

*A SUMMARY OF KEY MONITORING-RELATED
FEEDBACK/SUGGESTIONS PROVIDED TO
BAFFINLAND BY THE WORKING GROUPS SINCE
2018*

Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

| Monitoring Program | Year | TEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback | Reported in |
|--|----------|--|--|---|
| GENERAL | | | | |
| General | pre-2018 | Monitoring components developed with input from TEWG and integrated into the Terrestrial Environmental Effects Monitoring Plan (TEEMP). | N/A | Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019). |
| | 2018 | 1. Challenges with dust control is noted and new mitigations should be considered for inclusion to reduce dustfall (T-03222018; T-05062018; 2018 TEAMR comments); 2. Baffinland requests input from TEWG on evaluation of annual trends to determine if any programs should be changed on results observed thus far. (T-22032018); | 1. Baffinland is implementing new dust control measures including use of calcium chloride (and other options) for dust suppression, and engineering controls such as installation of shrouds at ore transfer points, reducing drop heights, etc.; 2. Baffinland to explore application of new types of dust suppressants to those previously used. | Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019). |
| | 2019 | Ongoing challenges with dust control remains (MHTO, QIA; 2018 TEAMR comments, T-04242019, T-20062019). | Baffinland to be piloting application of a new dust suppressant on Tote Road (Dust Stop®). | Captured through annual reports to the NIRB (e.g., 2017, 2018, and 2019). |
| | 2020 | 1. Ongoing challenges with dust control remains (MHTO, QIA; 2019 TEAMR comments, T-24062020, T-12102020). 2. Baffinland to consider correcting for wind when using sound recorders during noise pilot study (ECCC; T-24062020). | 1. Baffinland to be piloting application of a new dust suppressant on ore pile at Milne Port (DusTreat). 2. Use of acoustic recording units (ARUs) initially used for the Red Knot surveys to be used for pilot noise study in combination with audiomoths. | Additional details to be provided as part of 2020 reporting efforts. |
| DUSTFALL MONITORING PROGRAM | | | | |
| Dustfall Monitoring Program <i>Relevant to PC conditions 36, 50, 54d, 85c, 60</i> | pre-2018 | Monitoring components developed with input from TEWG and integrated into the Terrestrial Environmental Effects Monitoring Plan (TEEMP). | Existing program includes monitoring of dustfall at 33 sites through summer and 16 year-round. | N/A |
| | 2018 | 1. Tote Road traffic should be monitored and presented as part of dustfall results (QIA; T-22032018); 2. Request that dustfall be monitored at all sites year-round (GN, 2018 TEAMR, T-24042019); | 1. Traffic monitoring was included as part of reporting starting in 2018. Improvements were made to the traffic logs to better quantify road traffic; 2. Baffinland restricts winter sampling to only those stations found most valuable (i.e., those located nearest project development areas) given the inherent safety risks associated with visiting sites in the dark winter months and lack of access by helicopter. Accordingly, dustfall sampling is completed year-round at 16 of the 33 monitors. | See 2018 Terrestrial Environment Annual Monitoring Report (TEAMR). |
| | 2019 | 1. Request that additional dustfall samplers be added along the Tote Road to better define the magnitude of dustfall at 1,000 m distance from Project activities (QIA; 2018 TEAMR comments; T-24042019) 2. Request that Baffinland consider installation of dustfall samplers that are at lower heights than the standardized 2 m apparatus currently being used (GN, QIA; T-20062019); | 1. Six new additional dustfall samplers were added along the Tote Road at 1,000 m distance in 2019 bringing the total number of dustfall monitors at the 1,000m PDA boundary to 12. The new samplers were placed at 1,000 m from each side of the road at km 25, 56 and 75. Locations were selected based on input from the MHTO during an August 2018 Mary River Site visit; 2. Sampler (DF-P-01) located at Milne Port near ore stockpile relocated to account for expansion of stockpile area (now called DF-P-08). 3. Baffinland will continue to use dustfall samplers installed at heights of ~2 m high based on standardized methods (ASTM International 2019). | See 2019 TEAMR. |

Notes: Bolded items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Terrestrial Environment Working Group (TEWG) feedback received is provided by referencing either TEWG meeting date(s) (e.g., T-ddmmyyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the Terrestrial Environment Annual Monitoring Report (TEAMR) review process (e.g., 2018 TEAMR and 2019 TEAMR).

Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

| Monitoring Program | Year | TEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback | Reported in |
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| Dustfall Monitoring Program <i>Relevant to PC conditions 36, 50, 54d, 85c, 60</i> | 2020 | <p>1. Request that Baffinland continue to consider installation of dustfall samplers that are at lower heights than the standardized 2 m apparatus currently being used (GN, QIA; T-26022020, T-24062020, T-10122020);</p> <p>2. Baffinland to better investigate dust extent on snow given visual observation as reported by land users (MHTO, QIA; T-26022020, T-24062020)</p> <p>3. Request that Baffinland include longer-term air temperature trends and other weather variables that go back further than 2018 (QIA: TEAMR 2019, T-26022020);</p> <p>4. Request that Baffinland consider investigating soil and vegetation base metals data to, for example, traffic levels and weather conditions that influence dust deposition, and integrate with data on dust extent (T-26022020).</p> | <p>1. Baffinland will continue to use dustfall samplers installed at heights of ~2 m high based on standardized methods (ASTM International 2019). Baffinland has also communicated with Natural Resources Canada (NRCan) to learn further about relevant research methods being completed to monitor dust, including feasibility of using satellite imagery. As part of the December 10, 2020 TEWG meeting agenda, NRCan planned to present their research that is relevant to dust monitoring however due to delays in the meeting schedule, the agenda item will be moved to a future TEWG meeting.</p> <p>2. Baffinland has also included, as part of its 2020 reporting effects, an analysis of satellite imagery examining dust on snow to better understand the extent of dust deposition related to Project activities;</p> <p>3. An update to the analysis and presentation of weather data is planned as part of 2020 reporting efforts. Baffinland will endeavor to show longer-term climate trends instead of summarizing a single year and comparing solely to the previous year.</p> <p>4. Baffinland will continue to investigate the relationship between dustfall and metals concentrations in soil and vegetation in future monitoring programs and analysis, and integrate information with new sampling analyses (e.g., dustfall extent through satellite imagery).</p> | Additional details to be provided as part of 2020 reporting efforts. |
| | 2021 | <p>1. Request by the Nunavut Impact Review Board that quantitative measurements from the dustfall satellite imagery analysis were reported. The request was to include dustfall concentrations and area using the Snow Darkening Index (SDI), a measure of mineral dust on snow.</p> | <p>1. The analysis was completed and included data from Steensby Inlet as a reference area for comparison.</p> <p>2. 14 new dustfall monitoring stations were installed including;</p> <ul style="list-style-type: none">• four additional monitors at Milne Port to better characterize dustfall moving off the Milne Port site;• four new monitors along the section of the proposed Phase 2 railway that departs from the Tote Road right-of-way to define baseline conditions; and,• six dustfall monitors installed to collect dust at a height of 0.5 m. These non-standard monitors are part of a pilot study investigating the variability between dustfall sampling at the standardized height of 2.0 m and closer to ground level. This program was implemented in response to specific requests from the Government of Nunavut and the Qikiqtani Inuit Organization <p>At the end of 2021, 53 dustfall monitors (including the six ‘short’ monitors as part of the trial) were installed at defined/pre-existing monitoring locations.</p> | Additional details provided as part of the 2021 reporting efforts. |

Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

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| | 2022 | 1. Request to expand the dustfall imagery analysis to account for additional areas of interest identified in consultation with the TEWG or through supplementary information requests. | 1. The 2022 and baseline imagery were processed for the expanded study area beyond the original 20km buffer of the PDA. | Response to the Qikiqtani Inuit Association in 2022 Production Increase Proposal Renewal (QIA-09; Baffinland Iron Mines Corporation 2022a), and (cf. 2021 Dust Investigation; Hutchinson Environmental Sciences Ltd. 2022). |
| VEGETATION | | | | |
| Vegetation <u>Vegetation Abundance Monitoring</u> <i>Relevant to PC Conditions 36, 38, 50 and Project Commitments 67, 69, 107</i> | pre-2018 | 1. TEWG request to adapt the experimental design to account for and compare the potential herbivory effects in assessment plots (exclusion fencing). 2. Request to use statistical power analysis to generate sample size. 3. GN and QIA request additional vegetation abundance sites to be monitored in 2018 from 2017. | 1. Baffinland completed its first year of vegetation monitoring in 2014 and addressed this request through assessment of transects 1 to 8 and three reference sites (1 to 3). 2. Increase to number of transects by 7 (1 to 15) and reference sites by 3 (1 to 6) in 2016. 3. Baffinland completed third year of vegetation monitoring in 2017 and requests input from TEWG on future sampling frequency once results are available for review; Vegetation abundance trend analysis will be completed to assess potential changes in percent plant cover and plant group composition. | See 2014, 2016, 2017 TEAMR. |
| <u>Vegetation and Soil Base Metals Monitoring</u> <i>Relevant to PC Conditions 34, 36, 38, 50 and Project Commitments 67, 69, 107</i> <u>Exotic Invasive Vegetation Monitoring and Natural Revegetation</u> <i>Relevant to PC Conditions 32, 37, 38, 50 and Project Commitments 67, 68, 69, 70</i> | 2018 | 1. Request that Baffinland include assessment of soil moisture at vegetation abundance monitoring sites (ECCC; 2018 TEAMR comments, T-24042019, T-20062019); 2. Request that Baffinland add additional reference sites in order to control for the potential effects of soil moisture on plant cover and composition (GN, ECCC; 2018 TEAMR comments, T-24042019); 3. Request that Baffinland justify use of the point quadrat method for vegetation monitoring (GN; 2018 TEAMR comments, T-24042019); 4. Request that Baffinland consider exploring the timing of snowmelt and green-up in future monitoring efforts (QIA; 2018 TEAMR comments, T-24042019). | 1. Baffinland to include soil moisture as part of future vegetation abundance study design; 2. Baffinland to consider addition of new reference sites in 2019 to reduce variability. 3. The point quadrat method for monitoring vegetation abundance is considered one of the most objective and repeatable methods for monitoring vegetation. This statement is supported by several resources across multiple decades from 1933–2013; 4. Baffinland will consider exploring green-up as part of future vegetation monitoring. | See 2018 TEAMR. |

