribution of *Marenzelleria* species, we considered reliable records made by earlier authors based on morphological characters, and records by Bastrop and Blank (2006), Blank et al. (2008), Blank and Bastrop (2009), and Syomin et al. (2017) based on genetic data. Complete information on newly collected material, museum samples examined during this study and by other authors, and records by other authors for which no museum deposits were noted, is provided in Supplementary material Tables S1–S3. Records by other authors are annotated in Tables in the *Comments*. A list of the museums and other collections (and their acronyms) holding the examined or reported specimens of *Marenzelleria* spp. is in Table S4.

When no coordinates were provided for sampling sites from other studies, they were estimated using Google Earth Pro according to the original descriptions of the locations. Sampling locations of *Marenzelleria* spp. are plotted on maps using QGIS 3.20.0 software and the geodata provided by the OpenStreetMap Project (<https://osmdata.openstreetmap.de>). Final maps and the plates were prepared using CorelDRAW®2019 software.

DNA extraction, amplification and sequencing

We used the ReliaPrep gDNA Tissue Miniprep System (Promega Corporation, Madison, WI, USA) for DNA extraction and purification with standard protocol for animal tissue. Polymerase chain reaction (PCR) amplification of nuclear *18S rDNA*, D1 region of *28S rDNA* and *Histone 3*, mitochondrial *16S rDNA* and *cytochrome C oxidase subunit 1 (COI)* gene fragments was accomplished with the primers and conditions described by Radashevsky et al. (2014, 2016, 2020). Purified PCR products were sequenced in both directions on an ABI Prism 3500 Genetic Analyzer (Applied Biosystems) using the BrilliantDye Terminator v3.1 Cycle Sequencing Kit (NimaGen) and the same primers as for PCR. Sequence editing and contig

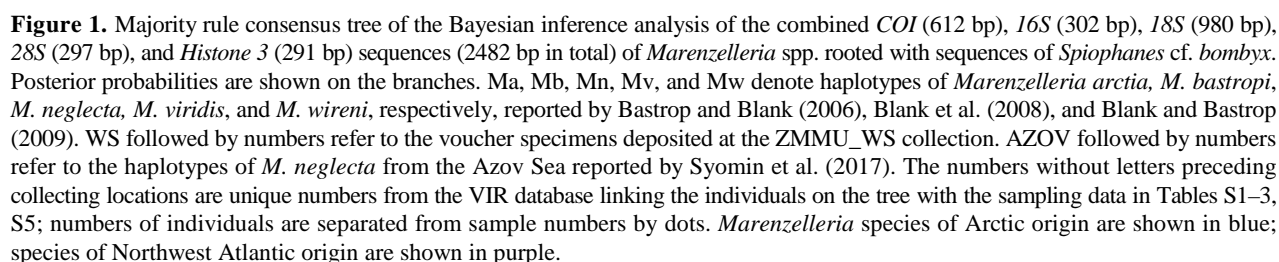
assembly were performed using SeqScape 2.5 (Applied Biosystems). GenBank accession numbers and brief information about sequences used in the present analysis are shown in Table S5. To link sequences with complete corresponding data, unique numbers from the first author's database (VIR) are given to samples in Tables S1–S3 and S5.

Data analysis

We aligned DNA sequences using the ClustalW method implemented in the MEGA 5.1 software (Tamura et al. 2011). Ambiguous positions and gaps were excluded from subsequent analysis using GBlocks (Castresana 2000) with settings for a less stringent selection. Pairwise distances (p , see Nei and Kumar 2000) both within and between groups were calculated in MEGA 5.1 (Tamura et al. 2011). We concatenated DNA data partitions using SequenceMatrix (Vaidya et al. 2011) and specified substitution models for each partition individually. The best-fitting nucleotide substitution models for Bayesian analysis (TVM+G for *COI*, GTR+G for *16S*, SYM+I for *18S*, TVM for *28S*, and HKY+I+G for *Histone 3*) were selected in MrModeltest version 3.7 (Posada and Crandall 1998) using Akaike Information Criterion (AIC).

We used MrBayes 3.2.7 (Huelsenbeck and Ronquist 2001; Ronquist and Huelsenbeck 2003) via the CIPRES web portal (Miller et al. 2010) for the Bayesian analyses of 10,000,000 generations, four parallel chains and sample frequencies set to 500, in two separate runs. Based on the convergence of likelihood scores, 25% of sampled trees were discarded as burn-in.

We performed two Bayesian analyses of sequences of *M. arctia* from the Kara and White Seas, including those obtained by Radashevsky et al. (2014, 2021), and sequences of *M. bastropi*, *M. neglecta*, *M. viridis* and *M. wireni* provided by Bastrop et al. (1998), Bastrop and Blank (2006), Blank et al. (2008), Blank and Bastrop (2009), and Syomin et al. (2017). A general analysis included available sequences of five genes: *COI*, *16S*, *18S*, *28S* and *Histone 3*. This analysis was done to formulate hypotheses about the phylogenetic relationships of *Marenzelleria* species for the first time using concatenated set of both mitochondrial and nuclear genes. The resulting tree was rooted using the sequences of *Spiophanes* cf. *bombyx* (Claparède, 1870) (provided by Radashevsky et al. 2020) according to a preliminary phylogenetic analysis of molecular data for spionid polychaetes, where *Spiophanes* Grube, 1860 appeared basal to *Marenzelleria* clade (Radashevsky et al. *unpubl. data*). We also performed an analysis of mitochondrial *COI* and *16S* genes of *Marenzelleria* species only. This analysis allowed to obtain more accurate p -distance estimates between *Marenzelleria* samples by reducing loss of data during exclusion of ambiguous positions and gaps after aligning *Marenzelleria* sequences with outgroup. It was rooted using sequences of *M. arctia* that in the general analysis appeared most basal among *Marenzelleria*.



The aligned sequences of *Marenzelleria* spp., with gaps excluded, comprised in total 2482 bp, including 612 bp (100% of original aligned sequences) for

COI, 302 bp (93.2%) for *16S* rDNA, 980 bp (96.3%) for *18S* rDNA (5'- and 3'-ends of the fragments; middle parts were excluded), 297 bp (96.4%) for *28S* rDNA, and 291 bp (100%) for *Histone 3*. The Bayesian analysis of the combined dataset resulted in a fully resolved consensus tree (Figure 1). The average *p*-distances for the individual gene fragments between groups of specimens are given in Table S6.

All ten *18S* sequences of *M. arctia* (five from the Kara Sea, three from the White Sea, one from the Baltic Sea, and one from the Barents Sea) were identical. Eight *28S* sequences (five from the Kara Sea and three from the White Sea) also were identical. *Histone 3* sequences of *M. arctia* from the Kara and White Seas differed by three substitutions (average *p* = 1.03%). No variability was found among the *Histone 3* sequences of conspecific individuals from the same location (Table S6).

COI-16S analysis (Figure S1)

The combined aligned sequences of *Marenzelleria* spp., with gaps excluded, comprised in total 934 bp, including 612 bp (100% of original sequences) for *COI*, and 322 bp (99%) for *16S* rDNA. The combined concatenated dataset contained 254 (27.2%) variable sites, 243 (26%) of which were parsimony-informative. The frequency of variable sites in the aligned sequences of *COI* (34.2%) was greater than that for sequences of *16S* (14%).

The Bayesian analysis of the combined dataset of two mitochondrial markers resulted in a fully resolved consensus tree (Figure S1). It revealed two groups among specimens identified by morphology as *M. arctia*. One group included specimens from the Baltic, Barents and White Seas; the other included specimens from the Kara Sea. Three *COI* haplotypes and three *16S* haplotypes were identified in each group, but none of them was common to specimens from both groups. In the first group, specimens from all locations had one common *COI* haplotype and one *16S* haplotype. The maximum ingroup *p*-distances in each group were 0.33% for *COI* and 0.62% for *16S*. The *p*-distances between the two groups ranged from 4.09% to 4.58% (28 variable sites) for *COI* and 0.62% to 1.24% (6 variable sites) for *16S* (Table S7).

Systematic Account

***Marenzelleria* Mesnil, 1896**

Marenzelleria Mesnil, 1896: 120. Augener 1913: 264–267. Fauchald 1977: 24. Maciolek 1984: 48. Sikorski and Buzhinskaya 1998: 1111–1112. Sikorski and Bick 2004: 255. Blank and Bastrop 2009: 311–318. Blake et al. 2020: 50.

Synopsis. Adults up to 140 mm long, 3 mm wide for 250 chaetigers in *M. viridis* (Verrill, 1873). Prostomium anteriorly wide, with entire, concave or weakly incised frontal margin, posteriorly narrowing and extending over first chaetiger as a low caruncle. Occipital antenna absent. Two pairs



Figure 2. Adult morphology of *Marenzelleria arctia* (live individuals from the Trosa Archipelago, Baltic Sea, Sweden). A, anterior end, dorsal view. B, general dorsal view. A – not fixed; B – SIO BIC A5893. Specimens likely about half a millimetre wide each. Photos by Fredrik Pleijel.

of small red eyes usually present. Nuchal organs U-shaped, over 1–5 anterior chaetigers. Each palp with frontal longitudinal ciliated groove only; basal sheath absent. Segment 1 well developed, with capillary chaetae and postchaetal lamellae in both rami. Posterior notopodia with hooded hooks in addition to capillary chaetae. Hooded hooks in neuropodia from chaetigers 10–51 onwards, alternating with thin capillary chaetae; hooks bi- or tridentate with outer hood only and slightly curved shaft. Inferior sabre chaetae in neuropodia usually from chaetiger 4 onwards. Branchiae from chaetiger 1 usually on anterior half of body, or throughout most of body, fused to notopodial postchaetal lamellae at least basally on anterior chaetigers, with surfaces oriented perpendicular to body axis; branchial blood vessels not interconnected by radial capillaries. Dorsal crests and lateral pouches absent. Pygidium with up to ten pairs of cirri. Digestive tract without gizzard-like structure. Main dorsal blood vessel without heart body. Nephridia from chaetiger 4 onwards, serving both excretory and gamete-releasing functions in fertile chaetigers.

Type species. *Marenzelleria wireni* Augener, 1913: 265.

***Marenzelleria arctia* (Chamberlin, 1920)**

(Figures 2, 3)

Scolecopides arctius Chamberlin, 1920: 17–18, pl. III, figs. 5–7, pl. IV, fig. 1.

Marenzelleria arctia: Sikorski and Buzhinskaya 1998: 1115–1118, figs. 2, 3. Radashevsky et al. 2021: 359, figs. 1, 2 (References).

Remarks on the identity of Marenzelleria arctia. *Scolecopides arctius* was first described from a lagoon at Collinson Point (Camden Bay, Beaufort Sea, Alaska, USA) by Chamberlin (1920). The species was largely forgotten until Sikorski and Buzhinskaya (1998) redescribed it based on the type material (paratypes MCZ ANNb-2194, 2195) and transferred it to the genus

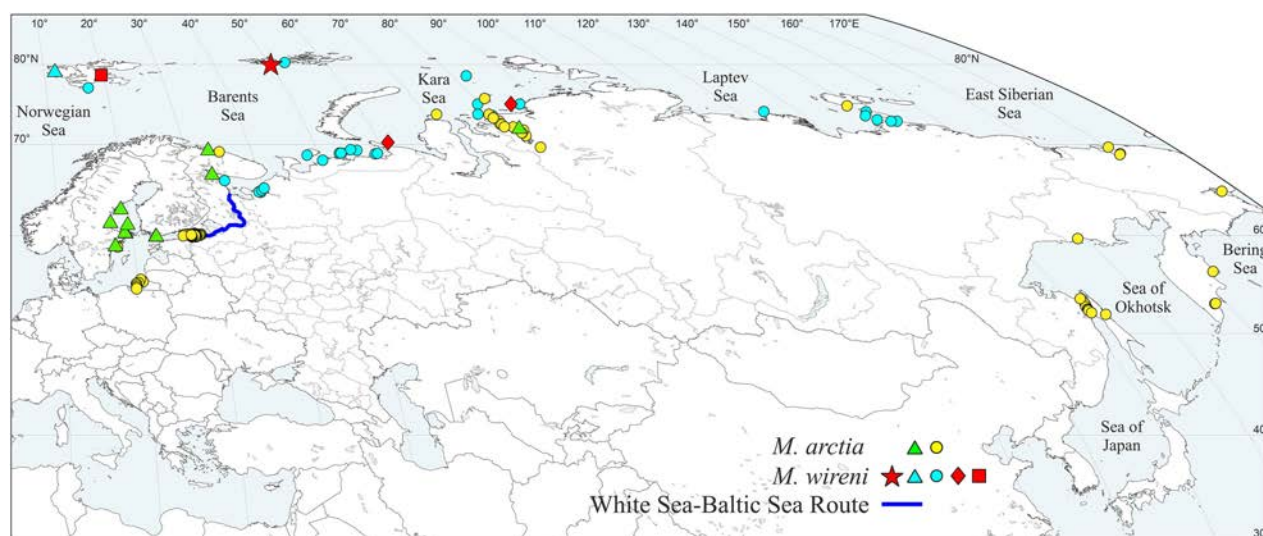


Figure 3. Map showing records of *Marenzelleria arctia* and *M. wirenii* from Eurasia based on morphology (circles, rhombi, square and star) and molecular data (triangles). Sampling locations for specimens described by Wirén (1883) marked with rhombi, by Marenzeller (1892) with square, by Augener (1913) with star. Possible route of *M. arctia* invasion from the White Sea to the Baltic Sea through the White Sea–Baltic Sea Canal marked with a blue line. See Tables S1, S3, S5 for details.

Marenzelleria. Earlier reports of *M. arctia* from the Kandalaksha Gulf by Stolyarov (1994), Burkovsky et al. (1995), and Burkovsky and Stolyarov (1995) were based on the identifications by Andrey V. Sikorski.

It is noteworthy that various aspects of the biology of *M. arctia* have been studied in North European populations, whereas the American population remains unexplored. In the present study, we compared the sequences of gene fragments of individuals from the Baltic, Barents and White Seas and individuals from the Kara Sea, which were all morphologically identified as *M. arctia*. Genetic distances between European and the Kara Sea groups of specimens were significant ($p = 4.28\text{--}4.29\%$) for *COI* fragments (in contrast to the distances between individuals from the same group $p = 0.05\text{--}0.13\%$ for *COI*), while they were 0.84–0.88% for 16S, 0.93% for *Histone 3*, and 0.0% for 18S and 28S (see Table S6). The high genetic distances between the *COI* fragments (which evolve faster), the low distances between the 16S and *Histone 3* fragments, and the sequence identity of 18S and 28S can be interpreted as a result of the isolation of the Kara Sea population and ongoing speciation. At the same time, the high genetic distance between *COI* fragments, isolated estuarine habitats of these Arctic worms, and the large geographic distance between the type locality of *M. arctia* in the Beaufort Sea (Alaska, USA) and Northern Europe raise doubts about the conspecificity of the North American and North European populations. The phylogenetic relationships and the systematic position of these populations require careful further study.