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| Vegetation <u>Vegetation Abundance Monitoring</u> <i>Relevant to PC Conditions 36, 38, 50 and Project Commitments 67, 69, 107</i> <u>Vegetation and Soil Base Metals Monitoring</u> <i>Relevant to PC Conditions 34, 36, 38, 50 and Project Commitments 67, 69, 107</i> <u>Exotic Invasive Vegetation Monitoring and Natural Revegetation</u> <i>Relevant to PC Conditions 32, 37, 38, 50 and Project Commitments 67, 68, 69, 70</i> | 2019 | 1. Request that Baffinland include assessment of soil moisture at vegetation abundance monitoring sites to determine if there are moisture differences between Near and Reference sites (ECCC, QIA; 2018 and 2019 TEAMR comments, T-24042019, T-20062019, T-02262020); 2. Request that Baffinland expand the number of Reference sites as part of the vegetation abundance monitoring program in 2019 (GN, ECCC; 2018 TEAMR, T-11122018, T-24042019, T-20062019). 3. Discussions on frequency of monitoring for the vegetation abundance monitoring program are ongoing (2019 TEAMR comments, T-7102019, T-26022020). | 1. Baffinland added a soil moisture assessment as part of the vegetation abundance study design and analysis. Soil moisture regime was incorporated into vegetation analyses as a covariate to account for associations with some plant groups. Further discussions with ECCC confirmed that additional analysis adequately addressed initial concerns. 2. Baffinland added 9 new vegetation monitoring references sites in 2019 (up from six). 3. Baffinland is in support of completing another year of vegetation and soils base metals/metalloids monitoring in 2020 to further investigate observed potential trends; ongoing discussions regarding frequency of monitoring. | See 2019 TEAMR. |
| | 2020 | 1. Baffinland to consider alternative methods to analyzing vegetation abundance in 2020 (2019 TEAMR comments, T-26022020, T-24062020); 2. As part of additional year of vegetation and soil base metals/metalloids monitoring in 2020, Baffinland to include a more detailed description of sample locations, concentrations and trends, screening for specific metals, in addition to relevant context should specific sample values be above or below analytical detection limits (QIA, ECCC; 2019 TEAMR comments, T-24062020). 3. Request that Baffinland consider exploring the timing of snowmelt and green-up in future monitoring efforts (QIA; 2018 TEAMR comments, T-24042019, T-26022020). | 1. Baffinland will investigate alternative methods for analyzing vegetation abundance in 2020 though this will not result in changes to 2020 monitoring plans. 2. Vegetation and soil based metals sampling completed in 2020. Integration of dustfall and vegetation being addressed through pairing of vegetation sites and new analyses to investigate trace metals to dustfall at paired sites; Further direction from the TEWG regarding sampling frequency, number of representative reference sites, soil moisture regime, and integration with dustfall monitoring can be discussed at future TEWG meetings upon review of newest data; 3. Baffinland completed green-up analysis to better understand timing of vegetation growth. | Additional details to be provided as part of 2020 reporting efforts. |
| BIRDS | | | | |
| Birds <u>Cliff-nesting raptor occupancy and productivity surveys</u> <i>Relevant to PC conditions 50, 73, 74, and Project Commitment 75</i> <u>Pre-clearing Nest Surveys</u> <i>Relevant to PC conditions 66, 70</i> | pre-2018 | 1. Bird surveys are most successful through collaborations established with ECCC-CWS and Arctic Raptors Inc. Raptor program influenced by QIA and TEWG input (QIA; T-05062018). | N/A | |

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| Birds <u>Cliff-nesting raptor occupancy and productivity surveys</u> <i>Relevant to PC conditions 50, 73, 74, and Project Commitment 75</i> <u>Pre-clearing Nest Surveys</u> <i>Relevant to PC conditions 66, 70</i> | 2018 | 1. Continue cliff-nesting raptor occupancy and productivity surveys (T-03222018); 2. Consider inclusion of small mammal trapping as part of raptor studies to assess whether raptor occupancy is associated with natural small mammal cycle (T-03222018) 3. Request for Baffinland to continue collaborating and provide funding and logistical support to regional shorebird monitoring conducted by ECCC-Canadian Wildlife Service (CWS) for improved efforts (T-05062018); 4. Investigate potential presence of Red Knot within the Mary River Project regional study area through vocalization study in collaboration with ECCC-CWS (ECCC; 2018 TEAMR, T-05062018); | 1. Baffinland continues to collaborate with University of Alberta researchers (through Arctic Raptors Inc.) to assess cliff-nesting raptor occupancy and productivity surveys; 2. Small mammal trapping included as part of raptor monitoring program design. 3. Collaboration with ECCC-CWS continues through PRISM surveys in 2018; 4. Red knot surveys deferred to 2019 field season; | See 2018 TEAMR. |
| | 2019 | 1. Investigate potential presence of Red Knot within the Mary River Project regional study area through vocalization study in collaboration with ECCC-CWS in 2019 (ECCC; 2018 TEAMR comments, T-24092019, T-20062019); 2. Request that Baffinland investigate alternative means to small mammal snap-trapping (ECCC: 2018 TEAMR report comments); | 1. Baffinland, in collaboration with ECCC-CWS, deployed 9 passive sound recording devices as an attempt to detect Red Knot vocalizations throughout the breeding season. Based on 2019 results, additional Red Knot surveys are not necessary along the northern transportation corridor and active Project areas (e.g., Mary River, Milne Port). 2. Baffinland considered other methods (e.g., live trapping, indices) however snap-trapping remains most suitable method considering program objectives, timing, and feasibility. | See 2019 TEAMR. |
| | 2020 | 1. Request that Baffinland re-deploy sound recorders in the Steensby Port area and along the south rail line to collect baseline data on Red Knot and other species in those areas (QIA, ECCC-CWS; 2019 TEAMR report comments). | 1. Baffinland will consider the re-initiation of vocalization surveys in suitable Red Knot habitat prior to initiating development-related activities in the Steensby Port and south rail line areas. Note that ARUs were used for noise pilot study completed in 2020. | N/A |
| MAMMALS | | | | |
| Mammals <u>Snow Track Surveys</u> <i>Relevant to PC conditions 54dii, 58f</i> <u>Snow Bank Height Monitoring</u> <i>Relevant to PC conditions 53ai, 53c</i> <u>Height of Land (HOL) caribou surveys</u> <i>Relevant to PC conditions 53a, 53b, 54b, 58b</i> | pre-2018 | 1. All carnivore monitoring programs put on hold in 2015 based on TEWG feedback due to low abundance of wolves. Studies to be reinitiated in the future should changes occur in wolf abundance and after further discussion with the GN and TEWG. 2. Request Baffinland enhance efforts for observing caribou during HOL surveys. | 1. All carnivore monitoring programs put on hold in 2015 due to low abundance of wolves based on TEWG feedback. Baffinland will reinitiate surveys upon feedback from the TEWG, GN or through local knowledge that numbers are increasing and/or high enough to monitor. 2. Increase in HOL survey locations from 16 to 24 and survey time (~15 mins to 20 mins) per station by survey team. | |

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| Mammals <u>Snow Track Surveys</u> <i>Relevant to PC conditions 54dii, 58f</i> <u>Snow Bank Height Monitoring</u> <i>Relevant to PC conditions 53ai, 53c</i> <u>Height of Land (HOL) caribou surveys</u> <i>Relevant to PC conditions 53a, 53b, 54b, 58b</i> | 2018 | <p>1. Request to increase snowbank monitoring frequency (GN; T-22032018; 2018 TEAMR)</p> <p>2. Baffinland to complete snow track surveys to not only look for caribou and other wildlife tracks but also assess potential interactions with Tote Road (i.e., deterrence) (GN; 2018 TEAMR comments, T-24042019).</p> <p>3. General ongoing request to expand caribou monitoring programs, including, though not exclusively, consideration of expanded Height of Land (HOL) surveys (time at each station, addition of new stations and/or frequency of visits since sites only visited once (GN; T-05062018, T-03082018);</p> <p>4. Baffinland to evaluate the addition of "daily species logs" or driver sightings as part of general wildlife incidental sighting records, while correcting for daylight hours, visibility and search effort (ECCC; 2018 TEAMR comments, T-24042019).</p> | <p>1. Baffinland increased snowbank monitoring frequency from one annual survey to at least once per month (November through May), though depends on snow conditions adequate for surveying. in early 2018, banks were assessed in Jan, Feb, April and May.</p> <p>2. To better assess concerns related to road permeability, snow bank height will be recorded at all locations where snow tracks are observed in addition to completing a deterrent assessment (i.e., assess whether animal deterred by road based on direction of tracks).</p> <p>3. Baffinland will consider expanding site-specific caribou monitoring programs when North Baffin caribou numbers increase. Three caribou aerial surveys were completed out of Mary River in April 2018. To help define caribou monitoring at the regional level, Baffinland, in coordination with the Government of Nunavut (GN), remains committed to developing a Memorandum of Understanding (MoU) that outlines a collaborative approach to mutually-sponsoring regional-level information needs. Methods for regional-level monitoring would be determined in conjunction with the TEWG and specifics identified in a future MoU (under development).</p> <p>4. Baffinland will investigate potential ways for standardizing incidental observations to contribute to continual site monitoring of wildlife encounters going forward.</p> | See 2018 TEAMR. |
| | 2019 | <p>1. Specific request to expand HOL survey effort at 24 stations given that no caribou have been observed since 2013 during HOL surveys; specific considerations should be made to incorporate historical migration and calving patterns, and any new information relevant to HOL goals and methodologies (MHTO, QIA; 2019 TEAMR comments, T-24042019, T-20062019);</p> <p>2. Request for snow bank height sampling locations to be randomized for each monthly sampling period instead of revisiting the same locations (GN; 2019 TEAMR comments, T-07102019, T-26022020).</p> <p>3. General ongoing discussions for Baffinland to expand caribou monitoring programs including caribou health assessments through contaminant (metals) monitoring (T-24042019, T-20062019).</p> <p>4. Baffinland to consider completing fox den surveys as part of raptor monitoring program (GN, MHTO; T-20062019).</p> | <p>1. Baffinland doubled its efforts in 2019, by visiting each HOL site at least twice (double effort from 2018) over the surveyed calving season period. Consultation on HOL program design will be considered as part of future TEWG meetings and subsequently considered for implementation in 2021.</p> <p>2. Baffinland will sample snowbank heights using a randomized approach starting in winter 2019. Baffinland notes that snowbank surveys are conducted randomly and opportunistically based on safe driving conditions along the Tote Road and Site Environment staff availability. Surveys are completed independently of road maintenance activities.</p> <p>3. Baffinland's existing vegetation health monitoring program (includes vegetation and soil base metal monitoring) is an integral component for measuring potential pathways of effects leading to metals uptake in wildlife, including caribou. Caribou health as evaluated through caribou tissues and body condition measurements would need to be investigated at a regional level to adequately assess regional trends and provide context for assessing causality and potential impacts related to Baffinland activities. Baffinland notes that previous attempts dating to 2015 were made to obtain sample kits from hunters travelling through Project areas but none were available. Baffinland has insisted that collaboration by numerous parties (e.g., MHTO, GN) is critical for the successful implementation of a caribou tissue monitoring program. Accordingly, Baffinland initiated discussions for potential collaboration with the caribou contaminants project lead funded through the Northern Contaminants Program (NCP) in December 2019.</p> <p>4. Terrestrial program already expanded in 2019 to include avian distance surveys, raptor productivity and occupancy, winter nest counts, and small mammal trapping. To be considered in future years only if relevant to do so.</p> | See 2019 TEAMR. |