Remarks on Laonice annenkovae Zachs, 1925. Zachs (1925) described *Laonice annenkovae* Zachs, 1925 from the Tuloma River estuary (Kola Bay, Barents Sea, Russia), and Uschakov (1939, 1950, 1953, 1955) reported this species from the White Sea and the Amur Liman (on the border between

the Okhotsk and the Sea of Japan). Sikorski and Buzhinskaya (1998) placed *L. annenkovae* into synonymy with *M. arctia* and for the first time reported this species from the Bering Sea in the Chukchi Peninsula and Kamchatka. Although Sikorski and Buzhinskaya (1998) noted that Uschakov's material was lost, they expanded the distribution of before-only-Arctic *M. arctia* along the Asian Pacific coast southward to the Amur Liman. New specimens of *Marenzelleria* from the Amur Liman and Sakhalinsky Gulf were collected by an Expedition of the Institute of Marine Biology, FEB RAS, in 2005 (MIMB 17905, 36659–36665). The worms from the Amur Liman are similar to those from Baffin Bay, Canada, but differ somewhat in the later start of sabre chaetae in neuropodia from chaetigers 10–12 instead of chaetiger 4. We also identified as *M. arctia* specimens from the Sea of Okhotsk collected in 1955 and 1997 (ZISP 13723 and 10/49457, respectively) that have not been previously reported in the literature. They are similar to *Marenzelleria* from the Amur Liman and Sakhalinsky Gulf. Note worthily, Sikorski and Bick (2004, p. 273) assumed that “In the Far East [Northwest Pacific], *M. arctia* and possibly *M. neglecta* occur.” In the Amur Liman, *Marenzelleria* is an important part of the prey of the Amur sturgeon *Acipenser schrenckii* and the Kaluga sturgeon *Huso dauricus* (Kolobov et al. 2013). The systematic position of *Marenzelleria* from the Northwest Pacific requires further study.

Sikorski and Buzhinskaya (1998) reported that designated a lectotype (ZISP 01/2210) and 23 paralectotypes (ZISP 02/2211 and 03/13765) from a type series of *Laonice annenkovae*. In reality, on the examination by one of us (VIR) on 12 Dec 2019, ZISP 01/2210 contained anterior fragments of 15 large worms. Therefore, one of these specimens, ca. 85-chaetiger anterior fragment, was designated by VIR as the lectotype (ZISP 01/2210) whereas the other 14 specimens were designated as paralectotypes and catalogued as ZISP 02a/50775 (12 specimens) and MIMB 42145 (2 specimens). Sample ZISP 03/13765 was not mentioned by Zachs (1925) in the original description of *L. annenkovae* and therefore cannot be considered as a part of the type series, as erroneously Sikorski and Buzhinskaya (1998) did.

Invasion of the Baltic Sea by M. arctia. In the Baltic Sea, *M. arctia* was first identified by genetic analysis of specimens collected in 2005 in two Swedish locations in the western part of the sea in Söderhamn and the Isle of Askö (Bastrop and Blank 2006: fig. 1). Soon after that, Blank et al. (2008: fig. 1) reported *M. arctia* from nine sites in the northern Baltic Sea (Sweden and Finland) and obtained new sequences of specimens from six sites in the Gulf of Bothnia, Åland Sea, and westernmost part of the Gulf of Finland (Figure 3). In 2009, many mature individuals of *M. arctia* were first found in the eastern part of the Gulf of Finland, after a series of hypoxic-anoxic events that led to the decline of native benthic communities (Maximov 2010, 2011, 2015, 2018). Currently, *M. arctia* dominates in the eastern deepwater (down to the depths of 70–80 m) part of the Baltic Sea

(Maximov et al. 2014, 2015; Golubkov et al. 2021; Kocheshkova and Ezhova 2018). Remarkably, the species has not been reported from the North Sea.

Two *Marenzelleria* specimens were collected from Trosa Archipelago (Baltic Sea, Sweden) and photographed by Fredrick Pleijel in June 2008 (Figure 2D, E). One of these specimens was preserved (SIO BIC A5893), and, although not examined in this study, according to the features shown on the picture (i.e., nuchal organ length, arrangement of branchiae), we refer it to *M. arctia*.

Blank et al. (2008) showed that Baltic *M. arctia* shared haplotypes with specimens from the Tuloma River (Kola Bay, Barents Sea, Russia) and suggested an introduction by ship ballast water from the European Arctic to harbours in the central or northern parts of the Baltic Sea. The exact route of that introduction remained unknown, however, because of most likely delayed record of the first appearance of the species in the Baltic Sea due to difficulties in identification of *Marenzelleria* specimens based on morphological characters, and possible inadequate genetic characteristics of populations within the range of distribution of *M. arctia*.

Here, for the first time, we propose a possible route for the invasion of the Baltic Sea by *M. arctia* from the White Sea through the White Sea–Baltic Sea Canal. The Canal was opened in 1933 and connects the White Sea with Lake Onega, and then with Lake Ladoga, which further connects with the Gulf of Finland (Figure 3). The most likely vector of this invasion is the transportation of larvae with ship ballast. The proposed route seems to contradict the first reports of this species from the western part of the Baltic Sea, but not from the Gulf of Finland. However, this may be due to the delayed record of the first appearance of the species in the area, as well as due to the locations of ballast water discharge by ships from the White Sea and further movement of larvae by local currents and subsequent successful settling of larvae, phenomena about which we have no data at this time.

***Marenzelleria neglecta* Sikorski and Bick, 2004**

(Figure 4)

Marenzelleria neglecta Sikorski and Bick, 2004: 264–268, figs. 2B, 3C, 5A–I, 6. Blank et al. 2008: 134 (molecular key). Blank and Bastrop 2009: 316–318, fig. 1 (phylogeny). Maximov 2015: 301–309. Kocheshkova and Ezhova 2018: 221–223. Kauppi et al. 2017: 195; 2018: 48–55. Syomin et al. 2017: 977–979, figs. 2–5. Wasmund et al. 2018: 78. Boltachova and Lisitskaya 2019: 137, fig. 2b, c. Boltachova et al. 2021: 17–18. Radashevsky et al. 2021: 360–361, figs. 1, 2. *Marenzelleria viridis*: Lyakhin et al. 1997: 431–434. Maximov and Panov 2003: 192. Not Verrill 1873. *Marenzelleria* sp. 1: Syomin et al. 2016: 112–113, fig. 2. *Marenzelleria* sp. 2: Syomin et al. 2016: 113–115, fig. 3. *Marenzelleria* sp. (nectochaeta): Syomin et al. 2016: 115, fig. 4.

Remarks. Bastrop et al. (1995) and Röhner et al. (1996a) examined *Marenzelleria* populations from northern Europe using allozyme electrophoresis and suggested the presence of two different species in the region: one in the North Sea and the other in the Baltic Sea. In an attempt

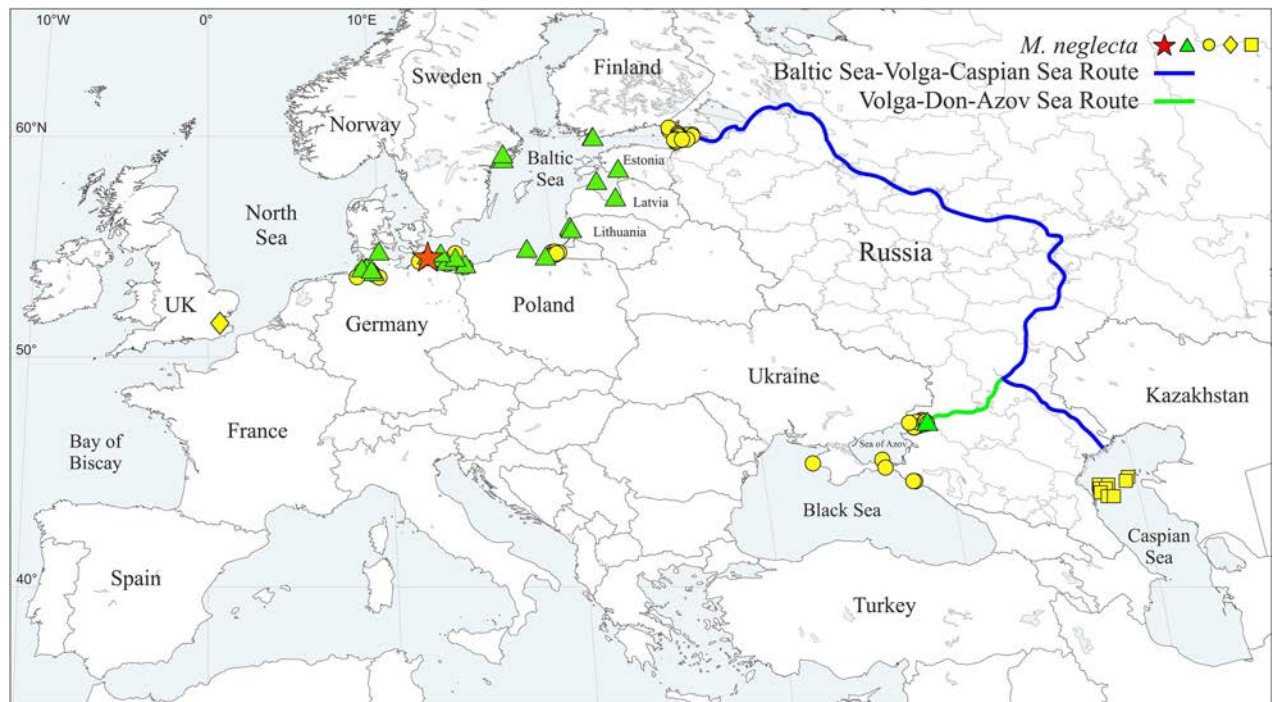


Figure 4. Map showing type locality (red star) and records of *Marenzelleria neglecta* from Eurasia based on morphology (yellow circles, squares and rhomb) and molecular data (green triangles); records from the Caspian Sea by Mikhailova et al. (2021, as *M. arctica*) marked with squares; our new record from the UK (River Thames) marked with a rhomb. Possible route of *Marenzelleria* invasion from the Baltic Sea to the Caspian Sea through the Baltic Sea–Volga Canal and the Volga River marked with a blue line. Possible routes of *Marenzelleria* invasion from the Baltic Sea to the Sea of Azov through the Baltic Sea–Volga Canal, the Volga River, the Volga–Don Canal and the Don River marked with blue and green lines. See Tables S2, S5 for details.

to determine the origin of these worms, Röhner et al. (1996b) compared their allozymes to *Marenzelleria* from the Atlantic coast of North America. Three species were distinguished and referred to as *Marenzelleria* Types I, II and III. The North Sea population was found similar to *Marenzelleria* Type I from the US coastal waters between Barnstable Harbour (Massachusetts) and Cape Henlopen (Delaware). The Baltic Sea population was found similar to *Marenzelleria* Type II from the US coastal waters between Chesapeake Bay (Trippe Bay) and Ogeechee River (Georgia). Therefore, it was suggested that the North and Baltic Seas were colonized by two *Marenzelleria* species from the North American Atlantic coast. Bastrop et al. (1997, 1998) confirmed this assumption when analyzing 16S rDNA fragments from the same populations. Sikorski and Bick (2004) revised the genus *Marenzelleria* and described *Marenzelleria* Type II as a new species *M. neglecta*. Darss-Zingst-Boddendchain (Germany) was chosen at the type locality of the species (Figure 4). Based on new material from Currituck Sound (North Carolina, USA), Bick (2005) described *Marenzelleria* Type III as the new species *M. bastropi*. The distribution of *M. neglecta* and *M. bastropi* in North America was reviewed and mapped by Radashevsky et al. (2021).

In the first half of the 1990s, *M. neglecta* began to spread in the Gulf of Finland in Estonia and Finland (Norkko et al. 1993; Stigzelius et al. 1997; Kotta and Kotta 1998). In 1996, rare *Marenzelleria* (initially identified as

M. viridis) were first discovered in the eastern part of the Gulf in Russia (Lyakhin et al. 1997), but the next year the worms spread over large areas and soon became a common component of both shallow and deepwater benthic communities (Maximov and Panov 2003; Maximov 2011, 2015). Dramatic changes in the zoobenthos of the eastern part of the Gulf of Finland took place in 2009, shortly after the devastating hypoxic-anoxic events in 2003 and 2006. Alien *M. arctia* quickly occupied most of the deepwater zone and became the dominant species in the communities (Maximov 2015). A similar distribution of the two *Marenzelleria* species was found in the southeastern part of the Baltic Sea in 2001–2014: *M. arctia* was mainly found in relatively deep (down to the 70–80 m depth), mesotrophic areas with salinity above 5‰, whereas *M. neglecta* inhabited shallow, eutrophic and hypertrophic, brackish waters of the Vistula and Curonian lagoons (Kocheshkova and Ezhova 2018).

In February–March 2014, the adults and larvae of *Marenzelleria* sp. were first found in the Don River and the Taganrog Bay of the Sea of Azov (Syomin et al. 2016). Their morphological characters varied greatly and corresponded to both *M. neglecta* and *M. arctia*. However, genetic analysis (mainly *COI* sequences, but also *16S*, *28S*, *cytb*, and *Histone 3*) showed that only *M. neglecta* was present in the region (Syomin et al. 2017). Soon after the first find in Taganrog Bay, *M. neglecta* became dominant in the region and also appeared in the centre of the Sea of Azov, in the Strait of Kerch, and on the Caucasian coast of the Black Sea (Taman Peninsula; Syomin et al. 2017). Syomin et al. (2016) suggested that, most likely, the worms could have entered the Don River and Taganrog Bay with the ballast waters of ships coming from the Baltic Sea through the Baltic Sea–Volga Canal, the Volga River, the Volga–Don Canal, and then the Don River (Figure 4). Syomin et al. (2017) warned about the further spread of *M. neglecta* in the Black Sea, as well as about the possible invasion of the Caspian Sea by this species. Indeed, in April 2016, *M. neglecta* was first collected off the western coast of Crimea (Boltachova and Lisitskaya 2019; Boltachova et al. 2021), and in October 2018, *Marenzelleria* was first found in the northern part of the Caspian Sea (Mikhailova et al. 2021). Mikhailova et al. (2021) noted that Caspian worms were similar to *M. arctia*, but since *M. neglecta* was already identified by molecular methods in the neighbouring Sea of Azov, they referred them to as *Marenzelleria* sp., pending reliable identification by molecular analysis. Because Syomin et al. (2016) also identified by morphology some worms from the Don River and Taganrog Bay as *M. arctia*, but later, based on molecular data, re-identified them as *M. neglecta*, here we tentatively refer the Caspian worms to *M. neglecta*. The worms could have entered the Caspian Sea with ballast waters of ships sailing from the Baltic Sea through the Baltic Sea–Volga Canal, and then through the Volga River (Figure 4).

Here we report for the first time *M. neglecta* in the British Isles (River Thames; MIMB 36644), recording the further spread of this species in the North Sea. Complete information on *M. neglecta* records is given in Table S2 (mapped in Figure 4).

***Marenzelleria wireni* Augener, 1913**

(Figure 3)

Marenzelleria wireni Augener, 1913 (*Part.*): 264–267, figs. 1, 2. Annenkova 1952: 126. Maciolek 1984 (*Part.*): 49–51, fig. 1a–g. Sikorski et al. 1988 (*Part.*): 835–837, fig. 4a–k. Sikorski and Buzhinskaya 1998: 1112–1115, fig. 1. Sikorski and Bick 2004: 255–261, figs. 1A–F, 2A, 3A. Bick 2005: 269–270, fig. 3 (references).

Marenzelleria sp.: Radashevsky et al. 2021: 363–364, figs. 2, 4–6.

Microspio wireni: Söderström 1920 (*Part.*): 249–250.

Paraspio wireni: Hartman 1959: 382.

Nerine vulgaris: Wirén 1883 (*Part.*): 408–409. *Fide* Augener 1913: 264.

Scolecoplepis sp.: Marenzeller 1892: 427–429, fig. 5. *Fide* Augener 1913: 264.

Spio gorbunovi Averintsev, 1990: 165–166, fig. 13. *Fide* Sikorski and Buzhinskaya 1998: 1112. Sikorski and Bick 2004: 255.

Remarks. The taxonomic history of *M. wireni* dates back to the material collected by the Swedish expedition on R/V *Vega* (1878–1880; the first Arctic expedition that passed the Northeast Passage and the first voyage around Eurasia) in the Kara Sea in 1878 and reported by Wirén (1883) as likely *Nerine vulgaris* Johnston, 1838. Marenzeller (1892) received one incomplete specimen (41 mm long, 2.75 mm wide for 148 chaetigers) collected by a German expedition (sponsored by Bremer Geographischen Gesellschaft) from Whalespointbucht (eastern Spitsbergen, northwest Barents Sea) in 1889. Marenzeller (1892) noted that his specimen looked similar to Wirén’s *N. vulgaris* and possibly represented a new species. However, due to the lack of good material for a complete description, he reported that it was *Scolecoplepis* sp.

In revising the Spionidae family, Mesnil (1896) used Wirén’s (1883) and Marenzeller’s (1892) descriptions to create a new genus, *Marenzelleria*, although he did not give a species name for the corresponding material. Following the descriptions, Mesnil (1896: p. 117) mistakenly diagnosed the new genus as having branchiae beginning from chaetiger 2.

Augener (1913) received three specimens collected by the Scottish Jackson-Harmsworth Expedition of Professor W.S. Bruce near the Cape Flora (Franz Joseph Land, northeastern Barents Sea) in 1896. Augener (1913: p. 265) re-examined Wirén’s (1883) and Marenzeller’s (1892) materials, found them similar to his material from the Franz Joseph Land, and named it after its first discoverer as *Marenzelleria wireni*.

Revising the genera *Scolecoplepis* Malmgren, 1867, *Marenzelleria* Mesnil, 1896, and *Scolecoplepides* Ehlers, 1907, Maciolek (1984: p. 49) noted the problem: “According to the current rules of the ICZN (not in effect in 1896), Mesnil’s generic name *Marenzelleria* would be a *nomen nudum*” (that is, Mesnil erected *Marenzelleria* without specifying the type species for the

new genus, VIR). To save the genus and solve the problem, Maciolek (1984: p. 49) suggested that “Augener (1913) effectively emended Mesnil’s (1896) diagnosis of *Marenzelleria* when he assigned his new species, *M. wireni*, to that genus.” Maciolek (1984) transferred *Scolecoplepis viridis* Verrill, 1873 to *Marenzelleria*, and described a new species *M. jonesi* (later synonymized with *M. viridis* by Rodi and Dauer 1996) based on material from Cape Henlopen (Delaware, USA). Maciolek (1984) overlooked the *Scolecoplepides arctius* (= *M. arctia*) described by Chamberlin (1920) from the Beaufort Sea (Alaska, USA), so her “material might contain specimens of both *M. wireni* and *M. arctia*” (Sikorski and Bick 2004: p. 261).

Bick (2005) collected and described *M. wireni* from Kongsfjorden (eastern Greenland Sea, western Spitsbergen). Blank and Bastrop (2009) sequenced 16S, COI and *Cytb* gene fragments, while Syomin et al. (2017) sequenced 28S and *Histone 3* from this material; these are the only sequences of the species available until present.

Marenzelleria wireni/*M. cf. wireni*/*Microspio wireni* were reported from the North Sea (Wohlenberg 1937; Elliott and Kingston 1987; Schiedek 1999; Essink and Dekker 2002; Wolff 2005), but these reports were misidentifications. Until now, there is no genetically confirmed record of *M. wireni* from the North and Baltic Seas, as well as from North America. Sikorski and Buzhinskaya (1998) and Sikorski and Bick (2004) provided new records of *M. wireni* for the Barents, White, Pechora, Kara, Laptev, East Siberian and Chukchi Seas (all in the Arctic Russia). Complete information on *M. wireni* records is given in Table S3 (mapped in Figure 3).

Discussion

Phylogeny of Marenzelleria

Earlier analyses of phylogenetic relationships among *Marenzelleria* species were based on sequences of the mitochondrial DNA only. Blank and Bastrop (2009) and Syomin et al. (2017) used 16S, COI and *cytochrome b* sequence data, whereas Radashevsky et al. (2021) used only 16S and COI data. All three analyses suggested a basal position for two Arctic species, *M. arctia* and *M. wireni*, and, thus, an Arctic origin of *Marenzelleria*. However, they resulted in slightly different hypotheses about relationships among boreal Northwest Atlantic species. Blank and Bastrop (2009: fig. 1) proposed sister relationships of *M. bastropi* with *M. viridis: neglecta* (*bastropi+viridis*), while Syomin et al. (2017: fig. 6) proposed sister relationships of *M. bastropi* with *M. neglecta: viridis* (*bastropi+neglecta*). The analysis by Radashevsky et al. (2021: fig. 1) suggested sister relationships of *M. neglecta* with *M. viridis: bastropi* (*neglecta+viridis*). The latter hypothesis was supported by the present analysis of five genes and seems more plausible given that the nodes in the phylogenetic tree received higher support.

Tree topology (Figure 1) and the distribution of *Marenzelleria* along the Atlantic coast of North America (see Radashevsky et al. 2021: fig. 2) allow us to assume that the boreal Northwest Atlantic species had evolved from a common ancestor that was originally widely distributed along the Atlantic coast of North America. Population isolation and adaptation in isolated habitats apparently led to the divergence of the ancestral population and the origin of three species: *M. bastropi*, *M. neglecta* and *M. viridis*.

Identification of *Marenzelleria* species

Although *Marenzelleria* includes only five described species, identifying worms by morphological characteristics is often challenging. Diagnostic characters such as the length of the nuchal organs, the distribution of branchiae, hooded hooks and sabre chaetae are age-dependent and individually variable (Sikorski and Bick 2004: table 1, fig. 6; Syomin et al. 2016: table), resulting in complex correlations between body size (width, length) and morphological features (see Radashevsky et al. 2021: figs. 5, 6). The usual presence of only anterior fragments in samples further complicates their identification. Hence, molecular data is an important complementary diagnostic tool (Röhner et al. 1996a; Bastrop and Blank 2006; Blank et al. 2008).

Blank et al. (2008) developed a PCR/RFLP protocol and provided a molecular identification key for three *Marenzelleria* species from the Baltic Sea. The protocol used the restriction fragment length polymorphism (RFLP) method, when the polymerase chain reaction (PCR) products of two mitochondrial DNA gene segments (16S, COI) were cut using restriction enzymes. Sikorski and Bick (2004) provided the first key for the morphological identification of five *Marenzelleria* species. The key was mainly based on species specific arithmetic differences of three numerical characters: the first chaetiger with neuropodial (ventral) hooded hooks (VHH), the first chaetiger with notopodial (dorsal) hooded hooks (DHH), and the last chaetiger with branchiae (Br). Because all these characters, as well as the nuchal organs length (the fourth important diagnostic character), were found to be size/age-dependent, Sikorski and Bick (2004) suggested that the key be used only for specimens more than 1.0 mm wide. Bick (2005) modified and updated the first morphological key, but noted that the revised version was best for specimens larger than 1.2 mm wide. Below is a further update to the key, which includes morphological data recently published by various authors.

Key to species of *Marenzelleria*

(complete adults with body width greater than 1.2 mm)

1. Nuchal organs extending beyond chaetiger 3 2
- . Nuchal organs not extending beyond middle of chaetiger 3..... 3

2. Nuchal organs to middle of chaetiger 5. Branchiae throughout most of body. Up to 180 chaetigers in total *M. wireni*
- . Nuchal organs to middle of chaetiger 4. Branchiae on less than one third of body (up to 69 branchiate chaetigers). Up to 250 chaetigers in total *M. neglecta*
3. Nuchal organs to middle of chaetiger 3. More than 20 chaetigers between start of hooded hooks in neuro- and notopodia. More than 60 branchiate chaetigers *M. bastropi*
- . Nuchal organs to middle of chaetiger 2. Less than 20 chaetigers between start of hooded hooks in neuro- and notopodia. Branchiate chaetigers more or less than 60 4
4. Up to 40 branchiate chaetigers. Dorsal hooded hooks start in postbranchiate chaetigers (Br-DHH < 0). Up to 120 chaetigers in total ...
..... *M. arctia*
- . Up to 130 branchiate chaetigers. Dorsal hooded hooks start in branchiate chaetigers (Br-DHH > 0). Up to 250 chaetigers in total
..... *M. viridis*

Conclusions

Polychaetous annelids, and especially spionids, are among the lists of alien species in the various regions discussed in the present work. Ballast water and hull fouling have been major vectors for the introduction of polychaetes, including spionids, worldwide (Çinar 2013). Because polychaetes are mainly marine or estuarine, transoceanic or long-distance coastal movements have been considered as main transportation routes. Ships transporting ballast via canals have rarely been reported and may be underestimated. The invasion of the Sea of Azov by *M. neglecta* thus likely occurred via transport of worms (larvae or adults or both) from the Baltic Sea via the Baltic Sea–Volga–Don Canal (Syomin et al. 2016, 2017). Similarly, *M. arctia* may have invaded the Baltic Sea by transport from the White Sea via the White Sea–Baltic Sea Canal.

The Arctic *M. arctia* has been extensively examined based on the North European populations located far from the type locality of the species in the Beaufort Sea (Alaska). However, molecular analysis of specimens, initially identified morphologically as *M. arctia*, found significant genetic distances between the Baltic, Barents and White Seas and those worms from the Kara Sea. This genetic distance, as well as the isolated estuarine habitats of these Arctic worms, and the large geographic distance between the type locality of *M. arctia* in the Beaufort Sea (Alaska) and northern Europe, raises doubts about the conspecificity of North American, North European and Northwest Pacific populations. Sequence data from the North American population are urgently needed to characterize the molecular identity of the species and to verify the conspecificity of the disjunct

populations. A similar situation may exist for *M. wireni*, which has been reported from isolated estuaries along much of the Arctic coast. Molecular data are only available for the Spitsbergen population of *M. wireni* from the Greenland Sea, which is approximately 800 kilometers from the proposed type locality of the species in Franz Josef Land (Kara Sea) and thousands of kilometers from the Eurasian mainland. Further molecular studies will be required to ensure a systematic revision of *Marenzelleria* and further development of the hypothesis of the origin and evolution of these spionid polychaetes.

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Authors' contribution

VIR conceptualized and designed the research, collected and analyzed the data, prepared figures, and tables, wrote the manuscript and approved the final version. VVP sequenced material, analyzed and interpreted genetic data, prepared tables, reviewed drafts and approved the final version. TVN sequenced material, organized funding provision and approved the final version. ABT collected material, interpreted the data and approved the final version.

Ethics and permits

Marine worms of the annelid family Spionidae are not listed as species at risk of extinction. The authors have complied with all policies relative to the collection and handling of marine species, and no ethics approval was required.

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Supplementary material

The following supplementary material is available for this article:

Table S1. Sampling location data and museum registration numbers of *Marenzelleria arctica*.

Table S2. Sampling location data and museum registration numbers of *Marenzelleria neglecta*.

Table S3. Sampling location data and museum registration numbers of *Marenzelleria wireni*.

Table S4. List of the museums and collections (and their acronyms) holding the examined or reported specimens of *Marenzelleria* spp.

Table S5. Taxa, sampling location data, references, and GenBank accession numbers of sequences used in the present study.

Table S6. Uncorrected pairwise average genetic distances (p , in %) between *Marenzelleria* spp. calculated in the analysis of five genes.

Table S7. Uncorrected pairwise average genetic distances (p , in %) between *Marenzelleria* spp. calculated in the analysis of two mitochondrial genes.

Figure S1. Majority rule consensus tree of the Bayesian inference analysis of the combined *COI* (612 bp) and *16S* (322 bp) sequences (934 bp in total) of *Marenzelleria* spp. rooted with sequences of *Marenzelleria arctica*.

This material is available as part of online article from:

http://www.reabic.net/aquaticinvasions/2022/Supplements/AI_2022_Radashevsky_etal_SupplementaryMaterial.xlsx