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| <p>Mammals</p> <p><u>Snow Track Surveys</u> <i>Relevant to PC conditions 54dii, 58f</i></p> <p><u>Snow Bank Height Monitoring</u> <i>Relevant to PC conditions 53ai, 53c</i></p> <p><u>Height of Land (HOL) caribou surveys</u> <i>Relevant to PC conditions 53a, 53b, 54b, 58b</i></p> | 2020 | <p>1. General ongoing request to expand caribou monitoring program including HOL survey effort, contaminant monitoring, etc. (QIA; TEAMR 2019 report comments, T-24042019, T-20062019, T-24022020, T-24062020, T-10122020).</p> <p>2. Request to integrate further Inuit observations into monitoring efforts moving forward (QIA; TEAMR 2019)</p> <p>3. Request that Baffinland continue to re-evaluate usefulness of existing snow track survey methods including whether this captures potentially more distant avoidance responses and whether existing survey method should be modified to consider alternative approaches such as with surveys completed by snowmobile, drone, etc. (QIA; 2019 TEAMR comments, T-24042019, T-20122020)</p> | <p>1. In order to address questions related to caribou contaminant levels, Baffinland partnered with co-leads (Gamberg Consulting and ECCC) of the proposed Caribou Contaminant Monitoring Program (CCMP) to obtain funding through the Northern Contaminant Program (NCP) in 2020. Through collaboration with the GN, CCMP will be obtaining caribou tissue samples from Pond Inlet hunters to assess their contaminant levels (including metals). As of February 22, 2021, no data is available.</p> <p>Baffinland is conducting analyses to determine the statistical power of various monitoring options to measure potential changes in caribou movement across Project infrastructure. The results of this work will inform decisions regarding future caribou impact monitoring effort;</p> <p>2. Baffinland will discuss further with the TEWG potential options for integrating Inuit observations into future reporting efforts.</p> <p>3. Baffinland notes that the primary purpose of snow track surveys is to monitor how caribou and other wildlife may interact with the Tote Road and associated traffic at close proximity. Accordingly, other surveys may be better suited to assess potential impacts at higher distances such as Height of Land when caribou are seen at higher numbers; Baffinland also notes that use of snowmobiles had been considered during early methodology development but was ultimately deemed unsuitable. Baffinland remains open to considering other suitable alternative options should they be brought forward.</p> | Additional details to be provided as part of 2020 reporting efforts. |

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| | 2023 | 1. Regional Study Area (RSA) was increased to account for GN and MHTO areas of interest. Timing of the study (from fall to spring) were adjusted per GN request and recommendation. QIA requested to be participants and to have prelim report. | 1. These areas were discussed during the June 2022, December 2022 and February 2023 meetings. A request to the MHTO for approval to proceed was granted. The QIA request was granted and committed. | See 2023 TEAMR |
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| | 2024 | <p>QIA recommends that Baffinland conduct western science baseline monitoring for caribou within the regional study area corresponding to the southern transportation route, prior to the start of construction along the route and in accordance with what is deemed reasonably acceptable by the HTOs following their input. QIA recommends that the data be collected using one or more of the following western science methods:</p> <ul style="list-style-type: none">• Collaring of at least 35 caribou in different groups (note: this is the preferred approach if deemed reasonably acceptable to HTOs);• A robust camera trapping study to monitor caribou presence and movement within the study area, to be designed in collaboration with the TEWG. <p>These western science-based monitoring efforts for North Baffin caribou will be used in combination with, and with equal consideration of, Inuit Qaujimajatuqangit, to detect the zone of influence, movement deflections, and habitat loss around the southern transportation route during project construction and operation. QIA recommends that comparable follow-up monitoring continue as deemed necessary by the TEWG throughout the life of the Project, to ensure appropriate mitigation measures are implemented based on the results of these monitoring efforts.</p> | <p>1. Baffinland provided Technical memo “Southern Rail Caribou Baseline Data Collection” to answer the question on the most appropriate method to capture this data. This was discussed in October, 2024 and January, 2025 TEWG meetings.</p> <p>2. Caribou collaring program was discussed as a viable methodology for getting this baseline, but it was turned down by two (2) HTOs, who preferred a camera program, a more expensive and program with a lot of impact, such as regular flights to change batteries.</p> <p>3. Baffinland and GN are exploring a collaboration to conduct a caribou collaring program in response to this recommendation.</p> | <p>Discussed extensively in TEWG meetings of October 2024 and January 2025.</p> |
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Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

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|--|----------|---|--|--|
| | 2024 | 4. The Qikiqtani Inuit Association (QIA) requested that Baffinland the TEWG to redefine caribou deflections to include repeated balking Project area and include the new definition of deflections is included Mitigation and Monitoring Plan. | 5. Baffinland commenced the redefinition of deflections with a technical memo issued on August 16, 2024. This was discussed at the TEWG meeting of October, 2024. Feedback was received and this was included and represented in January, 2025 TEWG. However, members were not satisfied with the use of a “mechanism-related behavioural response” in the definitions. The process is currently ongoing. | October, 2024 and January, 2025 TEWG meetings. |
| HELICOPTER FLIGHTS | | | | |
| Helicopter Flights <i>Relevant to PC conditions 59, 71, 72</i> | pre-2018 | Ongoing efforts to improve flight height compliance tracking and performance. | Flight height data cross-referenced with pilot logs from daily timesheets to help justify non-compliant transits. | |
| | 2018 | 1. Request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale (2018 TEAMR, T-22032018, T-05062018); 2. Request that both horizontal avoidance (to Snow Goose [SNGO] areas) and height restrictions should actively be considered as part of helicopter flight requirements (GN, ECCC; 2018 TEAMR comments). | 1. Baffinland enhanced communications to ensure all personnel are made aware of flight height requirements and reasoning, flight corridors,etc.; Additional pilot oversight provided by Site Environment team to ensure rationale is provided to improve reporting relevant to meeting compliance on flight height requirements. Specific examples provided in report to explain low-level flights (e.g., weather, slinging, staking, drop-off/pick-up); 2. Baffinland reports on individual helicopter flight tracks as part of annual reporting, in addition to advising pilots to stay outside of the defined SNGO area boundary that is buffered by the required 1,500 m horizontal avoidance distance. | See 2018 TEAMR. |

Notes: Bolded items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Terrestrial Environment Working Group (TEWG) feedback received is provided by referencing either TEWG meeting date(s) (e.g., T-ddmmmyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the Terrestrial Environment Annual Monitoring Report (TEAMR) review process (e.g., 2018 TEAMR and 2019 TEAMR).

Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

| Monitoring Program | Year | TEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Response to TEWG Feedback | Reported in |
|--|------|--|--|--|
| Helicopter Flights <i>Relevant to PC conditions 59, 71, 72</i> | 2019 | 1. Ongoing request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale for non-compliance flights (QIA, GN, QIA; 2019 TEAMR comments, T-24042019, T-02262020); 2. Request that both horizontal avoidance (to SNGO areas) and height restrictions should actively be considered as part of helicopter flight requirements (GN, ECCC, QIA; 2019 TEAMR comments, T-24042019). | 1. As part of helicopter briefings, Baffinland provides Snow Goose area boundaries for entry into individual helicopters' GPS systems in order to clearly denote SNGO boundaries. 2. Baffinland continues to work through requests related to improving helicopter flight rationale entries in pilot logs and modifying analyses in order to better understand overall helicopter use and how compliance and non-compliance data is recorded, analyzed and reported. Results presented in 2019 are preliminary and analyses will continue into 2020, including a review of historical data. The 2019 TEAMR does include detailed breakdown of rationale for low-level flights, categorizing compliance into fully compliant, non-compliant with rationale, and non-compliant without rationale. | See 2019 TEAMR. |
| | 2020 | 1. Ongoing request to improve helicopter pilot flight rational entries in pilot logs including descriptions of rationale for non-compliance flights and the provision of total transits (ECCC, QIA; 2019 TEAMR comments, T-02262020, T-24062020, T-10122020); 2. Request that Baffinland consider other areas of observed concentrations of migratory birds that are separate from the identified SNGO area boundaries (QIA, MHTO, ECCC); 2019 TEAMR comments; T-26022020, T-24062020). | 1. Baffinland continues to work through requests related to improving helicopter flight rationale entries in pilot logs and adapting analyses in order to better describe overall helicopter use, assess how compliance and non-compliance data is recorded, analyzed and reported, in addition to summarizing total transits. Baffinland intends to include historical data as part of 2020 data analysis and reporting efforts. This includes changing how helicopter flight data is analyzed and reported (e.g., from points to line segments), and flight duration (i.e., the number of flight hours of compliant and non-compliant flying); 2. Baffinland will consider other areas that may be identified by the TEWG as part of future discussions with the TEWG. 3. Recommendation led to re-analyzing the 2017 to 2019 helicopter flight data to align with updated (2020) standards. | Additional details to be provided as part of 2020 reporting efforts. |
| | 2021 | 1. Based on the request in 2020 by the TEWG to improve helicopter pilot flight rational entries in pilot logs the GN requested re-analysis of 2015 to 2016 helicopter overflight data to align with 2020 standards. | 1. Baffinland re-analyzed the 2015 to 2016 helicopter overflight data to correspond with the 2020 standards. | GN comment GN AR#02 during review of 2020 TEAMR. |
| | 2023 | 1. GN requested amendments to the helicopter overflight rational definitions that were addressed through ancillary consultations and discussions. | 1. The 2023 helicopter overflight data was collected using the amended list of rationale. The 2017 to 2022 helicopter data were re-categorized into the new rationale to compare with the 2023 helicopter data. | GN comment GN AR#01 during review of 2022 Nunavut Impact Review Board Annual Report. |
| WILDLIFE INTERACTION AND MORTALITY REPORTING | | | | |

Table 1: Summary of Program Components and/or Program Design Modifications in Consideration of Terrestrial Environment Working Group (TEWG) Feedback

| | | | | |
|---|------|---|--|-----------------|
| Wildlife Interaction and Mortality Reporting <i>Relevant to PC conditions 53a, 53b, and 57d</i> | 2019 | 1. Request that Baffinland investigate how fox mortality numbers across years compare with data on population cycles and prey availability (lemming cycles) (QIA; 2019 TEAMR comments) | 1. Baffinland notes that assessing the fundamental ecological question of predator/prey relationships is beyond the scope of Project effects monitoring and thus TEAMR, thus will not be considered for inclusion into existing programs. | See 2019 TEAMR. |
| HUNTERS AND VISITORS LOG | | | | |
| Hunters and Visitors Log <i>Relevant to PC conditions 54f</i> | 2019 | 1. Concern that data for number of hunters and visitors are not collected in a way that allows any statement to be made about whether people are avoiding the mine and road or not (QIA; 2019 TEAMR comments). | 1. Baffinland notes that the hunter and visitor log is voluntary to respect individuals' privacy and does not represent a complete record of all visitors passing through the Project area. Regardless, Baffinland will continue to manage access to the Project in a manner consistent with Article 13.3.1 of the Mary River Inuit Impact and Benefit Agreement. | See 2019 TEAMR. |