APPENDIX 3

COMMITMENT LIST

The following table details all commitments made by Baffinland in regards to the 2022 Production Increase Proposal Renewal (2022 PIPR). Baffinland made several initial commitments in its May 20, 2022 filing of the 2022 PIPR application with the NIRB. Baffinland made additional commitments developed in partnership with the Qikiqtani Inuit Association (QIA) during mediations regarding the 2022 PIPR. Further, Baffinland adopted further commitments in response to community engagement and comments received by interveners on its 2022 PIPR application. Baffinland looks forward to working with all interveners to ensure the full implementation of these commitments support continued operations at 6 mtpa while addressing concerns about the current Project, and foster further collaboration and partnership with all parties involved.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
001	N/A	Included as part of Production Increase Proposal Renewal	Marine Environment	<p>Baffinland will continue to implement the following mitigation measures to reduce or avoid impacts to marine mammals (Relevant species: Ringed Seal, Bearded Seal, Walrus, Beluga, Narwhal, Bowhead Whale, Polar Bear) as a result of shipping:</p> <ul style="list-style-type: none"> • Maintain constant speed and course when possible. • Reduce vessel speed to 9 knots. • Reduce vessel idling. • Additional temporary measures have been introduced for 2021 that shipping will not commence a continuous path of 3/10ths or less ice concentrations between the entrance of Eclipse Sound and Milne Port is present. • No breaking of landfast ice will occur in the spring or fall shoulder season. • When marine mammals appear to be trapped or disturbed by Project vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife move away from the immediate area (as safe navigation allows). • All Project vessels will be provided with standard instructions to operate their vessel in a manner that avoids separating an individual member(s) of a group of marine mammals from other members of the group; • All Project vessels will be provided with standard instructions to not approach within 300 m of a walrus or polar bear observed on sea ice; • Vessels awaiting instructions from the Port Captain to enter the RSA will be instructed to wait in Baffin Bay at least 40 km east of the Nunavut Settlement Area.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<p>Baffinland will implement the following additional mitigation measures in 2022 to reduce or avoid impacts to marine mammals (Relevant species: Ringed Seal, Bearded Seal, Walrus, Beluga, Narwhal, Bowhead Whale, Polar Bear) as a result of shipping:</p> <ul style="list-style-type: none"> • No icebreaking to commence the 2022 shipping season. Vessels will not begin their transit to Milne Port until 3/10ths or less ice is present along the entire shipping route through the Nunavut Settlement Area (NSA). • No more than 80 ore carriers will be chartered during the 2022 season to transport 6mtpa. This is 6 ore carriers less than the maximum anticipated and approved in the previous Production Increase Proposal and Extension Request. • Use of convoys throughout the 2022 season to further reduce total sound exposure. Acoustic monitoring data indicates that if ore carriers transit in convoys with inter-vessel separation less than 10 km, there is an overall reduction of the total sound exposure in the Regional Study Area compared to multiple individual transits of an equivalent number of vessels. Slight increases of instantaneous sound levels in the regions between the vessels are compensated for by shorter exposure duration, resulting in a net decrease of noise exposure. Baffinland proposes to target a 15% reduction in overall independent one way transits by implementing convoys, which effectively combines individual transits into single 'effective transits'.
002	N/A	Included as part of Production Increase Proposal Renewal	Terrestrial Environment	<p>Baffinland will continue to implement the following mitigation measures to reduce or avoid impacts to terrestrial wildlife (Relevant species: Caribou, Wolf) as a result of operations (Mine site, Tote Road, and Milne Port):</p> <ul style="list-style-type: none"> • Mitigation measures that will reduce the likelihood of reduced habitat effectiveness for caribou include: <ul style="list-style-type: none"> ○ Sensory disturbances will be limited where possible throughout the year. This can include a quarry blasting program that can restrict blasting when migrating caribou and other wildlife may be negatively affected. ○ Active caribou calving sites (as identified by observations from area hunters, Project biologists or observed by aircraft pilots) will be avoided between May 15 and July 15.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<p>Where possible, there will be no increase in construction or operational activity within 3 km of the calving sites during this period.</p> <ul style="list-style-type: none"> ○ In the Cockburn Lake Area (identified during baseline studies as having the highest occurrence of caribou calving sites), all non-essential activities will cease between May 15 and July 15 (e.g., construction activities will be planned to avoid this area during the calving season). ○ If any females (one or more) are observed within 3 km of a planned Project activity such as drilling or road construction from May 15 through July 15, then the activity location will be moved or the activity deferred as appropriate and, if possible, until a later date when caribou are not present. ○ Should a female caribou or a female with a calf or calves approach within 3 km of Project activities (between May 15 and July 15), the animals will be observed on the ground. If it is obvious that they are being disturbed, the activity will cease until they have moved away by at least 3 km. ○ If caribou approach a Project activity site before work commences, the animals will be observed on the ground, and if it is obvious that they are being disturbed (e.g., hesitating to cross work site, running in the opposite direction, visibly agitated), work will not commence until they have moved on. If caribou approach a Project site while work is in progress, caribou will be observed for signs of disturbance. If the caribou are disturbed, the activity will be modified or cease until the caribou have moved away or they are guided away from the worksite. ○ At such a time when caribou begin to be encountered regularly along the Tote Road, a wildlife monitor will be present on-site during the calving season to detect calving activities near the Tote Road, monitor cow/calf behaviour in relation to traffic, designate a temporary no-stopping zone, guide traffic, and document measures taken to reduce sensory disturbance to calving caribou. ● Mitigation measures that will reduce the likelihood of the Project being a barrier to caribou movement include: <ul style="list-style-type: none"> ○ Snow management activities will, throughout the winter season, maintain a snowbank height less than 1 m with smooth tops along the Tote Road.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<ul style="list-style-type: none"> ○ Identified trail crossings along the Tote Road where the physical structure might be a barrier to caribou movement will be constructed of finer fill material to replicate natural trail conditions, preventing leg entrapment, and gentler gradients to reduce the visual barrier of the embankments. Any additional (i.e., beyond those already identified) trail crossings identified during construction or operation will also be modified with gentler slopes and finer fill if caribou deflections are detected. In the context of caribou movement monitoring, deflection is defined as “caribou that fail to cross the Tote Road after approaching it.” ○ Wildlife signage could be posted at trail crossings along the Tote Road. Operators will be made aware of the crossing areas along the Tote Road, and daily observations will be reported so operators are aware of a potential presence at crossing sites and other areas. ○ Based on IQ knowledge provided by hunters and elders and/or site-staff observations, if migratory caribou start to move through the RSA, then the leading caribou will be allowed to cross over the Tote Road undisturbed so that others will follow. ○ Truck drivers will be provided with wildlife awareness training, including known crossing locations. Drivers will operate in accordance with the Caribou Decision Framework – Tote Road (Figure 3.2). ○ All site personnel entering and exiting the Tote Road will notify site dispatch and/or security. Notifications to road users will include mandatory wildlife reporting. ● Mitigation measures implemented to reduce the likelihood of the Project increasing caribou mortality risk include: <ul style="list-style-type: none"> ○ Wildlife right-of-way policy on Project roads ○ All site personnel entering and exiting the Tote Road will notify site dispatch and/or security. Notifications to road uses will include mandatory wildlife reporting. ○ Reporting and documentation of all mortalities and near misses is mandatory, and follow-up investigations will be conducted for all mortality events. ○ When caribou are observed on roads a “caribou advisory” will be issued through the site radio network to alert operators and drivers that caribou are in the area and to

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<p>maintain extra vigilance while driving in accordance with Baffinland's Caribou Decision Frameworks.</p> <ul style="list-style-type: none"> ○ Speed limits along Project roads are set at a maximum of 55 km/hr, in combination with the Caribou Decision Framework – Tote Road (Figure 3.2). Slow speeds and vehicle operator response to animal presence will allow caribou time to get off the road and will increase the chance of a truck being able to stop before colliding with a caribou. ○ Any carcasses will be removed from transportation corridors to discourage further collisions (e.g., scavengers). ○ A no-hunting policy for Project personnel will be implemented (notwithstanding the accommodation provided for traditional Inuit activities [Human Resource Management Plan SD-SEMP-003]). All site personnel are prohibited from transporting firearms to site. ○ Whenever practical and not causing a human safety issue, a stop work order will be used when wildlife in the area may become endangered (i.e., risk of physical injury or death) by the work being undertaken.
003	N/A	<p>Included as part of Production Increase Proposal Renewal</p> <p>Also relevant to comments from Hamlet of Igloolik and Igloolik Hunters and Trappers Association</p>	Terrestrial Environment	Baffinland will conduct aerial caribou surveys in Fall 2022 or 2023.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
004	N/A	Included as part of Production Increase Proposal Renewal	Dust	<p>Baffinland will continue to implement the following mitigation measures to reduce or avoid impacts to marine mammals, terrestrial wildlife, fish and fish habitat, water quality, air quality, etc. as a result of operations (Mine Site, Tote Road, Milne Port):</p> <ul style="list-style-type: none"> Specific actions that have been implemented, or could be further implemented by Baffinland for dust management at Milne Port have included: <ul style="list-style-type: none"> redesigning the ore pads to position fines in the centre and lump ore around the margins proper positioning of the conveyors to minimize ore drop distances when stockpiling installation of rubber bellows at the end of each stacker to minimize dispersion of dust generated during the fall installation of chutes on the shiploader to prevent windblown dust during loading operations installation of shrouding at the discharge end of the ore stackers to reduce the effect of windblown dust during stacking activities installation of downwind fencing removal of dust impacted snow at strategic locations at the project. application of a specialized crusting agent (DusTreat®) to the ore stockpile to reduce wind erosion and mobilization of fine iron ore particles. Specific actions that have been implemented, or could be further implemented by Baffinland for dust management for vehicle traffic include: <ul style="list-style-type: none"> regulating speed limits utilizing water and dust suppressants during snow free months. Application of new dust suppression products with increased durability and longevity for site infrastructure and approved for use in Nunavut on unpaved roads (DustBlok®) Specific actions that have been implemented, or could be further implemented by Baffinland for dust management at the crushing facility include: <ul style="list-style-type: none"> Installation of shrouding and other engineered controls on conveyors and the ship loader Moving and enclosing secondary crushing facilities to Milne Port. This will additionally increase the size of ore being transported. Use of de-dusting equipment (e.g. baghouses) in the indoor crushing and screening facilities to reduce fugitive emissions of dust and particulate matter

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<ul style="list-style-type: none"> Minimizing drop distances (i.e., using adjustable stackers) for stockpiling activities. <p>Baffinland will implement the following additional mitigation measures in 2022 to reduce or avoid impacts to marine mammals (Relevant species: Ringed Seal, Bearded Seal, Walrus, Beluga, Narwhal, Bowhead Whale, Polar Bear) as a result of shipping:</p> <ul style="list-style-type: none"> Baffinland will consider the proactive implementation of recommendations contained in the Interim Dust Audit Report, expected for release following the completion of the Dust Audit Committee Site Visit (June 8-15). Preliminary recommendations have been shared with Baffinland as follows: <ul style="list-style-type: none"> Strategic evaluation and installation of wind fencing Application of additional dust suppressants (DustBlok, DusTreat) to the airstrip and other stockpiles Revisions to blasting management plans and practices Continuous dust monitoring at PDA boundaries Ongoing involvement of Inuit in dust management Other operational practice improvements
005	Igloolik HTA-1	Hamlet of Igloolik Igloolik Hunters and Trappers Association	Future Development	Baffinland will work with the Hamlets and HTOs of Igloolik and Sanijarak to carry out additional baseline studies for marine, terrestrial, and avian wildlife related to Steensby. This could begin as early as 2023.
006	Igloolik HTA-1	Hamlet of Igloolik Igloolik HTA	Socio-economic Environment	If approval is granted for 6 mtpa for 2022, Baffinland commits to not lay off any Inuit employees during this production year (excepting employment matters that could give cause for termination on an individual basis, should they arise). We also confirm future applications will give due consideration to the need for adequate time for procedural matters.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
007	Igloolik HTA-1	Hamlet of Igloolik Igloolik HTA	Dust	Baffinland confirms that it is committed to full consideration of the dust audit suggestions, and will implement accepted recommendations from the Independent Dust Audit at its earliest opportunity.
008	Igloolik HTA-1	Hamlet of Igloolik Igloolik HTA	Socio-economic Environment	Baffinland will engage with Igloolik to develop community infrastructure commitments – including significant infrastructure projects such as road paving and women and youth centers – with an aim to realize benefits to Igloolik: <ul style="list-style-type: none"> • businesses; • women; • youth; and • hunters.
012	QIA Term 1	QIA	Socio-economic Environment	Baffinland will process a \$1,000,000 outstanding payment to QIA consistent with its approach to payments to all vendors, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.
013	QIA Term 3	QIA	Socio-economic Environment	Baffinland will process a \$1,700,000 outstanding payment to QIA for engineering and planning costs associated with the Pond Inlet Regional Training Centre consistent with its approach to payments to all vendors, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.
014	QIA Term 4	QIA	Socio-economic Environment	Baffinland will commence payments towards the \$10,000,000 commitment for the Pond Inlet Training Centre consistent with its approach to payments to all vendors, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.
015	QIA Term 5	Included as part of Production Increase Proposal Renewal Revised to reflect	Marine and Terrestrial	After consulting with existing members of the Marine Environment Working Group (MEWG) and Terrestrial Environment Working Group (TEWG) and receiving approval from the same, Baffinland commits to the following amendments to the terms of reference for the MEWG and TEWG: <ul style="list-style-type: none"> • an independent chair or co-chairs for each of the MEWG and TEWG; • decision-making processes to provide that decision-making must occur on a consensus basis between all working group members parties; • a commitment that working group decisions will be recognized as enforceable recommendations, with provision that Baffinland may request not to enforce the recommendation at which point the matter shall go to the Project Monitor for resolution;

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
		recommendation from QIA		<ul style="list-style-type: none"> Involvement of 1 representative from the remaining four HTOs at Baffinland's cost, should they elect to participate; and Mechanisms to ensure meeting materials and records of decisions are public.
016	QIA Term 6	<p>Included as part of Production Increase Proposal Renewal</p> <p>Revised to reflect recommendation from QIA</p>	Compliance	<p>That QIA and Baffinland request that Canada support the appointment of an independent compliance Project Monitor, based on recommended or agreed nominees from QIA and BIM, to:</p> <ul style="list-style-type: none"> oversee the implementation of Project commitments; ensure that the interests of impacted Inuit communities are substantially addressed in adaptive management development and implementation and benefit delivery; provide a bi-annual (twice yearly) report on the assessment about success of both parties in reaching benchmarks; and assist in resolution of dispute between the Parties regarding adaptive management and benefit delivery including resolution of dispute over recommendations from the Working Groups.
017	QIA Term 7	QIA	Environmental Management and IQ	<p>That QIA and Baffinland jointly develop and approve, by April 2024, the adaptive management elements for monitoring programs and Inuit OITRs for the AMP related to narwhal, seal, Arctic char, caribou, dust and culture, resource and land use.</p> <p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p> <p>Baffinland also notes it would regard April 2024 as an outside deadline, and would work to have interim and final management elements and OITRs in place as soon as they are available.</p>
018	QIA Term 8	QIA	Environmental Management and IQ	<p>That Baffinland support and fund the establishment and first year (from September 15, 2022 – March 31st, 2023) of the Inuit Stewardship Plan. QIA and Baffinland should be required to work together to evaluate the success of the Inuit Stewardship Plan in addressing Inuit concerns after that period. QIA agrees to consider payments received by Baffinland for ICA implementation received to date as partial payment towards this commitment early revenue according to a payment reconciliation completed by the Parties not later than September 15, 2022. Baffinland commits to provide additional funds as agreed between Parties following the development of a budget and workplan by not later than September 15, 2022.</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.
019	QIA Term 9	QIA	Environmental Management and IQ	<p>QIA and Baffinland agree that the AMP commitments above require completion of a Culture, Resources and Land Use Assessment (which will be inclusive of a cumulative impact assessment and a freshwater study), the Pond Inlet Country Food Baseline, and the development of the Inuit Stewardship Plan and Baffinland agrees to resource this work according to work plans and budgets prepared on a bi-annual (twice yearly) basis. Recognizing work to collect IQ on these topics has already been completed by QIA and is currently subject to verification, QIA commits to provide Baffinland with its timeline for sharing the information it has gathered to date, and a memo to confirm the scope of remaining work on these topics, on or before September 15, 2022.</p> <p>Baffinland notes that this commitment extends beyond the temporal scope of the current proposal. Baffinland will include considerations of this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p>
020	QIA Term 10	QIA	Future Development	Baffinland will comply with the requirements of the Nunavut Planning and Project Assessment Act with respect to any proposed expansions to or amendments of the Project. In doing so Baffinland will address any uncertainty regarding the accuracy of original effects assessments and the current status of any adaptive management plans.
021	QIA Term 11	QIA	Environmental Management and IQ	Baffinland will provide, by December 31, 2022, a timeline and plan for development of the monitoring and AMP plans committed to in this Table.
022	QIA Term 12	QIA	Environmental Management and IQ	<p>Baffinland will provide data on which indicators within the draft adaptive management plans have been triggered within the low, medium, and high response levels.</p> <p>Baffinland accepts this commitment but confirms the evaluation will be delivered through the joint Adaptive Management Plan Working Group to assist in the finalization of key management plans identified in Term 7.</p> <p>See full response to QIA-10.</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
023	QIA Term 13	QIA	Environmental Management and IQ	<p>Within 18 months of receipt of approvals for the 2022 PIP, Baffinland provide to the NIRB a copy of both: The ongoing Pond Inlet Country Food Baseline Study; and A CRLU Assessment that has been verified by QIA and the Project-affected communities; and That these documents must be provided along with an Action Plan for monitoring, mitigation and accommodation of impacts on CRLU, including Inuit food security, with evidence that this has been subject to consultation and verification with QIA and the Project-affected communities.</p> <p>Baffinland notes that this commitment extends beyond the temporal scope of the current proposal. Baffinland will include considerations of this commitment in any subsequent applications that would extend 6 mpta operations beyond 2022.</p> <p>See full response to QIA-05.</p>
024	QIA Term 14	QIA	Shipping	<p>Baffinland commits that all shipping and icebreaking within the Northern Shipping Corridor cease by October 31, 2022 and Baffinland continue to commit to no breaking of landfast ice through the Northern Shipping Corridor.</p>
025	QIA Term 15	QIA	Shipping	<p>Baffinland will provide scenario planning exercises to better quantify the costs/benefits of ship convoys. To conduct a study to see assess the simple seasonal average observer data from Bruce Head and the Leg 2 surveys correlates with the photo estimates for all the years to assess whether these metrics could provide an EWI for the year's results that would be applied in future to increase or decrease shipping at the end of summer. To resource Inuit-led monitoring, updated EWIs, Inuit OITRs, etc. To conduct a sampling program to assess cortisol levels in narwhal and morphometric measurements. This would be a systematic program working with harvesters to gather samples, and observations on what they are experiencing and comparing to previous years.</p> <p>Baffinland notes that this commitment extends beyond the temporal scope of the current proposal. Baffinland will include considerations of this commitment in any subsequent applications that would extend 6 mpta operations beyond 2022.</p> <p>See full response to QIA-02.</p>
026	QIA Term 16	QIA	Marine Environment	<p>Baffinland and QIA will develop, by September 30, 2022, specific technical plans for 2022 for Early Warning Indicators for narwhal.</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
027	QIA Term 17	QIA	Environmental Management and IQ	<p>That Project Certificate Terms and Conditions be amended to require that Baffinland immediately establish an Inuit-led monitoring program on dustfall as a pilot program to establish the mechanisms needed to allow Inuit observations to influence mitigation measures and test appropriate AMP structures, which are demonstrably responsive to Inuit OITRs, with the budget and work plan agreed upon by Baffinland and QIA prior to commencement.</p> <p>Baffinland notes that this commitment extends beyond the temporal scope of the current proposal. Baffinland will include considerations of this commitment in any subsequent applications that would extend 6 mpta operations beyond 2022.</p>
028	QIA Term 18	QIA	Dust	Baffinland commits to identifying high risk days for dust dispersion, based on weather. Baffinland will develop weather-specific measures after further review of the QIA's 2021 Dust Investigation Report, the forthcoming 2022 Dust Audit Report, and subsequent discussions with the TEWG.
029	QIA Term 19	QIA	Dust	<p>Refinement of the application rates in accordance with manufacturer's instructions are a more reliable solution to improved dust suppression performance, and Baffinland is willing to make this commitment in relation to the 2022 6 mtpa application.</p> <p>See full response to QIA-07.</p>
030	QIA Term 20	QIA	Dust	<p>Baffinland will minimize drop distances (i.e., using adjustable stackers) for stockpiling activities.</p> <p>Baffinland will further define the drop distances used and provide evidence in subsequent annual reports that they have been applied.</p> <p>Baffinland will provide an evaluation of where wind fencing would limit dust migrating from the ore stockpiles at Milne Port (and at the Mary River site), and construct them within 60 days of the first sealift/resupply ship arriving at Milne Port in 2023 in order to permit the materials to be shipped.</p> <p>Baffinland will define what other operational practice improvements will be made to minimize dust from Milne Port, and clarify how those measures will be implemented. Where Baffinland agrees to install additional equipment and infrastructure, Baffinland will provide a reasonable work plan, inclusive of a timeline to complete the work.</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<p>Baffinland notes that this commitment extends beyond the temporal scope of the current proposal. Baffinland will include considerations of this commitment in any subsequent applications that would extend 6 mpta operations beyond 2022.</p> <p>See full response to QIA-08.</p>
031	QIA Term 21	QIA	Dust	<p>Before Baffinland commits to any additional dust management measures, a practical approach would be to hold a dedicated Terrestrial Environment Working Group (TEWG) meeting once all the reports are released and Members have had an opportunity to review all the recommendations and their supporting rationale. This would include Baffinlands commissioned Dust Audit Report and QIA's 2021 Dust Investigation Report. The objective of the meeting would be to reconcile any differences and consolidate a final list of feasible recommendations. We can also use the strength of a newly implemented Terms of Reference for the TEWG that provides for all 5 HTO members to participate, an independent Chair to manage the meeting, and a consensus based decision making process.</p> <p>See full response to QIA-09.</p>
032	QIA Term 22	QIA	Dust	<p>Before Baffinland commits to any additional dust management measures, a practical approach would be to hold a dedicated Terrestrial Environment Working Group (TEWG) meeting once all the reports are released and Members have had an opportunity to review all the recommendations and their supporting rationale. This would include Baffinlands commissioned Dust Audit Report and QIA's 2021 Dust Investigation Report. The objective of the meeting would be to reconcile any differences and consolidate a final list of feasible recommendations. We can also use the strength of a newly implemented Terms of Reference for the TEWG that provides for all 5 HTO members to participate, an independent Chair to manage the meeting, and a consensus based decision making process.</p> <p>See full response to QIA-03.</p>
033	QIA Term 23	QIA	Terrestrial Environment	<p>Baffinland agrees that Inuit Qaujimajatuqangit (IQ) must inform any initiative to re-estimate the Project's Zone of Influence, however, we are uncomfortable with a commitment obligating other parties to perform studies with indeterminate scopes and without any indication that this proposed study has the support of the involved communities. Baffinland is also concerned with the QIA's ability to complete the proposed work in the proposed timeline in addition to the other important initiatives QIA and Baffinland have agreed to carry forward, including the development of the Inuit Stewardship Plan and the completion of a CRLU Assessment and the Pond Inlet Country Food</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
				<p>Baseline Report. These are significant undertakings that must be prioritized by the QIA with meaningful engagement from communities to ensure their completion.</p> <p>Baffinland will reconsider the proposal by the QIA as a Member of the Terrestrial Environment Working Group at a later date.</p> <p>See full response to QIA-04.</p>
034	QIA Term 24	QIA	Freshwater Environment	<p>Baffinland is already complying with recommendation 2 from the 2018 NIRB Monitoring Report, and the Aquatic Effect Monitoring Plan (AEMP) and Core Receiving Environment Monitoring Plan (CREMP) and Tote Road Monitoring Program (TRMP) adequately monitors Project related aquatic effects, and that through the long-term monitoring sites that assess Project impacts on the water quality, sediment deposition, and biota in the most impacted lake is sufficient to determine if and when modifications are required at other Project locations, including along the Tote Road and Phillips Creek.</p> <p>Baffinland has committed that any exceedance of the 0.54 mm moderate risk level will trigger additional study to validate the thresholds relative to impacts on arctic char eggs. A low risk threshold of 0.15 mm will also be applied that will trigger corresponding low risk response actions.</p> <p>See full response to QIA-01.</p>
035	QIA Term 25	QIA	Inuit Travel	<p>That the Project Certificate be amended to require Baffinland to develop and maintain a safe travel route around/across km 13 of the Tote Road, to be finalized upon the MHTO providing GPS coordinates of the desired route. This route will be maintained for life of project or until a time when the MHTO determines it must be modified to meet its intended purpose.</p>
036	QIA Term 26	QIA	Inuit Agreements	<p>Baffinland and QIA will undertake to, no later than January 31, 2023, Amend the IIBA (2018) to include Inuit Certainty Agreement Schedule "C".</p> <p>In order to address ongoing concerns regarding difficulties Inuit are experiencing in accessing wildlife compensation funding, Baffinland and QIA will work together to review and address the working and efficacy of the administration of the Wildlife Compensation Fund. The Parties will implement changes to the protocol, including claims procedure and substantive criteria, all intended to improve Inuit access to the Wildlife Compensation Fund.</p>

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
037	QIA Term 27	QIA	Inuit Agreements	Baffinland commits to a process to amend the IIBA required to implement changes to Project management, AMP, benefits, and oversight.
038	QIA Term 29	QIA	Inuit Agreements	Baffinland accepts QIA's proposal on measureable objectives pertaining the June 2020 ICA commitments which provides objectives for measuring IIBA implementation performance.
039	NTI-02	Nunavut Tunngavik Inc.	Environmental Management and IQ	Baffinland commits to incorporating IQ and scientific knowledge in monitoring.
040	GN-1	Government of Nunavut	Terrestrial Environment	<p>Baffinland commits to continue to work towards the completion of a caribou research agreement and data sharing agreement in support of regional caribou monitoring initiatives for the current project.</p> <p>Baffinland commits to including an agenda item on the next TEWG meeting agenda as a placeholder for the GN to provide their clarifications on items requested in GN-1 and for Baffinland to respond. Baffinland will provide the NIRB a record of meeting minutes and resolution on this agenda item in the 2022 NIRB annual monitoring report.</p>
041	CIRNAC-1	CIRNAC	Environmental Management and IQ	Baffinland confirms that management plan implementation will continue in accordance with previously committed timelines in order to appropriately continue to prevent, mitigate, and monitor potential Project-related impacts to surrounding ecosystem and socio-economic environments.
042	DFO-01	DFO	Marine Environment	Baffinland confirms its commitment to continue with existing marine mammal monitoring programs and to continue to progress its approach towards adaptive management.
043	DFO-01	DFO	Marine Environment	Baffinland proposes to hold a special meeting of the MEWG to identify, evaluate, and select additional adaptive management indicators, thresholds, and responses to integrate into a final MMP to apply should there be a 2023 shipping season and beyond. To prepare for this meeting, Baffinland requests that any Member proposals on adaptive management indicators and thresholds (EWIs) provide detailed written recommendations, including available baseline data, sampling methodology to ensure statistical power in comparing yearly collected data to baseline data, and proposed thresholds for identifying change.

BIM ID#	Comment ID#	Intervener(s)	Topic	Commitment
044	DFO-02	DFO	Marine Environment	<p>Baffinland will continue to work with DFO and other qualified external experts regarding Marenzelleria specimens recorded in the Project area, and specifically on the identification of Marenzelleria wireni and Marenzelleria arctica, to determine source of origin.</p> <p>Baffinland proposes that it continue to conduct genetic barcoding on aquatic samples and DFO conduct population genetic analysis as a complementary monitoring measure to Baffinland's ongoing genetic barcoding on aquatic samples.</p>
045	DFO-03	DFO	Marine Environment	<p>Baffinland confirms that a stationary, autonomous acoustic monitoring station will be deployed in Milne Inlet in 2022 at a water depth of approximately 275 m to monitor sounds from vessels (including vessel convoys), to detect and characterize marine mammal vocalizations and vocal behaviour in the study area, and to characterize the overall soundscape. The recorder will be deployed along the nominal shipping route southeast of Bruce Head and will be equipped with four hydrophones in an array configuration, to allow for localization of narwhal calls.</p>

APPENDIX 4

DISPOSITION OF QIA COMMITMENT TABLE

QIA Term ID	Recommendation	Baffinland Response	Notes
1	That Baffinland pay \$1,000,000 (2020 Dollars) outstanding to MHTO within 5 days of the NIRB Report on the 2022 PIP Proposal and before a Minister's decision on the 2022 PIP Proposal (this amount was due within 5 days of the close of the Phase 2 Public Hearing but remains unpaid, and is relevant to an assessment of whether section 35 accommodation requirements are met).	Accepted with revisions	Baffinland will process the payment consistent with its approach to payments to all vendors at this point in time, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.
2	That Baffinland pay \$1,000,000 to MHTO for 2022, to offset 2022 impacts on harvesting, within 5 days of a positive NIRB determination recommending approval of the 2022 PIP Proposal.	Not accepted	<p>Baffinland cannot accept QIA's proposal an additional payment of \$1,000,000 to the MHTO for the following reasons:</p> <ol style="list-style-type: none"> There is no indication that impacts to harvesting have occurred in 2022 and the year is not yet complete <ol style="list-style-type: none"> QIA and MHTO have not provided any evidence that impacts requiring compensation have occurred in 2022. Our understanding from conversation with community members and social media posts is that Pond Inlet Inuit have continued to have hunting success in 2022. We are aware of evidence of successful narwhal harvesting, and we are aware that Pond Inlet hunters have already exceeded their quota for caribou allocated for 2022.. The MHTO continues to claim that operations have already resulted in significant impacts to harvesting rights and to key wildlife species, however, no detailed information supporting these claims have been provided to Baffinland or to NIRB. MHTO has not addressed the evidence of successful harvesting of narwhal and caribou presented in Section D of the Production Increase Proposal Renewal Application Supplement, submitted by Baffinland on June 15, 2022. Without further information provided by the MHTO, it is not possible to reconcile how significant impacts to harvesting are occurring when the overall numbers indicate that harvesters from Pond Inlet filled their 2021 summer narwhal quota and exceeded their 2021/2022 caribou quota. HTOs did not indicate any concern about narwhal populations in the North Baffin region (or in Eclipse Sound specifically) in their submissions via the Qikiqtaaluk Wildlife Board in their submissions to the Nunavut Wildlife Board, provided to NIRB via our letter of May 10, 2022 advocating for only one narwhal management unit in the North East Baffin Region (NEBI), with the ability to share tags amongst communities and to carry forward unused tags. Based on IQ shared with the NWMB, narwhal move freely throughout NEBI. Distributions and abundances change across NEBI waters between years, showing that individual narwhal do not always return to the same specific areas within NEBI waters every year. There is also evidence of varying populations in Eclipse Sound occurring from year to year based on DFO surveys that were carried out prior to Baffinland commencing operations. The Mary River Inuit Impact Benefit Agreement was amended in 2018 to include conditions that provide additional compensation in support of the original Production Increase Proposal. The added Articles will apply to a 6 mtpa operation in 2022, should it be approved, and include: <ol style="list-style-type: none"> 17.7 Harvesters Enabling Program, this has provided \$1.68 million in benefits to date 17.8 Wildlife Monitoring Program, this has only funded one proposal to date in 2019 for \$205,000; Baffinland remains open to considering a proposal for 2022 17.9 Marine research Equipment, Pond Inlet will receive a marine research vessel once deliveries can be made in 2023 Although not included in the Mary River IIBA, the Tasiuqtiit Working Group will receive \$10,000 for every ore carrier required to carry more than 4.2Mt to market in 2022; this fund has received \$730,000 to date There are already mechanisms in the Mary River Inuit Impact Benefit Agreement to address unanticipated effects and wildlife compensation, which include: <ol style="list-style-type: none"> Articles 15.6 of the Mary River Inuit Impact Benefit Agreement provides a mechanism to address different or greater significance of foreseen impacts through the Joint Executive Committee, and if required, mediation and arbitration (Article 21)

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			<p>b. The MHTO can apply to the existing Wildlife Compensation Fund and should their claim meet established criteria payments can be made accordingly, with Baffinland obliged to top up the fund when it is within \$50,000 of being exhausted. The QIA has not approached Baffinland to indicate that the Fund has been depleted to this extent.</p> <p>4. Baffinland has agreed to terms in QIA's proposed Commitment List that create additional avenues to identify and resolve issues relating to harvesting, which include:</p> <p>a. Agreement to QIA's proposed commitment to review and implement changes to the Wildlife Compensation Agreement (Term 26). It is noted that QIA is the administrator of this program: https://www.qia.ca/programs/mary-river-wildlife-compensation-fund/. See also current guidelines: https://www.qia.ca/wp-content/uploads/2017/05/Mary-River-Wildlife-Compensation-Fund-Guidelines-for-applications-English.pdf and QIA's current application forms: https://www.qia.ca/wp-content/uploads/2017/05/Mary-River-Wildlife-Compensation-Fund-Claim-Form-English.pdf</p> <p>b. Agreement to QIA's proposed commitment for QIA to complete their work the Pond Inlet Country Food Baseline and Culture, Resource and Land Use Assessment (QIA-09), and for Baffinland and QIA to work together with communities to develop Inuit focused indicators (Term QIA-07) and Inuit led monitoring programs (QIA-08). All of these terms will inform discussions related to harvesting impacts, and if required, additional compensation.</p>
3	That Baffinland pay outstanding QIA costs in the amount of \$1,700,000 + GST (2021 Dollars) for engineering and planning costs associated with the Pond Inlet Regional Training Centre by November 15, 2022.	Accepted with revisions	Baffinland will process the payment consistent with its approach to payments to all vendors at this point in time, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.
4	That Baffinland commence payments towards the \$10,000,000 (2018 Dollars) commitment for the Pond Inlet Training Centre, to be paid as follows: <i>October 15, 2022 - \$1,500,000; November 15, 2022 - \$1,500,000; December 15, 2022 - \$2,000,000; January 15, 2023 - \$1,500,000; February 15, 2023 - \$1,500,000; and March 15, 2023 - \$2,000,000.</i>	Accepted with revisions	Baffinland will process the payment consistent with its approach to payments to all vendors at this point in time, which is contingent on available cash flow. Baffinland's cash flow will be greatly improved with the stability of an approval to continue transporting 6 mtpa in 2022.