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Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

| Monitoring Program | Year | MEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Consideration of MEWG Feedback | Reported in |
|--------------------|-----------|---|--|---|
| GENERAL | | | | |
| General | 2018-2020 | Assess existing program design statistical power by running power analyses on all relevant program datasets | Power analyses were completed for MEEMP, Aerial Survey Program, Bruce Head Shore-based Monitoring Program and 2017-2018 Integrated Narwhal Tagging Program. See specific program component for additional detail on when power analyses were introduced and how the results influenced changes to program design (e.g., Marine Environmental Effects Monitoring Program/Aquatic Invasive Species Program [MEEMP/AIS]); and/or were not necessary based on program objective (e.g., no power analyses completed on Ship-based Observer [SBO] data). | Refer to Bruce Head, Aerial Survey, MEEMP/AIS sections for specific details. |
| | | Request further consideration of Inuit perspectives into marine monitoring programs (M-15032018) | 1. Hired increasing number of Inuit researchers in marine monitoring programs (2017 = 12; 2018 = 11; 2019 = 23; Inuit from Nunavut communities could not be hired in 2020 due to COVID-19 restrictions); 2. Annual pre-shipping and End of shipping season and/or monitoring program-specific meetings held between 2018 and 2020 (end of season TBD) which included discussion of monitoring programs; 3. Workshop in Pond Inlet was held in 2017 (included MHTO) to gain more information on area, marine mammals and marine monitoring programs, which influenced planning of 2018 programs; 4. Baffinland included as part of 2017 integrated marine mammal report a summary of marine mammal IQ form community workshops held by Baffinland; 5. End of season Inuit participant interviews participating in programs in 2019 including: Bruce Head Shore-based Monitoring Program, Ship-based Observer (SBO) Program, Marine Mammal Aerial Survey Program and Marine Environmental Effects Monitoring Program (MEEMP)/Aquatic Invasive Species (AIS) Program. 6. Since 2018, Golder technical lead travels to Pond Inlet for in-person meeting with the MHTO (exclusively, not part of MEWG) to discuss aspects of each monitoring program. There are a minimum of two meetings per year for this, one during fall to discuss each of the summer programs that were completed and review preliminary data/discuss Inuit perspectives/etc; and one on the spring to present that year's proposed monitoring programs and to gain Inuit perspectives on the program, discuss hiring initiatives, and request a Letter of Approval for each program. (Note these meetings could not occur in 2020 due to COVID-19 restrictions). Following the HTO meeting, Golder meets with the Inuit participants in Pond Inlet to discuss the same topics as outlined above with HTO, as well as to discuss their potential enhanced involvement in the program (e.g. as Inuit Leads for the program, to get more involved in data analysis and reporting, and overall to garner their input into program design etc for the following year). Golder also maintains regular contact with its Inuit participants via telephone calls, social media and email to exchange information, request information, insight, input, and perspectives. | Captured through annual reports to the NIRB (e.g., 2017, 2018, 2019) and meeting minutes. |
| | | Improve MEWG functioning including feedback processes (M-15032018, M-21062019, M-8052020) | 1. In 2018, Baffinland introduced the Working Group Comment Response Form, which provides MEWG the opportunity to provide specific comments on each of the annual draft marine monitoring program reports. Responses to each of these comments are provided by Baffinland, and if responses have resulted in a change to the monitoring program for future years, this is noted in the response. 2. Multiple iterations have occurred on the existing Terms of Reference related to the working group as led by the GN. Status is ongoing. | |

Notes: Bolded items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Marine Environment Working Group (MEWG) feedback received is provided by referencing either MEWG meeting date(s) (e.g., M-ddmmyyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the various marine monitoring program report review processes, including Annual Reports to the NIRB.

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

| Monitoring Program | Year | MEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Consideration of MEWG Feedback | Reported in |
|--------------------|-----------|--|---|--|
| General | 2018-2025 | General request that seal monitoring be reflected through the various programs (Qikiqtani Inuit Association [QIA], Mittimatalik Hunters and Trappers Organization [MHTO]); M-06062018, M-10122018, M-02252020, M-21062019, M-09122020; 2018 and 2019 Annual Report to the NIRB comments) | Ship-based Observer (SBO) sightings data from 2018 and 2019 records sighting locations of where seals were observed during Botnica transits. Seal sightings were also recorded through aerial surveys completed in 2019 and 2020, and included sightings summary (detection rates) and spatial distribution (locations where they were observed). Note that Baffinland will also be implementing a dedicated systematic aerial-based ringed seal survey in 2021 (photographic and infrared aerial surveys) to identify ringed seal abundance/density and distribution in the RSA including identification of seal hot spots. Baffinland will also be analyzing data collected from a dedicated 2014 ringed seal aerial survey conducted by LGL Limited in the RSA. Both the 2021 and 2014 datasets will be reported in a single ringed seal abundance and distribution report in Q4 2021). Note that Baffinland did not complete ringed seal aerial surveys since 2014 because DFO completed dedicated ringed seal aerial surveys in the RSA in 2017 and 2018 (photographic and infrared aerial surveys) and so this information has been published and thus is available to Baffinland (and the public/NIRB) to inform seal density and distribution in the RSA (no need to duplicate these surveys). Note that Baffinland previously completed ringed seal baseline aerial surveys over a three-year period pre-operations (2006, 2007 and 2008). The 2021 and 2014 ringed seal aerial survey data will be compared to previous DFO survey data (2017 and 2018) and Baffinland baseline survey data (2006-2008). Baffinland has also developed multiple ringed seal specific indicators, thresholds and response actions for its monitoring programs as part of the adaptive management plan for the Phase 2 Proposal, and has been actively engaged with QIA in this process, and once these are vetted by the QIA, will be put forward to the MEWG for their input/vetting (as part of Marine Mammal TARP and Toolkit package). | see 2018, 2019 Ship-based Observer (SBO) reports; 2019 Marine Mammal Aerial Survey Program report; 2020 Marine Mammal Aerial Survey report in preparation and to be submitted as part of the 2020 Annual Report to the NIRB. |
| | | Early Warning Indicators (EWIs) are to be selected by Baffinland (Relevant to PC conditions 110 and 112) (M-13092019, M-1110208, M-10122018, M-25012019, M23042019, M-21062019, M-02252020, M-25062020) | Baffinland has had ongoing engagement with the MEWG to discuss various monitoring variable(s) that may be most suitable to use as a EWI. Calving rate has been deemed the most suitable variable to use as an EWI at this time, though does not prohibit consideration of other variables being actively monitored. Baffinland has also developed multiple ringed seal specific indicators, thresholds and response actions for its monitoring programs as part of the adaptive management plan for the Phase 2 Proposal, and has been actively engaged with QIA in this process, and once these are vetted by the QIA, will be put forward to the MEWG for their input/vetting (as part of Marine Mammal Trigger Action Response Plan [TARP] and Toolkit package). In December of 2020, Baffinland submitted to the QIA the Marine Mammal TARP and Toolkit for their review, input and approval. Several teleconference meetings were held between Baffinland, Golder and QIA prior to this to discuss specifically development of the Marine Mammal TARP and toolkit, including ringed seal indicators, thresholds and response actions. | Baffinland submitted to the NIRB in August 2020 a memo entitled "Early Warning Indicators for Marine Mammals" describing its process and reasoning for identifying narwhal calving rate as a EWI. In December of 2020, Baffinland submitted to the QIA the Marine Mammal TARP and Toolkit for their internal review, input and approval. |
| | | Test sampling of ballast water salinity should be undertaken on all vessels discharging in Milne Port (DFO, QIA, Parks Canada [PCa]). | Baffinland purchased new water quality instrumentation in 2018 to meet industry-standard requirements for reliably measuring temperature and salinity, in addition to a second identical unit. A comprehensive, stand-alone Standard Operating Procedure manual was developed for Baffinland's ship-based sampling program. Subsequently, Baffinland issued a Ballast Water Management Plan (BWMP) in 2019 and accordingly formalized a standard compliance testing program, with results reported as part of annual reporting efforts to the NIRB. | see BWMP (Baffinland 2019) and annual reports to the NIRB (e.g., 2018-2019; 2020 in preparation) |

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

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| | | Baffinland received comments from members- DFO, QIA, Oceans North and Parks Canada on the five (5) year environment monitoring plan. M-05062024; M-20032025 | Baffinland discussed this on three separate occasions – a technical memo providing justification and rationale was shared with members and the NIRB, and written submissions were addressed at the Mar 20, 2025 MEWG meeting. | This has been discussed at June, 2024 and March, 2025 MEWG meetings |
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Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

| Monitoring Program | Year | MEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Consideration of MEWG Feedback | Reported in |
|---|------------|--|--|---|
| MARINE ENVIRONMENTAL EFFECTS MONITORING PROGRAM | | | | |
| Marine Environmental Effects Monitoring Program (MEEMP)/Aquatic Invasive Species (AIS) Program NIRB Project Certificate (PC) No. 005 Terms and Conditions 76, 83 (a), 85, 87, 99, 113, 114, 126 | Up to 2017 | Request geographical expansion of the AIS monitoring program to Ragged Island (MHTO and Fisheries and Oceans Canada [DFO]) | 1. Baffinland implemented a number of changes to the previous 2015-2016 AIS sampling approach (noting that 2010, 2013 and 2014 are considered baseline years) including addition of numerous sampling sites at Milne Port; 2. Program was expanded to include AIS sampling at Ragged Island; 3. Addition of tidal gauge and vertical physical profiles of physical oceanographic parameters in Milne Port. | see 2017 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species (AIS) Monitoring. |
| | 2018 | General request following 2017 sampling year to increase sampling (QIA; M-15032018), including: 1. Request addition of benthic infauna as an Environmental Effects Monitoring (EEM) indicator for the MEEMP program (QIA, Environment and Climate Change Canada [ECCC], DFO; 2017 MEEMP/AIS report comments, M-06062018); 2. Request establishment of permanent belt transects in the MEEMP program in lieu of epibenthic/epifloral underwater towed video surveys along historical transect lines (un-marked) (QIA, PCa; 2017 MEEMP/AIS report comments, M-06062018). 3. Request to extend duration of the fish monitoring program to occur over a longer extent of the open-water season than in previous years of monitoring and expand types of sampling gear used (2017 MEEMP/AIS report comments; M-06062018); 4. Request to use other species other than char in tissue/body burden monitoring as part of MEEMP program, given that Arctic char are not resident in marine environment throughout year (2017 MEEMP/AIS report comments; M-06062018, M-06212019); 5. Request expansion of AIS program including undertaking ship hull biofouling through dive program (2017 MEEMP/AIS report comments; M-06062018); 6. Request integrating into AIS program the use of an independent secondary taxonomic lab for taxonomic verification of potential AIS. At DFO’s request, Université Laval (Dr. Philippe Archambaults’ Benthic Ecology Lab) was selected for this purpose, as this is DFO’s arctic specialist lab which they rely on for their invasive species work (DFO, QIA, PC, Oceans North [ON], World Wildlife Fund (WWF); 2018 MEEMP/AIS report comments). | 1. a) Two new sediment sampling stations added along East Transect to account for future expansion (Freight Dock); b) Addition of benthic infaunal sampling to the distance-gradient design, replacing epifauna and macroflora previously completed through towed underwater video transect surveys. Infaunal samples collected along three transects (North, West, East) with programs radial design, and in concert with sediment sampling. Sediment sampling and infaunal sampling was increased from 5 sampling stations on each transect to 15 sampling stations per transect based on input from MEWG and requirement to increase statistical power (and hence increase sampling intensity/sample sizes. Baffinland also relocated several benthic infaunal sampling stations (15-25 m) that were part of the 2014-2017 AIS monitoring to new locations along the three existing MEEMP transects used for EEM; 2. Addition of a Before-After-Control-Impact (BACI) approach along transect lengths, using 10 permanent belt transects (5 Exposure and 5 Reference locations) and monitoring using a remotely operated vehicle (ROV) underwater video system and removal of towed video surveys for benthic epifauna and epiflora along transect lengths. 3. Baffinland extended its fish sampling program to run over four weeks in 2018, therefore doubling of duration from 2017 over which fish sampling occurs. New sampling gear/existing sampling method modifications (eg., gillnetting, Fukui traps, angling, beach seines) to improve fish catch rates and expand diversity of species captured. 4. Addition of local shellfish species <i>H. Arctica</i> in addition to incidental mortalities of Arctic char for tissue sampling. 5. Baffinland expanded AIS program to include remotely operated vehicle (ROV) with underwater video capacity in 2018 to assess biofouling on ships as an alternative monitoring tool to proposed dive program due to unmanageable safety concerns and administrative restrictions. Taxonomic data collected through increased sampling used to inform Aquatic Invasive Species (AIS) / Non-indigenous species (NIS) surveillance monitoring; deployment of AIS settlement plates in sets so their recovery can be staggered to allow for longer soak duration and thereby the collection of older specimens of the fouling taxa that are easier to identify. 6. Baffinland has integrated into the AIS program the use of an independent taxonomic lab for taxonomic verification of potential AIS since 2018, and specifically has sent samples to Université Laval (Dr. Philippe Archambaults’ Benthic Ecology Lab), as recommended through MEWG review. | See 2018 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Program report. |