QIA Term ID	Recommendation	Baffinland Response	Notes
5	<p>That the Project Certificate Terms and Conditions be amended to require the following amendments to the terms of reference for the Marine Environment Working Group and Terrestrial Environment Working Group, after consulting with existing members of each working group.</p> <p>That an independent chair be appointed for each of MEWG and TEWG and that this independent Chair be responsible for scheduling and administering meetings including circulating meeting invitations, agendas and documentation.</p> <p>That the Working Groups’ decision-making process be amended to provide that it must occur on a consensus basis between all working group member parties, with all votes and decisions in writing and recorded by the chair.</p> <p>That the WG decisions be recognized as enforceable recommendations, with provision that Baffinland may request not to enforce the recommendation at which point the matter shall go to the Project Monitor for resolution.</p> <p>That Baffinland fund the involvement of the impacted communities’ HTOs in the Working Groups, with funding for 2 members from the MHTO in each Working Group and for participation from the remaining four HTOs (including through the possible participation of the Qikiqtani Wildlife Board) should they elect to participate in Working Groups.</p> <p>That Working Group materials and records of decisions become public with the independent chair responsible for keeping and circulating minutes which shall be posted to the Baffinland website all meeting minutes once finalized and provided to Baffinland by the independent chair.</p>	Accepted	See Commitment # 015 for reference.

QIA Term ID	Recommendation	Baffinland Response	Notes
6	<p>That the Project Certificate Terms and Conditions be amended to require that Canada appoint an independent compliance monitoring body be appointed by December 31, 2022.</p> <p>That QIA and Baffinland request that Canada support the appointment of an independent compliance monitoring body, based on recommended or agreed nominees from QIA and BIM, to: oversee the implementation of Project commitments; ensure that the interests of impacted Inuit communities are substantially addressed in adaptive management development and implementation and benefit delivery; provide a bi-annual (twice yearly) report on the assessment about success of both parties in reaching benchmarks, with the first assessment due by February 15, 2023 about success in achieving initial commitments related to the 2022 PIP Proposal; and assist in resolution of dispute between the Parties regarding adaptive management and benefit delivery.</p>	Accepted with revisions	<p>Baffinland and QIA have agreed on the concept of a Project Monitor supported by the federal government. We have not previously discussed the concept of an independent compliance monitoring <u>body</u> and is concerned with 1) the expanded scope and complexity of the proposal, and 2) duplication with the environment and socio-economic working groups, including the new expansion of the environmental working groups to include members from all HTOs, as well as any additional groups envisioned under the proposed Inuit Stewardship Plan (of which QIA has asked for a renewed funding commitment from Baffinland and Baffinland has accepted) 3) potential for significant duplication with NIRB monitoring.</p> <p>As an outcome of its mediation with QIA, at QIA's suggestion Baffinland has committed (See Commitment QIA-06) to support the appointment of a Project Monitor to fulfill specific functions in relation to dispute resolution related to Working Group recommendations and Inuit interests.</p> <p>Baffinland suggests that the federal government, QIA and Baffinland proceed with the Project Monitor proposal, and evaluate the effectiveness of the Project Monitor in combination with the addition of additional participation from all of the impacted HTOs in the environment working group. This evaluation can proceed after the delivery of the Project Monitor second bi-annual report before any modifications are considered.</p> <p>Baffinland proposes the following modified wording of this commitment (See Commitment #XX):</p> <p>“That QIA and Baffinland request that Canada support the appointment of an independent compliance monitoring body Project Monitor, based on recommended or agreed nominees from QIA and BIM, to:</p> <ul style="list-style-type: none"> -oversee the implementation of Project commitments; -ensure that the interests of impacted Inuit communities are substantially addressed in adaptive management development and implementation and benefit delivery; -provide a bi-annual (twice yearly) report on the assessment about success of both parties in reaching benchmarks; and -assist in resolution of dispute between the Parties regarding adaptive management and benefit delivery including resolution of dispute over recommendations from the Working Groups.”
7	That QIA and Baffinland jointly develop and approve, by April 2024, the adaptive management elements for monitoring programs and Inuit OITRs for the AMP related to narwhal, seal, Arctic char, caribou, dust and culture, resource and land use.	Agreed in Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p> <p>Baffinland also notes it would regard April 2024 as an outside deadline, and would work to have interim and final management elements and OITRs in place as soon as they are available.</p>
8	That Baffinland support and fund the establishment and first year (from September 15, 2022 – March 31st, 2023) of the Inuit Stewardship Plan. QIA and Baffinland should be required to work together to evaluate the success of the Inuit Stewardship Plan in addressing Inuit concerns after that period. QIA agrees to consider payments received by Baffinland for ICA implementation received to date as partial payment towards this commitment early revenue according to a payment reconciliation completed by the Parties not later than September 15, 2022. Baffinland commits to provide additional funds as agreed between Parties following the development of a budget and workplan by not later than September 15, 2022.	Agreed in Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p>
9	QIA and Baffinland agree that the AMP commitments above require completion of a Culture, Resources and Land Use Assessment (which will be inclusive of a cumulative impact assessment and a freshwater study), the Pond Inlet Country Food Baseline, and the development of the Inuit Stewardship Plan and Baffinland agrees to resource this work according to work plans and budgets prepared on a	Agreed in Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p>

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	bi-annual (twice yearly) basis. Recognizing work to collect IQ on these topics has already been completed by QIA and is currently subject to verification, QIA commits to provide Baffinland with its timeline for sharing the information it has gathered to date, and a memo to confirm the scope of remaining work on these topics, on or before September 15, 2022.		
10	That Baffinland agrees that a further reconsideration is required for any further expansions to or amendments of the Project to address the ongoing uncertainty regarding the accuracy of original effects assessment and the incomplete adaptive management plans and process.	Accept with revisions	<p>The need for and scope of any future reconsideration processes is the responsibility of the Nunavut Impact Review Board and Minister, consistent with the Nunavut Planning and Project Assessment Act.</p> <p>Baffinland will comply with the requirements of the Nunavut Planning and Project Assessment Act with respect to any proposed expansions to or amendments of the Project. In doing so Baffinland will address any relevant uncertainty regarding the accuracy of original effects assessments and the current status of any adaptive management plans.</p>
11	That Baffinland provide, by December 31, 2022, a timeline and plan for development of the monitoring and AMP plans committed to in this Table.	Accepted	
12	That Baffinland provide data on which indicators within the draft adaptive management plans have been triggered within the low, medium, and high response levels.	Accepted	<p>Baffinland accepts the proposed commitment but confirms the evaluation will be delivered through the joint Adaptive Management Plan Working Group to assist in the finalization of key management plans identified in Term 7.</p> <p>See full response to QIA-10.</p>
13	That, within 18 months of receipt of approvals for the 2022 PIP, Baffinland provide to the NIRB a copy of both: The ongoing Pond Inlet Country Food Baseline Study; and aCRLU Assessment that has been verified by QIA and the Project-affected communities; and That these documents must be provided along with an Action Plan for monitoring, mitigation and accommodation of impacts on CRLU, including Inuit food security, with evidence that this has been subject to consultation and verification with QIA and the Project-affected communities.	Agreed in Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p> <p>See full response to QIA-05 – we note that preparation of these assessments and studies is the primary responsibility of QIA.</p>
14	That the Project Certificate Terms and Conditions be amended to specifically require that all shipping and icebreaking for the Project cease by October 31, 2022, and icebreaking must not occur when ice is greater than 3/10 coverage, unless otherwise supported in writing by MHTO and QIA.	Accepted with revisions	<p>Revised commitment language: That all shipping and icebreaking within the Northern Shipping Corridor cease by October 31, 2022 and Baffinland continue to commit to no breaking of landfast ice through the Northern Shipping Corridor.</p> <p>Rationale - Baffinland cannot commit to not breaking ice above 3/10 coverage in the Fall. Based on historical ice data from 1997 to 2020, the average date 3/10 coverage occurs in Eclipse Sound and Milne Inlet is Oct 16, and it's occurred as early as September 27. Icebreaking in the Fall is not carried out in the same way as it is in the Spring. In the Spring, vessels are required to navigate thick first year ice that is steadily decaying in concentration and thickness over a predictable amount of time. In the Fall, freeze-up occurs rapidly in terms of concentration, but slowly in terms of thickness, and the timing is highly variable. In the Fall icebreakers are not required to assist vessels in the navigation of thin new ice, and typically only need to become operational towards the very end of the season when ice thickness warrants it. That being said, icebreakers are a necessary component of the Fall shoulder season as a requirement of vessel owners to ensure safe passage is available in worst-case ice conditions. Without ice breaker support, insurance coverage for ore carriers is not certain to be obtained which in turn may cause vessels to rule out performing Baffinland business altogether during that part of the season.</p>
15	That Baffinland provide scenario planning exercises to better quantify the costs/benefits of ship convoys. To conduct a study to see assess the simple seasonal average observer data from Bruce Head and the Leg 2 surveys correlates with the photo estimates for all the years to assess whether these metrics could provide an EWI for the year's results that would be applied in future to increase or decrease shipping at the end of summer. To resource Inuit-led monitoring, updated EWIs, Inuit OITRs, etc. To conduct a sampling program to assess cortisol levels in narwhal and morphometric measurements. This would be a systematic	Agreed in Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p> <p>See full response to QIA-02.</p>

QIA Term ID	Recommendation	Baffinland Response	Notes
	program working with harvesters to gather samples, and observations on what they are experiencing and comparing to previous years.		
16	That Baffinland and QIA develop, by September 30, 2022, specific technical plans for 2022 for Early Warning Indicators for narwhal.	Accepted	See Commitment #16 for reference.
17	That the Project Certificate Terms and Conditions be amended to require that Baffinland immediately establish an Inuit-led monitoring program on dustfall as a pilot program to establish the mechanisms needed to allow Inuit observations to influence mitigation measures and test appropriate AMP structures, which are demonstrably responsive to Inuit OITRs, with the budget and work plan agreed upon by Baffinland and QIA prior to commencement.	Agreed In Principle	Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.
18	That the Project Certificate Terms and Conditions be amended to require Baffinland to establish a program for identification of days with high risk for dust dispersal, and a plan for additional measures to be taken on those days to reduce the volume of trucks using the Tote Road, the amount of ore being handled and transported at the Mine and Port, and the use of additional dust suppressants on the Tote Road and at the Mine and Port on those days; and That the full list of mitigation measures and the approach for identifying high risk days for dust dispersion be developed by the TEWG and implemented by Baffinland.	Accepted with revisions	Baffinland is willing to commit to identify high risk days for dust dispersion, based on weather. Baffinland will develop weather-specific measures after further review of the QIA's 2021 Dust Investigation Report, the forthcoming 2022 Dust Audit Report, and subsequent discussions with the TEWG. See full response to QIA-03.
19	That Baffinland commit to increasing the frequency for application of DustBlok or similar product along the Tote Road as a condition of receiving approval from the NIRB for the PIP Renewal, and document the frequency of use of dust suppressants applied to the road in the 2022 annual report and make a direct comparison to 2021. That Baffinland leave a minimum of a 31 m buffer but ideally a 100 m buffer in the application of dust suppressants along the Tote Road on either side of water crossings.	Accepted with revisions	DustBlok® application is as per the manufacturer of the product as identified through a site visit to test the specific site conditions and road materials in 2019. The procedure for application consists of an initial application followed by maintenance applications throughout the season. It should be noted that the amount of dust suppression applied is influenced by a number of factors (e.g., precipitation, wind speeds etc.). Therefore, increasing the frequency of the application of the product may not have a direct correlation to reduction of dust. Baffinland is also limited by the current supply of DustBlok it has at the Mine Site for the remainder of the 2022 season. Baffinland proposes the following modified proposal: Refinement of the application rates in accordance with manufacturer's instructions are a more reliable solution to improved dust suppression performance, and Baffinland is willing to make this commitment in relation to the 2022 6 mtpa application. See full response to QIA-07

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20	That Baffinland minimize drop distances (i.e., using adjustable stackers) for stockpiling activities. BIMC to further define the drop distances used and provide evidence in subsequent annual reports that they have been applied. That Baffinland provide an evaluation of where wind fencing would limit dust migrating from the ore stockpiles at Milne Port (and at the Mary River site), and construct them within 60 days of the first sealift/resupply ship arriving at Milne Port in 2023 in order to permit the materials to be shipped. That Baffinland define what other operational practice improvements will be made to minimize dust from Milne Port, and clarify how those measures will be implemented. Changes requiring additional infrastructure or materials should be implemented within 60 days of the first sealift/resupply ship arriving at Milne Port in 2023 while operational changes should be implemented immediately.	Agreed In Principle	<p>Baffinland agrees in principle to the proposed commitment but notes that it extends beyond the temporal scope of the current proposal. Baffinland will include considerations for this commitment in any subsequent applications that would extend 6 mtpa operations beyond 2022.</p> <p>Baffinland further notes that 60 days is not a sufficient time period to expect construction of additional infrastructure following sea lift delivery in 2023. Where Baffinland agrees to install additional equipment and infrastructure, Baffinland will provide a reasonable work plan, inclusive of a timeline to complete the work.</p> <p>See full response to QIA-08.</p>

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21	<p>That Baffinland adopt the following recommendations outlined within QIA’s investigation of the spatial extent dustfall from the Project is impacting the surrounding receiving environment to better characterize the magnitude and extent of those effects: Dustfall isopleth modelling should be updated with real project data (including vehicle traffic patterns, point sources, and dust monitoring data), and the spatial extent of the model should be expanded until Project impacts are indistinguishable from background deposition; Snowpack water quality should continue to be monitored annually at the 20 sites sampled in 2021 to determine if there are spatial-temporal trends in water quality guideline exceedances, indicating priority areas of concern for aquatic and terrestrial receptor effects from metals, TDS and TSS; Dustfall and soil/lichen metals monitoring sites should be expanded at a minimum to include locations identified as Areas of Community Concern, and the areas where the highest dustfall was identified in the 2021 assessment (We direct BIMC to Section 5.3 of HESL 2022 for site locations); Seasonally monitored dustfall sites should be compared with FEIS predictions to confirm that they meet their current low isopleth zone ranking, and to determine the spatial extent and magnitude of dust dispersion beyond the project area; Additional dustfall monitoring locations will help in comprehensively evaluating long-distance dust dispersion. The locations of additional sites should be determined based on results of the updated and expanded isopleth modelling recommended above; A snow quality metric (and associated action level triggers) should be developed, integrating traditional knowledge on acceptable snow quality on the land with western science numerical indicators. The metric should be applied to dustfall monitoring to track snow changes related to dust before adverse effects occur. Mitigation strategies to prevent snow quality degradation, based on this metric, should also be developed; Dustfall monitoring sites should be added along Milne Inlet to investigate increasing dust extent documented by satellite imagery from 2014 to 2020; Satellite imagery analysis should be expanded to include areas beyond 20 km of the Project Development, to cover the locations used in our 2021 field monitoring; The potential influence of local topography on wind patterns and dust dispersion should be investigated, and the results used to inform dust dispersion modelling and assumptions; and A desktop study on dust duration on the land should be designed to identify locations likely to experience longer-term dustfall effects. The study should describe the relative role of runoff and wind in dispersing dust from the land, and consider site-specific factors, such as wind, precipitation, topography, snowpack conditions, and vegetation. These modelling and monitoring recommendations should be implemented by BIMC as a condition of receiving approval from the NIRB for the PIP Renewal. Further, that Baffinland investigate a “threshold” wind speed associated with mobilizing dust from the Project (Mary River, Tote Road and Milne Port), and implement an operational staged decrease in dust generating site activities once that wind speed is met or exceeded. The staged decrease in activities should be clearly outlined in an appropriate plan (e.g., the Environmental Protection Plan).</p>	Accepts with revisions	<p>Before Baffinland commits to any additional dust management measures, a practical approach would be to hold a dedicated Terrestrial Environment Working Group (TEWG) meeting once all the reports are released and Members have had an opportunity to review all the recommendations and their supporting rationale. This would include Baffinlands commissioned Dust Audit Report and QIA’s 2021 Dust Investigation Report. The objective of the meeting would be to reconcile any differences and consolidate a final list of feasible recommendations. We can also use the strength of a newly implemented Terms of Reference for the TEWG that provides for all 5 HTO members to participate, an independent Chair to manage the meeting, and a consensus based decision making process.</p> <p>See full response to QIA-09.</p>

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22	<p>That within 3 months of the receipt of the approvals for the 2022 PIP, Baffinland implement all recommendations for improving their dust monitoring programs, including improved locations of monitoring sites to ensure that stations are not in the “lee” of the wind; alignment of dustfall monitoring with existing vegetation monitoring programs so that the two programs can inform each other; use of passive vertical monitoring in addition to the current isopropyl monitors; continuous monitoring of dustfall at PDA boundaries; finalize methods for bi-weekly regional dustfall extent monitoring using satellite imagery; and other recommendations for dust monitoring improvements contained within the final Dust Audit Report. These improved methods will be included in a revised version of the Air Quality and Noise Abatement Management Plan. Dust monitoring will be used to reassess the impacts of dust from the Project on key receptors, determine the efficacy of existing mitigation measures, and determine if additional mitigation measures are needed. That within 3 months of the receipt of approvals for the 2022 PIP, Baffinland will implement all recommendations of the draft Final Dust Audit Report. Furthermore, Baffinland will implement the following additional mitigation measures: Improved dust control at all locations where ore is moving or being handled at the mine and port sites; Identify high risk days for dust dispersion; Implement additional mitigation measures for ore movement on high risk days, including reduced truck speed on high risk days; avoiding truck use of the Tote road on the highest risk days, and use of additional dust suppressants as needed. That within 3 months of the receipt of approvals for 2022 PIP, Baffinland initiate a remote sensing monitoring program to investigate the impacts of dust on lichen health in the Project area. This remote sensing monitoring program will be designed with input by the TEWG. This information will be used to inform the zone of influence re-estimation for caribou. That within 6 months of the receipt of approvals for 2022 PIP, Baffinland implement all recommendations from the TEWG and/or QIA and the MTHO for improving their vegetation monitoring programs to ensure that metal uptake by vegetation is properly considered.</p>	Accepted with revisions	<p>Before Baffinland commits to any additional dust management measures, a practical approach would be to hold a dedicated Terrestrial Environment Working Group (TEWG) meeting once all the reports are released and Members have had an opportunity to review all the recommendations and their supporting rationale. This would include Baffinlands commissioned Dust Audit Report and QIA’s 2021 Dust Investigation Report. The objective of the meeting would be to reconcile any differences and consolidate a final list of feasible recommendations. We can also use the strength of a newly implemented Terms of Reference for the TEWG that provides for all 5 HTO members to participate, an independent Chair to manage the meeting, and a consensus based decision making process.</p> <p>See full response to QIA-03.</p>

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23	<p>That within 3 months of receipt of approvals for the 2022 PIP, Baffinland will provide funding to QIA to conduct a full study of caribou on North Baffin based on Inuit Qaujimajatuqangit, to identify areas within the vicinity of the Project that are highly sensitive for caribou (Caribou Protection Zones) and to gather data to support the re-estimation of the Zone of Influence around the Project. This Study will be led by QIA in conjunction with the HTOs. The results will be used by QIA to re-estimate the Zone of Influence around the Project and will inform the enactment of additional mitigation measures for caribou.” That within 12 months of receipt of approvals for the 2022 PIP, Baffinland will work with QIA to re-estimate the Zone of Influence for caribou around the Project, using both Inuit Qaujimajatuqangit and western science to determine the extent of reduced habitat suitability around the mine and the likely impacts to caribou at a regional scale. This re-estimated Zone of Influence will be monitored over time as caribou numbers increase, to assess the effectiveness of mitigation measures. That within 18 months of receipt of approvals for the 2022 PIP, Baffinland will implement all mitigation measures for caribou identified by QIA and the HTOs, to ensure that impacts to North Baffin caribou—which are highly sensitive at low points in their population cycles and must be supported to recover—are reduced to the extent possible. QIA and the HTOs may choose to involve the TEWG as an advisory group for the development of appropriate mitigation measures. That immediately following the receipt of approvals for the 2022 PIP, Baffinland will implement the following additional mitigation measures for caribou: a) no blasting within 5 km of all suitable caribou calving and post-calving habitat during the caribou calving period and immediately post-calving, with these dates to be determined by the MHTO; b) helicopters to maintain a 2 km horizontal distance from all suitable calving and post-calving habitat during the caribou calving period and immediately post-calving, with these dates to be determined by the MHTO; c) when caribou are observed along the Tote road, immediate stoppage of hauling for a suitable period of time to be determined in collaboration with the MHTO and the TEWG.</p>	<p>Requires further discussion through the TEWG</p>	<p>Baffinland agrees that Inuit Qaujimajatuqangit (IQ) must inform any initiative to re-estimate the Project’s Zone of Influence, however, we are uncomfortable with a commitment obligating other parties to perform studies with indeterminate scopes and without any indication that this proposed study has the support of the involved communities. Baffinland is also concerned with the QIA’s ability to complete the proposed work in the proposed timeline in addition to the other important initiatives QIA and Baffinland have agreed to carry forward, including the development of the Inuit Stewardship Plan and the completion of a CRLU Assessment and the Pond Inlet Country Food Baseline Report. These are significant undertakings that must be prioritized by the QIA with meaningful engagement from communities to ensure their completion.</p> <p>Baffinland will reconsider the proposal by the QIA as a Member of the Terrestrial Environment Working Group at a later date.</p> <p>See full response to QIA-04.</p>

QIA Term ID	Recommendation	Baffinland Response	Notes
24	That 2018 NIRB monitoring recommendation 2 related to dust management be stringently applied to fish-bearing streams and lakes along the tote road. QIA requests that the Proponent commit to establishing long-term monitoring sites to assess Project impacts on the water quality, sediment deposition, and biota in Phillips Creek. QIA recommends that future DFO permitting for this Project consider the potential impacts of elevated dustfall and eroded sediment from Project activities on juvenile Arctic Char in Tote Road streams, and require studies be conducted should the information prove to be inadequate for impact assessment. QIA recommends that the Proponent establish a meaningful sedimentation threshold based on mortality rates of Arctic Char eggs exposed to Project-generated dust sediment.	Accepted with revisions	<p>Baffinland is already complying with recommendation 2 from the 2018 NIRB Monitoring Report, and the Aquatic Effect Monitoring Plan (AEMP) and Core Receiving Environment Monitoring Plan (CREMP) and Tote Road Monitoring Program (TRMP) adequately monitors Project related aquatic effects, and that through the long-term monitoring sites that assess Project impacts on the water quality, sediment deposition, and biota in the most impacted lake is sufficient to determine if and when modifications are required at other Project locations, including along the Tote Road and Phillips Creek.</p> <p>Baffinland has committed that any exceedance of the 0.54 mm moderate risk level will trigger additional study to validate the thresholds relative to impacts on arctic char eggs. A low risk threshold of 0.15 mm will also be applied that will trigger corresponding low risk response actions.</p> <p>See full response to QIA-01.</p>
25	That the Project Certificate be amended to require Baffinland to develop and maintain a safe travel route around/across km 13 of the Tote Road, to be finalized upon the MHTO providing GPS coordinates of the desired route. This route will be maintained for life of project or until a time when the MHTO determines it must be modified to meet its intended purpose.	Accepted	See Commitment #35 for reference.
26	That Baffinland and QIA undertake to, no later than January 31, 2023: Amend the IIBA (2018) to include Inuit Certainty Agreement Schedule “C”. Amend the WCA consistent with ID-17 Section 17.1.5(a), (b), (c), (d) and (f) of the Inuit Certainty Agreement. In order to address ongoing concerns regarding difficulties Inuit are experiencing in accessing wildlife compensation funding, Baffinland and QIA will work together to review and address the working and efficacy of the administration of the Wildlife Compensation Fund. The Parties will implement changes to the protocol, including claims procedure and substantive criteria, all intended to improve Inuit access to the Wildlife Compensation Fund.	Accepted with revisions	Baffinland accepts the proposal to amend the Mary River Inuit Impact Benefit Agreement by January 31, 2023 to include Inuit Certainty Agreement Schedule C, should this align with the Phase 2 effective date, and to review and implement changes to the Wildlife Compensation Agreement. However, Baffinland does not require an Amendment to the Water License and does not agree to amend the Water Compensation Agreement consistent with Schedule 17 of the Inuit Certainty Agreement for the current scope of activities.
27	That Baffinland agrees to a process to amend the IIBA and Water Compensation Agreement that are required to implement changes to Project management, AMP, Benefits and oversight.	Accepted with revisions	Baffinland accepts the proposal to amend the Mary River Inuit Impact Benefit Agreement by January 31, 2023 to include Inuit Certainty Agreement Schedule C, should this align with the Phase 2 effective date, and to review and implement changes to the Wildlife Compensation Agreement. However, Baffinland does not require an amendment to the Water License and does not agree to amend the Water Compensation Agreement consistent with Schedule 17 of the Inuit Certainty Agreement for the current scope of activities.
28	That Baffinland post a \$5,000,000 Project Bond within 30 days of a positive NIRB recommendation for approval of the 2022 PIP Proposal, and QIA to not draw down the Bond until after March 31, 2023, in order to discharge unfulfilled obligations regarding agreed upon Measurable Objectives under the Inuit Certainty Agreement, as this payment is an aspect of considering whether sufficient accommodation has occurred for the 2022 PIP Proposal.	Not accepted	While Baffinland is committed to the Measurable Objectives referred to in Term 29, there is no obligation for Baffinland to post a Project Bond of any value at this time as the Phase 2 Effective Date (which is the trigger for this obligation) has not yet passed. Even in the circumstance the Inuit Certainty Agreement is terminated, Baffinlands Schedule C obligation towards the Project Bond is clear, it does not remain and Baffinland and QIA shall agree upon a payment method and schedule in the event amounts are owed.
29	That Baffinland accept QIA proposal on Measurable objectives pertaining to the June 2020 ICA commitments which provides objectives for measuring IIBA implementation performance.	Accepted	See Commitment #38 for reference.
30	That Baffinland fund a one-time \$1,000,000 benefit to QIA by March 31, 2023 in the event of the Minister approving the 2022 PIP Renewal.	Not accepted	Baffinland has already provided significant payments to the QIA between 2018 and 2021, the years in which the Project operated at a 6 mtpa limit. This totals over 67,816,349.85 for the 4 year period, or \$16,954,087.46 for each year, on average. The request for an additional \$1million dollar payment is arbitrary, without rationale and Baffinland does not accept the proposal.

APPENDIX 5

SUMMARY OF ENGAGEMENT

The following record details engagements pursued by Baffinland during the period since May 20, 2022 (when Baffinland filed the 2022 Production Increase Proposal Renewal (2022 PIPR) with the Nunavut Impact Review Board (NIRB)) in regards to the 2022 PIPR for continued operations at 6 mtpa and generally in relation to the Mary River Project. Baffinland frequently engaged with interveners – including affected communities, community organizations, Elders, and territorial and federal government and regulatory bodies – to discuss the 2022 PIPR, answer outstanding questions, hear any concerns regarding continued operations at 6 mtpa, and develop mitigations to help address concerns. We also worked to communicate how community feedback was incorporated in the Mary River Project.

In its engagements, Baffinland makes use of various media and engagement platforms including social media, in-person meetings, virtual meetings, and regular correspondence. In community engagements, Baffinland is frequently asked for further details on benefits to communities. Attached as Appendix A to this engagement summary are information sheets broken down by each community which provide further details of benefits. Also, attached as Appendix B are Baffinland’s various social media posts (i.e., Facebook, Twitter, Instagram) made since Baffinland’s 2022 PIPR application filing with the NIRB on May 20, 2022.