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Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

| Monitoring Program | Year | MEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Consideration of MEWG Feedback | Reported in |
|--|------|---|---|--|
| Marine Environmental Effects Monitoring Program (MEEMP)/Aquatic Invasive Species (AIS) Program NIRB Project Certificate (PC) No. 005 Terms and Conditions 76, 83 (a), 85, 87, 99, 113, 114, 126 | 2019 | <p>1. Evaluate existing program design's statistical power by running power analyses on existing datasets with each year of sampling (QIA, DFO, PC; 2018 MEEMP/AIS report comments, M-23042019, M-21062019);</p> <p>2. Request adding additional sampling stations along each transect for benthic and sediment sampling to increase power of detection (DFO, QIA; 2018 MEEMP/AIS report comments, M-23042019, M-21062019, M-25022020);</p> <p>3. Request addition of a new offshore transect in the MEEMP benthic and sediment quality sampling program-extending in a northeast direction from the ore dock. This was to cover new area where floating freight dock and proposed second ore dock will be located (QIA, DFO; 2018 MEEMP/AIS report comments; M-23042019, M-21062019, M-25022020);</p> <p>4. Request modifications to Fukui traps to increase catch rate (literature shared by QIA – incorporated into sampling methods), and also varying sampling methodology (location, depth, bait, checking frequency) to increase catch rate (QIA; 2018 MEEMP/AIS report comments; M-23042019; M-21062019);</p> <p>5. Request addition of hoop/fyke nets to MEEMP fish sampling program to compensate for low catch in Fukui traps (DFO, QIA; 2018 MEEMP/AIS report comments, M-23042019, M-21062019);</p> <p>6. Request introduction of bottom trawls to MEEMP fish sampling program (QIA, DFO) to target other potentially missed species (e.g. Arctic cod) (DFO, QIA; 2018 MEEMP/AIS report comments; M-23042019; M-21062019);</p> <p>7. Recommendation to do ageing study of <i>H. arctica</i> so this information can be used to interpret any changes in growth and metal uptake. This was because this species was shown to have an extended lifespan (+100 years) in Greenland and therefore might not be an ideal indicator species for Project body burden tracking. (QIA)</p> <p>8. Arctic char age determinations be verified by expert with extensive experience reading char otoliths as they can be fairly long-lived species (methodology provided). (QIA; 2018 MEEMP/AIS report comments);</p> | <p>1. Baffinland completed an a priori power analysis in 2018 which informed the 2019 sampling design (power analysis results indicated a need to increase sampling effort). The MEEMP sampling design was subsequently modified in 2019 to satisfy statistical power requirements for detection of Project effects, as outlined in the 2018 MEEMP Report. Note that following the analysis of MEEMP data collected in 2019, power analyses were completed and included in the 2019 MEEMP Report:</p> <p>2. Following the results of the power analysis, benthic infauna and sediment sampling stations were changed to a larger radial gradient design increasing from four transects with 5 stations to five transects with 15 stations (i.e., tripling of samples) to improve statistical power and the ability to detect Project-related effects (though only 10 of 15 were completed in 2019 due to logistical constraints). Separate AIS stations were not sampled due to the expansion of the benthic sampling program. Benthic infauna and sediment samples were collected using a standard Ponar grab and a Van Veen grab, increasing the sample volumes and surface areas; Also change in composite sampling where 3 subsamples composited into single sample for each station;</p> <p>3. Addition of 5th transect (Northeast Transect) in consideration of Freight Dock and potential future second Ore Dock. North Transect renamed to Northeast Transect;</p> <p>4. Modification to Fukui traps implemented explored and change in fish sampling gear to include fyke net to assess its potential for eventual replacement of Fukui traps. Baffinland incorporated feedback in 2019 on increased jigging and gill net sampling effort to allow for more consistent and repeatable fish sampling between monitoring years in MEEMP Program;</p> <p>5. Baffinland expanded sampling methods in 2019 and included the use of fyke nets.</p> <p>6. Baffinland expanded program design in 2019 and implemented in 2020 (could not be done in 2019 due to late arrival of research vessel) to included bottom trawls to MEEMP fish sampling program to target other potentially missed species (e.g., Arctic cod).</p> <p>7. Fish tissue sampling expanded to include sculpin species in 2019;</p> <p>8. Shellfish <i>H. arctica</i> samples submitted for age analysis instead of collecting length and weight measurements in the field and in consideration of aging protocol; Consideration of unique Arctic char age reading by aging lab.</p> <p>9. Baffinland modified program design in 2019 to use higher resolution video equipment with improved lighting for ship hull monitoring. Baffinland also investigating a reasonably practical and safe means to collect biological samples from ship hulls for taxonomic identification. Ship hull monitoring effort increased to 6 vessels. (An even higher resolution ROV was also used in 2020 to further address concerns.)</p> <p>10. Vertical physical profiles of water quality parameters including temperature, salinity, conductivity, turbidity, pH, chlorophyll-a, and dissolved oxygen were taken north of Ragged Island in Eclipse Sound in August and September. Increased spatial coverage of vertical physical profiles of conductivity/salinity, temperature and depth (i.e. CTD profiles) near Milne Port following deployment and recovery of Physical Oceanographic moorings;</p> <p>11. Background review of potential sea level rise in Nunavut to provide context to ongoing continuous monitoring of water levels at Milne Port Ore Dock in the open-water season. Background review of hydrology and geomorphology in Phillips Creek Estuary to assess the potential for natural sediment redistribution at the head of Milne Inlet;</p> | See 2019 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species (AIS) Monitoring Program (including Appendix O). |

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Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

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| Marine Environmental Effects Monitoring Program (MEEMP)/Aquatic Invasive Species (AIS) Program NIRB Project Certificate (PC) No. 005 Terms and Conditions 76, 83 (a), 85, 87, 99, 113, 114, 126 | | 9. Recommendation of using higher resolution video equipment for ship hull monitoring for biofouling including improved lighting systems was incorporated into AIS Program (QIA, DFO, WWF, ON; 2018 MEEMP/AIS program report comments); 10. Installation of oceanographic moorings in study area and increased CTD depth profiling to better understand physical oceanographic conditions in Milne Inlet, to be used to further inform monitoring programs and ballast water dispersion (including modelling). (QIA; 2018 MEEMP/AIS program report comments); M-21062019) 11. Undertake further study to determine influence of Phillips Creek on MEEMP results (QIA; 2018 MEEMP/AIS report comments, M-21062019, M-05032020); 12. Additional water quality sampling requested. Will tie into general monitoring and ballast water dispersion model prediction including a sensitivity analysis using actual ballast water volume, temperature and salinity measurements recorded during 2018 shipping operations (QIA, PC, DFO; 2018 MEEMP/AIS program report comments; M-21062019, M-25022020). | 12. Additional water quality sampling completed as part of 2019 monitoring at 4 standard stations in radial pattern offshore from discharge point and sampled 6 times over ~ 6 weeks (1 week longer than in 2018, as recommended by MEWG). | |
| | 2020 | 1. Follow-up request adding additional sampling stations along each transect for benthic and sediment sampling to increase power of detection (DFO, QIA; 2018 MEEMP/AIS report comments, M-23042019, M-21062019, M-25022020); 2. Suggestion for collection of specimens for DNA analysis (DFO; 2019 MEEMP/AIS report comments, M-25062020) 3. Suggestion that water sampling be timed to occur during active discharging ballast water for subsequent eDNA sampling (though limitation in discriminating between live versus dead samples) (DFO; 2019 MEEMP/AIS report comments, M-25062020). | 1. Following the results of a power analysis in 2019, benthic infauna and sediment sampling stations were changed to a larger radial gradient design increasing from four transects with 5 stations to five transects with 15 stations each to improve statistical power and the ability to detect Project-related effects. All stations were successfully sampled in 2020; 2. Baffinland has modified sampling program to include the retention of samples for subsequent DNA analysis. 3. Baffinland will continue to discuss the development of a biological sampling plan with DFO. Baffinland had previously committed to implementing a program based on DFO guidance and this was intended to be completed in 2020. Due to logistical limitations associated with COVID-19, Baffinland was unable to complete this program. Initial resolution with DFO is that DFO will lead a field program in support of the development of a risk-based approach for future compliance monitoring. | Additional details to be provided as part of 2020 reporting efforts. |