Date	Engagement Type	Engaged Participants	Description
2022/05/20	Virtual meeting	Qikiqtani Inuit Association (QIA)	QSTEP updates
2022/05/24	In-person meeting (Pond Inlet)	Mittimatalik Hunters and Trappers Association (MHTO)	Discussion of next steps with Phase 2 process and answers to QIA on the same. Potential path forward for Baffinland.
2022/05/27	Virtual meeting	QIA	QSTEP updates
2022/05/31	Email	QIA	Request to arrange meeting with QIA to discuss Phase 2 process.
2022/06 – 2022/07	Mediation	QIA	Between June to July 2022, QIA and Baffinland participated in a mediation with Mr. Justice Frank Iacobucci. A federal government representative attended as an observer. The mediation resulted in the development of some commitments applicable to the 6 mtpa application, including a recommendation by both Baffinland and QIA for the federal government to support a new Project Monitor and alterations to the Working Groups.
2022/06/01	In-person meeting (Mary River)	QIA	Kick-off meeting for Inspection

Date	Engagement Type	Engaged Participants	Description
2022/06/03	Virtual meeting	QIA	QSTEP updates
2022/06/03	In-person meeting (Mary River)	QIA	Closeout meeting for inspection
2022/06/03	Teleconference	DFO	Plans for remediation of culverts on the Tote Road
2022/06/06	Teleconference	SAO Arctic Bay	General updates
2022/06/08 – 2022/06/15	In-person meeting (Mary River)	QIA (Dust Committee)	Site Audit #2; numerous technical sessions and site tours
2022/06/10	Virtual meeting	QIA	QSTEP updates
2022/06/11	In-person meeting (Iqaluit)	Mayor of Pond Inlet	General updates
2022/06/14	Virtual meeting	MEWG	MEWG Meeting part 1/3 - discussion of upcoming shipping season and 2022 monitoring programs.
2022/06/15	In-person meeting (Mary River)	NIRB	Kick-off meeting for Inspection
2022/06/16	In-person meeting (Mary River)	NIRB	Closeout meeting for Inspection
2022/06/20	Email	Hamlet of Sanirajak	Email to Chief Administrative Officer
2022/06/20	Virtual meeting	QIA	QSTEP updates
2022/06/21	In-person (Mary River) and virtual meeting	ECCC	Kick-off meeting for Inspection
2022/06/22	Virtual meeting	MEWG	MEWG Meeting part 2/3 - discussion of upcoming shipping season and 2022 monitoring programs.

Date	Engagement Type	Engaged Participants	Description
2022/06/22	Teleconference	SAO Arctic Bay	General updates
2022/06/23	Virtual meeting	Terrestrial Environment Working Group (TEWG)	Discussion of 2022 terrestrial monitoring programs
2022/06/23	Virtual meeting	QIA Arktis Solutions	Employment committee meeting
2022/06/23	In-person (Mary River) and virtual meeting	ECCC	Closeout meeting for Inspection
2022/06/24	Virtual meeting	QIA	QSTEP updates
2022/06/27	Email	QIA	Invitation for QIA to meet with Baffinland to discuss upcoming shipping season and PIPR. Baffinland provides answers to QIA questions on Phase 2.
2022/06/28	In-person meeting (Mary River)	DFO	Kick-off meeting for Inspection
2022/06/28	In-person meeting (Mary River)	CIRNAC	Kick-off meeting for Inspection
2022/06/29	Virtual meeting	MEWG	MEWG Meeting part 3/3 - discussion of upcoming shipping season and 2022 monitoring programs.
2022/06/29	In-person meeting (Mary River)	CIRNAC	Discussion of Production Increase Proposal Renewal ("PIPR")
2022/06/29	Email	MHTO	Scheduling of shipping season meeting for July 6, 2022 in Pond Inlet; suggestion of agenda items for consideration during meeting
2022/06/29	Teleconference	MHTO	Scheduling of shipping season meeting for July 6, 2022 in Pond Inlet

Date	Engagement Type	Engaged Participants	Description
2022/06/29	Teleconference	Igloolik Hunters and Trappers Organization	Discussion of PIPR highlights including max 80 vessels, convoys, continued dust management focus
2022/06/29	Teleconference	Nangmautaq HTO (Clyde River)	Discussion of PIPR highlights including max 80 vessels, convoys, continued dust management focus
2022/06/29	Teleconference	Ikajutit Hunters and Trappers Association (Arctic Bay)	Discussion of PIPR highlights including max 80 vessels, convoys, continued dust management focus
2022/06/30	In-person meeting (Mary River)	DFO	Closeout meeting for Inspection
2022/07/01	Email	MHTO	Baffinland confirming July 12-13 dates for dates for schedule of shipping season meeting.
2022/07/04	In-person meeting (Pond Inlet)	MHTO	Brief discussion regarding IIBA Article 17.8 and funding available for the community-based monitoring program, noting that no applications for funding have been received since 2019
2022/07/06	Email	MHTO	Baffinland confirming meeting dates of July 13/14 are suitable for Baffinland, in response to voicemail received from MHTO on July 4 MHTO declining initially proposed meeting dates of July 13/14 meeting with Baffinland due to multiple conflicts
2022/07/07	Email	Hall Beach Hunters and Trappers Association	Follow up on PIPR and meeting scheduling (shared application documents)
2022/07/07	Phone call	Hall Beach Hunters and Trappers Association	Follow up on PIPR and meeting scheduling (shared application documents)

Date	Engagement Type	Engaged Participants	Description
2022/07/12	In-person meeting (Arctic Bay)	Ikajutit Hunters and Trappers Association	Discussion on PIPR, marine aerial surveys, and description of planned baseline surveys at Steensby
2022/07/12	In-person meeting (Arctic Bay)	Arctic Bay Elder	Discussion on importance of mine for youth and the next generations for employment and benefits
2022/07/12	In-person meeting (Arctic Bay)	Arctic Bay Elders	Discussion on importance of mine for employment
2022/07/12	Radio show (Pond Inlet)	Residents of Pond Inlet	Shipping Season (2022) update; introduction of shipping monitor team and mitigation measures
2022/07/15	Teleconference	Mayor of Igloolik	General Updates
2022/07/21	Email	Igloolik Hunters and Trappers Organization	Follow up on PIPR and meeting scheduling (shared application documents)
2022/07/22	Teleconference	Hall Beach Hunters and Trappers Association	Follow up on PIPR; request time to meet with Baffinland team regarding PIPR
2022/07/22	Teleconference	Ikajutit Hunters and Trappers Association	Follow up on PIPR, honorarium, support on documents to support HTO public meeting
2022/07/22	Email	Hall Beach Hunters and Trappers Association	Confirmation of meeting dates regarding discussion of PIPR
2022/07/22	Teleconference	Hall Beach Hunters and Trappers Association	Confirmation of meeting dates regarding discussion of PIPR
2022/07/22	Teleconference	Hall Beach Hunters and Trappers Association	Follow up on PIPR; request time to meet with Baffinland team regarding PIPR
2022/07/25	Email	Ikajutit Hunters and Trappers Association	Check in post Baffinland and IHTA meeting (July 12, 2022); discussing Baffinland's recent PIPR submission (shared application documents)

Date	Engagement Type	Engaged Participants	Description
2022/07/26	In-person (Igloodik)	Igloodik Hamlet Council Igloodik Hunters and Trappers Organization	Discussion on PIPR
2022/07/27	In-person (Arctic Bay)	Ikajutit Hunters and Trappers Association	Public meeting; Discussion on PIPR, motion brought forward for support of PIPR.
2022/07/27	In-person (Sanirajak)	Sanirajak Hamlet Council Hall Beach Hunters and Trappers Organization	Discussion on PIPR
2022/08/02	Teleconference	QIA, Acting ED	General updates
2022/08/04	Virtual meeting	MEWG	Discussion of 2022 shipping season including the updated Shipping and Marine Wildlife Management Plan and the 2022 Narwhal Adaptive Management Plan; brief overview of updated working group Terms of Reference
2022/08/05	Teleconference	MHTO (Chairperson)	Discussion on PIPR
2022/08/08	In-person	MHTO	Public meeting; Discussion on PIPR, motion brought forward to not support PIPR.
2022/08/09	Teleconference	Pond Inlet Elder	Discussion on PIPR
2022/08/09	Teleconference	QIA, Acting ED	General updates
2022/08/09	Teleconference	EDT, Deputy Minister	General updates

Date	Engagement Type	Engaged Participants	Description
2022/08/10	Teleconference	SAO Grise Ford	Discuss preparations for upcoming NIRB Community Round Table (CRT)
2022/08/12	Teleconference	SAO Resolute Bay	Discuss preparations for upcoming NIRB CRT
2022/08/17	Email	MHTO (Enookie Inuarak)	Invitation to engage in further discussions with MHTO to discuss 2022 and planning for the future.

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MARY RIVER PROJECT BENEFITS FOR POND INLET

September 30, 2021

Pond Inlet Direct Benefits

\$16,046,874

Wages to Pond Inlet residents since 2015:

- 2015 - \$1,822,996
- 2016 - \$1,515,516
- 2017 - \$1,794,333
- 2018 - \$1,820,723
- 2019 - \$2,880,585
- 2020 - \$2,626,161
- 2021 - \$1,925,977

46 Pond Inlet residents work for Baffinland out of 286 Inuit employees.

\$140,125 Financial disbursements to Pond Inlet Co-op membership due to charter flight contract signed with Arctic Co-op on April 1st, 2019.

IIBA Harvesters Enabling Program of **\$400,000** annually to Pond Inlet residents. **\$1,380,000** provided to Hamlet for distribution and administration to-date.

\$10,000,000 – Baffinland Inuit Training Centre

\$590,000 Tasiuqtiit Working Group- end of 2020 shipping season

- 2018 - \$130,000 – paid
- 2019 - \$240,000 – paid
- 2020 - \$220,000 – paid

Over \$512,749 Sponsorship and Donations Program since 2018 including (but not limited to):

- Mittimatalik Food Bank donations
- COVID-19 Food Relief

\$124,515 School Lunch Program

- 2017 - \$15,000
- 2018 - \$34,515
- 2019 - \$45,000
- 2020 - \$30,000

\$263,850 Baffinland community office rent and office payments since 2019.

\$15,882,424 Total value of contracts awarded to Inuit firms based in Pond Inlet in 2021 (to August 2021)

IIBA Community Benefits

- **\$750,000** Wildlife Compensation Fund
- **\$275,000** Business Capacity Start-up Fund
- **\$1,100,000** Ilagiiktunut Wellness Fund
- **\$300,000** School Lunch Programs for High Schools and Elementary Schools
- **\$300,000** Community Counsellor through the Ilisaqsivik Society
- **\$300,000** Community Research Vessel approx. value
- **\$200,000** Wildlife Monitoring Program

Pond Inlet Phase 2 Benefits

- **\$1,680,000** committed to Tasiuqtiit Working Group annually at full Phase 2 operations
- **\$1,300,000** one-time payment to the Mittimatalik Hunters and Trappers Organization for changes in hunting experience that Inuit from Pond Inlet have described.
- **\$300,000** partnership with Laval University to build a Pond Inlet Research Centre.
- **40** community-based trainees created in Pond Inlet per year for first 3 years.
- **8** new community-based full-time permanent positions created in Pond Inlet.
- Community Infrastructure to be built including **Community Day Care, Baffinland Office, Training Center and Community Garage.**

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MARY RIVER PROJECT BENEFITS FOR ARCTIC BAY

September 30, 2021

Arctic Bay Direct Benefits

\$18,038,405

Wages to Arctic Bay residents since 2015:

- 2015 - \$1,915,735
- 2016 - \$1,800,199
- 2017 - \$1,625,436
- 2018 - \$1,807,224
- 2019 - \$3,640,000
- 2020 - \$3,179,852
- 2021 - \$2,084,738

\$100,000 School Lunch Program, since 2020.

\$156,623 Financial disbursements to Arctic Bay Co-op membership from the charter flight contract with Arctic Co-op since April 1st, 2019

\$63,250 Total value of contracts awarded to Inuit firms based in Arctic Bay since 2015

Over \$189,610 Sponsorship/ Donations Program since 2018 including (but not limited to):

- \$50,000 - Day Care donation 2019
- Elders' gathering in Igloolik, 2019
- Food Bank donations
- Anu Nunavut Quest (annual North Baffin dog team race)
- Annual Christmas Hampers
- Qamutik Cup Tournament 2018
- COVID-19 Food Relief

\$33,000 Baffinland community office rent to the Hamlet of Arctic Bay since 2019

44 Arctic Bay residents work for Baffinland out of 286 Inuit employees.

In-kind donation of counselor for schools

IIBA Community Benefits

- **\$300,000** Community Research Vessel approx. value
- **\$750,000** Wildlife Compensation Fund
- **\$275,000** Business Capacity Start-up Fund
- **\$1,100,000** Ilagiktunut Wellness Fund
- **\$300,000** School Lunch Programs
- **\$300,000** Community Counsellor through the Ilisaqsivik Society
- If phase 2 approved, Community Infrastructure to be built including **Community Day Care, Baffinland Office, Training Center and Community Garage.**

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- 2015 - \$1,296,631
- 2016 - \$1,500,289
- 2017 - \$1,287,095
- 2018 - \$1,963,520
- 2019 - \$3,227,432
- 2020 - \$2,688,379
- 2021 - \$1,625,950

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- **\$300,000**-ሰላም ድርጅቱ የሰላም ልማት ስራዎች
- **\$750,000**-ሰላም ድርጅቱ የሰላም ልማት ስራዎች
- **\$275,000**-ሰላም ድርጅቱ የሰላም ልማት ስራዎች
- **\$1,100,000**-ሰላም ድርጅቱ የሰላም ልማት ስራዎች
- **\$300,000**-ሰላም ድርጅቱ የሰላም ልማት ስራዎች
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MARY RIVER PROJECT BENEFITS FOR CLYDE RIVER

September 30, 2021

Clyde River Direct Benefits

\$15,164,011

Wages to Clyde River residents since 2015:

- 2015 - \$1,296,631
- 2016 - \$1,500,289
- 2017 - \$1,287,095
- 2018 - \$1,963,520
- 2019 - \$3,227,432
- 2020 - \$2,688,379
- 2021- \$1,625,950

\$424,241

Financial disbursements to Clyde River in the form of donations and food support due to charter flight contract with Arctic Co-op resulting in over 19 tonnes of food being provided since April 2019.

Over \$165,000

Sponsorship and Donations Program 2018-2020 including (but not limited to):

- \$26,000 to Ilisaqsivik Society for COVID19 food relief
- Funding for sports programming, including at Quluaq School
- Ittaq Society

\$57,000 - Baffinland community office rent paid to the Hamlet since 2017

36 Clyde River residents work for Baffinland out of 286 Inuit employees.

IIBA Community Benefits

- **\$300,000** Community Research Vessel approx. value
- **\$750,000** Wildlife Compensation Fund
- **\$275,000** Business Capacity Start-up Fund
- **\$1,100,000** Ilagijktunut Wellness Fund
- **\$300,000** School Lunch Programs
- **\$300,000** Community Counsellor through the Ilisaqsivik Society
- If phase 2 approved, Community Infrastructure to be built including **Community Day Care, Baffinland Office, Training Center and Community Garage.**

Δ^l ∩ C^a ⊆ Δ_b ∩ Ċ

20 $\Delta^b \neg c^a \neg d^c \Delta^{ab} b a \Delta^c b^c >$
 $<^c a^c c^a d^a m^c 286 - a^c \neg b^b$
 $\Delta m \Delta^c \Delta^{ab} b a \Delta^c b^b \neg^c$

[illegible]