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| BRUCE HEAD SHORE-BASED MONITORING PROGRAM | | | | |
| Bruce Head Shore-based Monitoring Program <i>Relevant to PC Conditions 99, 101, 109, 110, 111, 112, 126</i> | Up to 2018 | 1. Request to supplement visual observations with drone footage as a means to verify observation counts and correct for observation bias under conditions of low visibility or increased distance. 2. Consider alternate locations for the observation platform to allow for the inclusion of new strata that would allow to assess non-travel-based narwhal behaviour (e.g., sedentary types such as milling, foraging, etc.); 3. Shore-based monitoring approach better than alternative method used in 2018 (MHTO; M-09132019) | Baffinland to consider these during future Bruce Head implementation since shore-based program was not possible in 2018. | See 2014-2017 Final Data Integration Report: Bruce Head Shore-based Monitoring. |
| | 2019 | 1. Consideration of integrating passive acoustic monitoring with marine mammal observations made at Bruce Head and tagging program (M-10122018); 2. Assess existing program design statistical power by running power analyses on existing datasets (M-06212019) 3. General request to improve Bruce Head monitoring surveys to better characterize marine mammal behavioural responses to vessel exposure events, group composition estimates, Relative abundance and distribution (RAD), etc. including installation of physical oceanography mooring at Bruce Head to correlate narwhal behaviour with tide/current levels (QIA/DFO; M-06212019, M-02252020); 4. Develop a means to determine detection in furthest offshore strata (PC, QIA; M-06212019). 5. Request to increase survey effort to capture more ship transit events and increase overall samples size (MHTO, QIA, DFO, WWF) 6. Suggest further increasing survey effort so that more transits are recorded over the sampling season (DFO; 2019 Bruce Head Shore-based Monitoring Program comments). 7. MEWG has questioned the validity of using a 10 km exposure zone 8. Consideration of including assessment of potential hunting effects into analysis going forward (QIA; 2019 Bruce Head Shore-based Program report comments). | 1. Baffinland resumed its shore-based monitoring program at Bruce Head in 2019 and 2020 with modifications to the study design to provide a more comprehensive approach for assessing potential effects to narwhal from Project-related activities. JASCO undertook a passive acoustic monitoring (PAM) in 2019 and 2020 that was run concurrently with the Bruce Head Program and involved the deployment of underwater recording stations directly in front of the Bruce Head survey platform within sighting range of Bruce Head observers such to be able to integrate changes in narwhal vocal behaviour in concert with observed changes in relative abundance, distribution and behaviour (as recorded by Bruce Head observers). Related to this work, Golder and JASCO, on behalf of Baffinland, have partnered with the University of New Brunswick (UNB) to undertake several investigations that aim to link shipping noise levels obtained from the multi-year PAM program and changes in narwhal behaviour as recorded from the Bruce Head program (i.e., to investigate the relationship between behavioural responses observed in the monitoring programs and estimated received sound levels experienced by marine mammals). Two Master of Science (MSc) graduate students from UNB are leading this work under the direction of Dr. John Terhune (Professor Emeritus in the Department of Biology, UNB). Sam Sweeney (MSc Candidate #1) is specifically looking at broadband noise perception by narwhal related to Baffinland shipping in the Regional Study Area (RSA). This work has involved applying a narwhal-specific auditory weighting function to ship noise recorded at the Bruce Head PAM recorders to determine the durations and amplitudes of broadband noise from individual ore carriers as they transit over the recording stations (representing the sound levels that would be perceived by narwhals in their receiving environment). Using this information, Sam Sweeney has integrated ship movement data (available from Automatic Identification System [AIS] ship tracking system) to assess the sound output from transiting vessels as a function of vessel distance, vessel travel direction and vessel orientation. Using existing Bruce Head behavioural datasets from 2017 and 2019 and existing PAM datasets from 2014, 2015, 2018 and 2019, Sam Sweeney's overall study objective is to evaluate if there is a relationship between perceived broadband noise levels and observed surface behavioural responses of narwhal to shipping. This work is presented in Sam Sweeney's MSc thesis which was formally submitted to UNB and his committee in January 2021. | see 2019 Bruce Head Shore-based Monitoring Program Report (Golder Report); 2020 Bruce Head Shore-based Monitoring Report (Golder Report, pending); 2017-2018 Integrated Narwhal Tagging Program; 2019 Passive Acoustic Monitoring Program (JASCO Report); 2020 Passive Acoustic Monitoring Program Report (JASCO Report, pending), Golder Technical Memorandum: Movement of tagged narwhal (<i>Monodon monoceros</i>) in relation to icebreaking operations and associated vessel traffic during the 2018 fall shoulder season; Golder Technical Memorandum: Summary results for the 2019 Marine Mammal Monitoring Programs |

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| Bruce Head Shore-based Monitoring Program <i>Relevant to PC Conditions 99, 101, 109, 110, 111, 112, 126</i> | | 9. Suggest including the distance of vessel from monitored animals during surveys - Baffinland has indicated limitations to this approach through use of UAVs in 2020 and by assessing received noise levels and associated changes in behaviour (2019 Bruce Head Shore-based Program report comments). | <p>Sam's MSc defense is planned for April 2021. Sam's research on this topic is expected to be submitted for publication in a scientific journal in 2021. Crystal Prieur (MSc Candidate #2) is using existing 2018 and 2019 PAM data from Bruce Head and concurrent ship movement (AIS) data to evaluate potential changes in narwhal vocal behaviour in relation to Baffinland shipping activities. This work will be presented in Crystal Prieur's MSc thesis which is scheduled for completion in Q4 2021. Crystal Prieur's MSc defense will occur shortly thereafter and her research is expected to be submitted for publication in a scientific journal in early 2022. Golder and JASCO have also been engaged in a collaborative study that aims to correlate mother-calf behavioural information collected by visual observers at Bruce Head with narwhal vocalization data collected in 2019 and 2020. This represents an exploratory analysis of mother-calf contact calls based on an integration of visual behavioural data from Bruce Head and passive acoustic data from Bruce Head. This study aims to identify unique mother-calf contact calls (similar to those reported in beluga) which could then subsequently be used to test for changes in mother-calf vocal communication relative to ship noise. Finally, Golder/JASCO, on behalf of Baffinland, have undertaken additional analyses to incorporate measured ship sound levels collected as part of JASCO's PAM Program with numerical acoustic modelling, in order to link behavioural responses observed in tagged narwhal (as collected from the 2017 and 2018 narwhal tagging program) with estimated received levels from shipping experienced by narwhal at specific exposure distances. Results from this work have been used to investigate whether or not specific broadband received sound levels are correlated to a consistent behavioural response demonstrated by narwhal in the presence of shipping. Results from this work are presented in a Golder Report entitled 'Narwhal Behavioural Responses Relative to Vessel Exposure Distances and the 120 dB Disturbance Threshold', which will be included as a companion document to Baffinland's 2020 Annual Report to NIRB (planned for submission in Q1 of 2021). This work serves to evaluate the appropriateness of using the existing 120 dB disturbance threshold for narwhal with respect to the assessment of ship noise on narwhal behavioural responses (and would validate whether there is need for a possible refinement /or adjustment of the existing 120 dB disturbance threshold). This is a complex exercise, and has taken considerable effort to date to achieve this objective with a reasonable level of confidence. As demonstrated above, Baffinland's marine mammal monitoring programs and PAM programs are inherently integrated.</p> <p>2. Power analyses were completed for the 2019 Bruce Head program (as well as for Baffinland's other statistically-based marine mammal monitoring programs) to assess the statistical power for this program. This included performing a series of model simulations to quantify the model's statistical power to detect various effect sizes (see Appendix E for details). These will be continued into future years including 2020.</p> <p>3. An unmanned Aerial Vehicle (UAV) or drone-based survey component was introduced in 2019 (and continued in 2019) which was intended to improve monitoring of marine mammal behavioural response and changes in group composition relative to shipping. The UAV was also used to ground truth sightability of narwhal in the various study strata from the vantage point of the observation platform (including testing for the ability for observers to detect narwhal in the furthest strata). The UAV also provided detailed information on narwhal presence in the vicinity of acoustic recorders in order to correlate visual observations of narwhal with acoustic behaviour. Further to this, the Stratified Study Area (SSA) boundary was expanded to include substrata (J1 and J2) at the mouth of Koluktoo Bay to further evaluate narwhal movements at the mouth of Koluktoo Bay in relation to vessel traffic (strata K and L too far as suggested by QIA); only strata J and existing</p> | See Golder Technical Memorandum: Summary results for the 2019 Marine Mammal Monitoring Programs; Golder Technical Memorandum: Golder Review of Jones (2020) Draft Report: 'Passive Acoustic Monitoring of Underwater Radiated Noise from Ships in Eclipse Sound, Nunavut (2018-2019). |

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| Bruce Head Shore-based Monitoring Program <i>Relevant to PC Conditions 99, 101, 109, 110, 111, 112, 126</i> | | | <p>A-I will be included going forward into 2020. An oceanographic mooring was installed in 2019, and data was collected and analyzed as part of the 2019 Bruce Head monitoring study to incorporate potential influence of tide in the model.</p> <p>4. See response above.</p> <p>5. See response to #6</p> <p>6. Golder increased its survey effort in 2019 by extending the period of daily observations from 8-10 hours in 2017 to 16 -18 hours in 2019 and 2020. To accomplish this, Baffinland had to relocate the living camp from 1.5 km inland to the cliff site so that observers were closer to the observation platform (and eliminate the 1 hour walk each way each day). Baffinland also doubled the number of observers starting in 2019 (and extending into 2020) to achieve 16 to 18 hours of sampling effort per day (compared to 8 to 10 hours in 2017). Also improved down time due to weather. Due to logistical constraints of maintaining an operational camp, the field program cannot be extended over the entire shipping season.</p> <p>7. Analysis approach based on restriction of exposure zone from 15 km to 10 km based on noise modeling and tagging efforts. Baffinland has provided multiple lines of evidence supporting its approach to narwhal-vessel exposure event analyses. This is described in detail in Golder's review of Jones (2020) draft report (Golder 2021).</p> <p>8. Hunting effect has been considered in the Bruce Head analyses since 2015. However, this was more systematically integrated starting in 2019 by installing in-air acoustic recorders above the Bruce Head hunting camp which serve to record gun shots from local hunting activities, which is then processed and integrated into the Bruce Head database. This allowed for hunting to be included in the analyses with hunting included as a co-variable in the model.</p> <p>9. Distance from vessel is more adequately analyzed as part of the narwhal tagging program, as this is the only program in which precise locations are simultaneously available for both narwhal and ships. This metric is already integrated in the tagging report. Distance between narwhal and vessel is also evaluated indirectly in the Bruce Head Program by considering in the analysis the relative distance between individual survey strata and Project vessels - in relation to observed changes in relative abundance, group composition and behaviour.</p> | |

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| Bruce Head Shore-based Monitoring Program <i>Relevant to PC Conditions 99, 101, 109, 110, 111, 112, 126</i> | 2020 | 1. Request that noise from different vessel types be assessed through noise monitoring (QIA; 2019 Bruce Head Monitoring Program report comments); 2. Consider use of UAV to assess the difference in narwhal response to north- and southbound vessels to the difference in vessel noise propagation (QIA; 2019 Bruce Head Monitoring Program report comments). 3. Support for continuation of behavioural data (QIA; M-02252020) | 1. Sampling design to include higher daily observer effort (up to ~20 hours of daily coverage per day); due to logistical constraints of maintaining an operational camp, the field program cannot be extended over the entire shipping season and is therefore restricted to run over ~4 weeks during peak narwhal activity. 2. Use of UAV to monitor changes in group composition and behavioural in the Behavioural Study Area (BSA) relative to shipping activities, monitor the study area concurrently with shore-based observations to confirm sightings information, monitor changes in abundance and behaviour of marine mammals in a defined study area in Koluktoo Bay (outside of visual range of the platform), evaluate detection performance (i.e., ability to effectively detect animals) in the distal portions of the study area, and assess vocal behaviour of narwhal groups in relation to vessel traffic through visual-acoustic correlation (VAC) study report. 3. Further restriction of the exposure zone to better assess close proximity effects (≤ 3 km) with the goal of increasing statistical power to detect potential effects of shipping on narwhal behaviour and group composition (supporting EWI work). 4. Hunting effect to be considered for subsequent analyses (though for 2019 onwards only) given that wildlife acoustic recorders were only installed starting in 2019. 5. Inclusion of animal density estimates as part of RAD analyses completed in SSA to account for potential differences in relative density between stratum. 6. Assessment of noise emitted by different vessel types (QIA); Baffinland notes that this is being pursued as part of graduate student's thesis at UNB, as described further above for year 2019. | Additional updates to be provided as part of 2020 reporting efforts. |
| | 2021 | 1.DFO's comment on calculation of error around the proportion of calves for the Early Warning Indicator was intended as a recommendation. In order to determine if there is a significant change in the proportion of juvenile narwhal, it is important to develop an index of variability in the measurement as well as an indication related to the error around the measurement. (DFO comment submitted 18 June 2021). | 1. An assessment of variation in the EWI analysis, in relation to the baseline levels (i.e., proportion of immature narwhal in 2014–2015), was modified to include an index of variability. An effect size was calculated as the difference between each year's least squares mean and the average of 2014–2015 least squares mean values, expressed as percentage out of the average of 2014–2015 least squares mean values. The revised EWI threshold is deemed to have been exceeded if a statistically significant difference is observed between each year's least squares mean and the average of 2014–2015 least squares mean values. | See 2022 Bruce Head Shore-Based Monitoring Program - Final Report |

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|---|------|--|--|---|
| | 2022 | 1.Requests that Baffinland make additional efforts to solicit IQ on narwhal life history functions (QIA; 2022 Bruce Head Monitoring Program report comments, QIA 2022 NIRB M&AE# 35); 2. Baffinland to provide MEWG members with advance notice of impending scientific publications and report on their findings in annual reporting to NIRB once publication acceptance is known (QIA; 2022 Bruce Head Monitoring Program report comments, QIA 2022 NIRB M&AE# 35). | 1. Baffinland will continue to solicit IQ on narwhal life history functions such as birthing or calf rearing, including Inuit observations of change. 2. Baffinland will provide MEWG members with advance notice of impending scientific publications and report on their findings in annual reporting to NIRB once publication acceptance is known. | See 2022 Bruce Head Shore-Based Monitoring Program - Final Report |
| PASSIVE ACOUSTIC MONITORING PROGRAM | | | | |
| Passive Acoustic Monitoring Program <i>Relevant to PC conditions 101, 105, 109, 110, 111, 112, 184</i> | 2018 | Request for acoustic recorders to be deployed in various locations in Eclipse Sound and Milne Inlet (M-06062018) | Acoustic recorders deployed at 5 sites in Milne Inlet in 2018 (near Bruce Head, south Milne Inlet and Koluktoo Bay). Acoustic recorders deployed at 5 sites in 2019 (3 near Bruce Head and Koluktoo Bay, 1 near Ragged Island and 1 near Bylot Island. The Ragged and Bylot recorders stayed in over winter to record icebreaker noise during shoulder seasons. Acoustic recorders deployed at 1 site in 2020 near Bruce Head. In 2021, there are plans to deploy several acoustic recorders at the floe edge east of Pond Inlet. | See 2018 Passive Acoustic Monitoring Program Report. |
| | 2019 | 1. Request to deploy additional acoustic recorders in other parts of the RSA to better understand ship noise levels in those areas, including proportion of time sound levels exceeded 120 dB. (QIA, DFO, PC, ON, WWF; 2019 Bruce Head Monitoring Program report comments; M-23042019, M-06212019, M-07102019). | 1. a) Address previous data gaps related to vessel-related disturbance effects on narwhal into program design through deployment of three underwater acoustic monitoring stations near Bruce Head over a two-month period to measure shipping noise levels and underwater vocalizations in concert with visual-based observations from the platform. Also see response above for 2018. b) Baffinland also installed one AMAR in Eclipse Sound (near Bylot Island) and one AMAR in Northern Milne Inlet (near Ragged Island) during the 2019 field season (and two units redeployed to overwinter from 2019-2020 during freeze-up and break-up), with recordings collected over ice-covered periods and during open water period. c) Integration of acoustic data collection and Unmanned Aerial Vehicle (UAV) survey into program design to ground truth sightability of narwhal from the vantage point of the observation platform and provide snapshots of number of animals in the vicinity of acoustic recorders in order to correlate visual observations of narwhal with acoustic behaviour (carried over into 2020 due to logistical challenges related to UAV operation in 2019). d) JASCO has been contracted by Baffinland to improve the detector (work in progress) based on improved training algorithms | See 2019 Passive Acoustic Monitoring Program - Final Report. |

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| Passive Acoustic Monitoring Program <i>Relevant to PC conditions 101, 105, 109, 110, 111, 112, 184</i> | 2020 | 1. Avoid/reduce number of deployed acoustic stations in 2020 due to concerns that they emit noise and displace marine mammals (MHTO; End of 2019 Shipping Meeting; M-02252020, M-25062020); 2. Assess individual vessel noise scapes (ON; 2019 Passive Acoustic Monitoring Program report comments); 3. Suggest improvements for the automated vocalization detector to better refine calls from different species (e.g. killer whale vs. narwhal). (QIA/DFO; 2019 Passive Acoustic Monitoring Program report comments). | 1. Limit monitoring to single underwater acoustic monitoring station deployed and retrieved in 2020 during open-water season. 2. In Q4 of 2020, JASCO prepared a technical memorandum entitled 'Vessel Source Level Estimates for the 2018 and 2019 Shipping Seasons' which is considered a supplement to the 2018 and 2019 Passive Acoustic Monitoring reports (Frouin-Mouy et al. 2019, 2020). This memo provides a more specific characterization of the sound emissions from individual Project vessels (all project vessel types), including an analysis of individual vessel noise sound signatures. 3. In 2020, JASCO undertook additional work to improve/enhance the automated vocalization detector to better refine narwhal vocalizations and calls from other species, based on improved training algorithms. The detector is now being used reliably as part of the ongoing PAM programs and acoustic assignments/analyses. | Additional updates to be provided as part of 2020 reporting efforts; JASCO Technical Memorandum: Vessel Source Level Estimates for the 2018 and 2019 Shipping Seasons: Baffinland Mary River Project – 2018 and 2019 Open Water Shipping Seasons. |
| | 2022 | 1. Baffinland to continue acoustic monitoring and work with Inuit to advance understanding of the methodology (QIA 2022 NIRB M&AE# 35 | 1. Baffinland deployed and retrieved acoustic recorders at two stations in Milne Inlet near Iluvilik (Bruce Head), along with separate over-winter recorders that will be retrieved in 2024. | 2023 Passive Acoustic Monitoring Report |
| SHIP-BASED OBSERVER PROGRAM | | | | |
| Ship-based Observer (SBO) Program <i>Relevant to PC conditions 106, 108, 121, 122, 123, 126</i> | Up to 2017 | Revisit implementation of program when opportunities for safe vessel boarding are available in addition to vessel providing marine wildlife observers adequate sighting opportunities | N/A | N/A |
| | 2018 | 1. Support for re-establishing the SBO program provided adequate vessel is secured. 2. General ongoing request to maximize Inuit participation in programs; 3. Request to include daily or weekly ice charts as part of SBO technical report to compare sightings data with ice conditions (QIA, PC, DFO; 2018 SBO Monitoring report comments). 4. Request to adopt standardized methods (i.e., the Environment Canada Seabird at Sea (ECSAS) survey protocol for seabird surveys as part of the SBO program (QIA and ECCC; M-06062018) | 1. Program was resumed in 2018 and was implemented from the icebreaker MSV Botnica (due to COVID-19 restriction, the SBO program could not be completed in 2020). Deployed marine wildlife observers (MWOs) including Inuit researchers on MSV Botnica when in transit. These MWOs were trained in both marine wildlife and seabird data collection techniques. 2. Baffinland hired increasing number of Inuit researchers in marine monitoring programs (2017 = 12; 2018=1; 2019 = 23; Inuit from Nunavut communities could not be hired in 2020 due to COVID-19 restrictions); 3. Ice conditions included in 2018 reporting but reporting format will be reevaluated for 2019. 4. Seabird surveys were completed according to ECSAS protocols for moving platforms and data was provided to Canadian Wildlife Service-Environment Climate Change Canada (CWS-ECCC). | See 2018 Ship-based Observer Program Report. |

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| Ship-based Observer (SBO) Program <i>Relevant to PC conditions 106, 108, 121, 122, 123, 126</i> | 2019 | 1. General request to modify the data collection methodology for the analysis regarding marine mammal behavior including movement characteristics relative to a vessel (by lowering the number of categories) (2018 SBO report comments; M-21062019) 2. Reporting of group sizes to be included when feasible (QIA) with a description of whether these are based on single observations of numerous individuals, or small groups hauled out on large ice floe, though typically group size is considered a collective of animals roughly uniformly distributed within one to five body lengths of one another (Group sizes and definitions should be clearly defined as part of data collection (QIA; 2018 SBO report comments, M-21062019) | 1. Inclusion of representative ice conditions during time of surveys based on 2018 feedback (QIA); (i) Ice cover data was collected during active watch periods at two spatial scales (ice cover in near (< 100 m) and far fields (> 100 m) ice cover in the far field (> 100 m); (ii) Median and mean ice conditions were used to define sea ice normal values; (iii) weekly ice chart maps were produced for inclusion in the annual monitoring report. The relationship between sightability parameters and detection rates was evaluated; 2. Seal group size was defined in the SBO training manual and data collection methods for seal group size were explained to Inuit researchers during SBO training program. 3. Inclusion of comparisons of relative marine mammal abundance as part of annual reporting efforts. | See 2019 Ship-based Observer Program Report. |
| | 2020 | - | SBO not completed in 2020; alternative incidental sightings program organized through Marine Mammal Observation Network (MMON). | N/A |
| | 2021 | | SBO not completed in 2021; alternative incidental sightings program organized through Marine Mammal Observation Network (MMON). | N/A |
| | 2022 | | SBO not completed in 2022; alternative incidental sightings program organized through Marine Mammal Observation Network (MMON). | N/A |
| | 2023 | 1. More information is needed on how distances were measured and/or estimated. What training was done for distance estimation? How was observer accuracy and precision in distance estimation assessed and measured? (QIA; 2019 SBO report comment #4) 2. Unreliable observations of seals made at 1.5 km or more away from the vessel.(QIA; 2019 SBO report comment #2) 3. Identified significant concerns with the rigour and quality of the seal observation data collected in 2019. (QIA; 2019 SBO report comment #2) 4. Behavioural data are needed, and should be analyzed with ice condition data (QIA; 2019 SBO report comment #6) | 1. Modification to improve methods for measuring or estimating distances to marine mammal sightings: a) As part of training, marine wildlife observers (MWOs) received additional instruction/guidance on measuring distances using available field equipment, e.g., reticle binoculars b) An additional distance measurement tool, the clinometer, was adopted into the field data collection protocol. c) A pair of Big Eye binoculars (40x100) were used during active monitoring to aid in species identification and recording behavioural responses. d) MWOs regularly practiced using reticle binoculars and clinometers to measure distances to objects/landmarks (e.g., land features, icebergs, other vessels) on the water that were validated using onboard radar and/or electronic mapping/plotting tools. e) For each sighting, data was recorded on how distance was measured or estimated. 2. Distance to sightings was accounted for in the analyses for relative abundance, closest point of approach (CPA), and behavioural responses (i.e., Sightings were truncated by distance (≤ 2 km) to remove sightings at farther ranges e.g., to minimize uncertainty in species identification and group sizes) 3. Additional text from the training manual was included in the main body of the report to clarify details on field and analytical methods. 4. Additional behavioural response data were collected and analyzed in 2023. | See 2023 Ship-based Observer Program Report. |
| MARINE MAMMAL AERIAL SURVEY REPORT | | | | |

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

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|---|------|---|--|---|
| Marine Mammal Aerial Survey Report <i>Relevant to Project Certificate Conditions 99, 101, 109, 111, 126</i> | 2019 | 1. General request by the MEWG for Baffinland/DFO to re-establish marine mammal aerial surveys along the Northern Shipping Route to allow for more regular monitoring of narwhal abundance in the Project area through the life of the Project (M-15032018, M-23042019). 2. Surveys to follow historical survey methods completed by DFO (M-23042019, M-21062019). 3. General request for Baffinland to assess program design statistical power by running power analyses on all relevant program datasets. | 1.a) Inclusion of early shoulder season conditions including period of potential narwhal staging at floe edge and/or migration into Eclipse Sound. b) Aerial surveys to include modifications to transect spacing and grid orientation in the Admiralty Inlet South stratum, and increasing number of transects in Tremblay Sound, from one to four photographic (DFO); c) Admiralty Inlet originally divided into 3 strata will be changed to two strata (DFO and QIA); d) Reconnaissance flights to be flown in Eskimo Inlet and White Bay if time allows; e) Reconnaissance flights of Tay Sound, Paquet Bay, Oliver Sound, added along with northern fjords in Admiralty Inlet (QIA); 2. Completion of surveys in 2019 using similar methods to historical surveys completed by DFO. 3. Completion of power analyses to determine if aerial surveys had sufficient power to determine if negative impacts as a result of vessel noise are occurring. | See 2019 Marine Mammal Aerial Survey Program Report. |
| | 2020 | 1. Baffinland to consider running aerial surveys should DFO not be able to complete them in 2020 (M-02252020); 2. Suggestion that surveys be completed earlier in August (DFO; M-25062020) | 1. Similar aerial survey approach to 2019 aerial surveys completed in 2020. Survey dates are based on restricted flight schedule due to COVID-19 restrictions (Aug 18-Sept 1, 2020). 2. Power analyses to be undertaken as done in 2019. | Additional details to be provided as part of 2020 reporting efforts. |
| | 2021 | 1. Fly dedicated aerial surveys at 1,000 ft to collect photographic data on narwhal age composition for the Eclipse Sound and Admiralty Inlet areas. | 1. Fly dedicated aerial surveys at 1,000 ft to collect photographic data on narwhal age composition for the Eclipse Sound and Admiralty Inlet areas. Data to be used to compliment EWI results from the Bruce Head Shore-based Monitoring Program. | See Proportion of immature narwhal (Early Warning Indicator) in Eclipse Sound and Admiralty Inlet based on 2020/2021 Aerial Survey Imagery. Technical Memorandum. 26 October 2022 |
| | 2022 | 1. Parks Canada recommends that the proponent investigate if a significant breakpoint exists and whether it could be associated with shipping activities (Parks Canada; 2022 PC Technical comments on Baffinland's 2022 Annual Report - Marine Environment, PC-02); | 1. A resampling simulation method was used to estimate the trend in stock abundance estimates over the past twenty years for three areas: Eclipse Sound, Admiralty Inlet, and the combined Eclipse Sound and Admiralty Inlet. The significance of the effect of year ($\alpha = 0.05$) and the regression slope for each sampling year were recorded for each of the three areas. This resulted in an array of 5,000 P-values for each area and 5,000 values of slope and its significance for each sampling year in each area. The median and 95% confidence interval around the annual slope values were calculated from the 5,000 iterations for each area, and the proportion of iterations that had a significant slope out of all 5,000 iterations was recorded and was interpreted as the probability of a significant temporal effect for that year. | see 2023 Marine Mammal Aerial Survey Program Report. |
| | 2024 | 1. DFO requests WSP to provide reason for the choice of wavy model to model narwhal trend | In summary, a non-linear model was selected based on the nature of the survey data since a linear model (on the log-scale) would not adequately describe the observed trends. As additional years of survey data are collected, the continued use of the linear model would increasingly violate the assumptions of regression, which would compromise the accuracy of the estimates. This was raised at the May, 2024 MEWG meeting, and a fulsome response is in the IR comments on the 2023 NIRB Report. | 2023 Marine Mammal Aerial Survey Program Result |
| | 2024 | M-13052024-04: Why is there such a large variation in the number of degrees of freedom (df) between survey years? For example, between the 2019 Eclipse Sound survey (df= 6.45) and the 2023 Eclipse Sound survey(df= 305). M-13052024 | The large variation in the df value between surveys is due to the inclusion of two separate survey techniques to generate the abundance estimates (photographic and visual observer surveys). By nature of their survey design, photographic surveys invariably have a higher df value compared to visual observer surveys. The calculated approximation for df of a combined estimate is a mix of the separate values. For example, if most of the sightings in a combined estimate were obtained during the photographic surveys, the resulting combined estimate will have a df value closer to that of the photographic survey (comparatively higher df value). Alternatively, if an | <i>This is in reference to 2023 MMASP - Technical Report, Appendix E, p. 212 of 219 (WSP 2024).</i> 2023 Marine Mammal Aerial Survey Program Result |

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

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|--|------|---|---|---|
| | | | abundance estimate is based mostly on sightings recorded during the visual observer surveys, the resulting df value of the abundance estimate will more closely match that of the visual observer survey (comparatively lower df value). | |
| | 2024 | Re: photo survey detection model - the report states that “hazard rate key function with no adjustment had the lowest AIC of 6187.95 for the detection model but was rejected because the distribution did not follow a hazard rate function”. How is the model best fit by a distribution that did not fit the data. M-13052024. | Although overall model fit is described by AIC, the resulting correction factor is biased the most by model fit at distance zero (i.e. along the survey trackline in this case). The type of key-function incorporated in the model can affect model fit at distance zero which has the effect of rescaling the entire detection function. With respect to model selection, Buckland et al. (2001, see p. 49) states that “it is the fit of the model to the distance data near the line or point that is most important”. This model selection criteria caused us to reject the model with the lowest AIC in this instance. | <i>This IR is in reference to p. 74 of Section 3.4.4.2 of the 2023 MMASP - Technical Report (WSP 2024).</i> |
| | 2024 | DFO and Oceans North has commented on Baffinland use of 2013 as baseline for narwhal abundance estimates, instead of 2004 baseline figures. | <p>Baffinland provided the MEWG with a detailed technical memo in November 2023 explaining the rationale for using 2013 as the baseline and not the data collected in 2004. The range of the confidence intervals for the narwhal population estimate in 2004 makes statistical comparisons with any future estimates extremely difficult. For instance, there is no statistically significant difference in the estimated narwhal abundance in Eclipse Sound between 2023 and 2004. The range in 2004 is between 9,471 narwhal and 37,096 narwhal. However, this is never presented as such. It is presented by most MEWG participants as a factual 20,225 narwhal – see Table 1 of Ocean North’s response. Presenting it as such is misleading to community members. It insinuates that the population abundance has dropped in half when there’s no clear way to determine if this is true.</p> <p>In addition, there’s no way to determine the potential impact that shipping might have had on the abundance of narwhal in Eclipse Sound. Between 2005 and 2012, only 20 project-related vessels entered the RSA. During this same period, 231 non-Project vessels entered the RSA. To tell community members that Baffinland activity resulted in the narwhal abundance in Eclipse Sound to drop in half because of 20 vessels coming through the RSA over the course of 8 years is misleading on many levels.</p> <p>Baffinland has and will continue to include previous aerial survey results, including the 2004 results, in its discussions of more contemporary programs. However, the 2004 results will not be used as the pre-construction basis from which to compare currents results for the purpose of determining potential project effects and the integrity of impact predictions.</p> | June, 2024 and January, 2025 MEWG meetings; NIRB correspondence. |

Notes: Bolded items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Marine Environment Working Group (MEWG) feedback received is provided by referencing either MEWG meeting date(s) (e.g., M-ddmmyyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the various marine monitoring program report review processes, including Annual Reports to the NIRB.

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

| Monitoring Program | Year | MEWG Feedback (annual program reports or meetings) | Summary of New Program Components and/or Program Design Modifications in Consideration of MEWG Feedback | Reported in |
|--|------------|--|--|--|
| NARWHAL TAGGING STUDY | | | | |
| Narwhal Tagging Study <i>Relevant to Project Certificate Conditions 109, 110, 111</i> | 2017, 2018 | 1. Discussions on type of tags to be used during tagging program led by DFO of which Baffinland is a collaborator (M-15032018; 2017 Tagging program comments); 2. Recommendation to install shore-based MOTE stations to increase tag data recovery for narwhal tagging study (DFO; M-15032018). 3. Assess existing program design statistical power by running power analyses on existing datasets (general comment applicable to all programs; M-06212019); 4. Baffinland to consider expanding analyses to cover a wider region since currently limiting analysis to within 10 km (DFO; M-06212019); 5. Baffinland to consider running aerial survey at the completion of the narwhal Tagging Program (DFO; M-15032018) | 1. Baffinland worked in collaboration with DFO over two field seasons on the tagging program (2017 and 2018). 2. Two MOTE stations were installed in 2017 (Tremblay and Bruce Head), and two more were installed in 2018 (Herodier and Emmerson Island). 3. Baffinland committed to completing power analyses to assess whether integrated (2017-2018) had sufficient power to detect vessel effects under effect sizes. As requested through MEWG discussions, a power analysis was completed for each model using simulations that quantified the relevant model's statistical power to detect various effect sizes (results available in Appendix C of 2017-2017 Narwhal Tagging Integrated report); 4. As suggested by DFO, full extent of the Regional Study Area is included in the analysis, though 10 km was defined as the suitable exposure zone based on a number of factors. Golder is keeping analyses restricted to control for more factors (ie. account for more than just vessels such as hunting, small vessels). 5. Baffinland planned for and completed aerial surveys in 2019 and 2020. | See 2017-2018 Integrated Narwhal Tagging Study. |
| | 2022 | 1.DFO recommends further monitoring of narwhal exchange between Eclipse sound and Admiralty Inlet, as tagging programs were not conducted during the 2022 monitoring program, which would provide evidence for the Proponent claiming; “The observed changes in narwhal abundance in Eclipse Sound in recent years likely reflects a natural exchange between the two putative stock areas that began prior to Baffinland shipping operations, with animals shifting between Eclipse Sound and Admiralty Inlet based on where habitat conditions may be more favorable that season. | 1. The degree of narwhal exchange between the Eclipse Sound and Admiralty Inlet management areas is best determined through a comprehensive tagging program. Baffinland has formally proposed to continue its narwhal tagging program over the last few years to fill this data gap. The MHTO has indicated that they are not supportive of a tagging program being undertaken by Baffinland or its professional consultants. Baffinland will continue to work with the MHTO and MEWG members to develop a tagging program that the MHTO may support in order to fill the identified data gap on the degree of exchange between the neighboring narwhal management areas. | See DFO Technical comments on Baffinland's 2022 Annual Report - Marine Environment, DFO-2. |

Notes: Bolded items indicate that discussions may still be ongoing or that Baffinland will not be addressing the request (with Baffinland response). The key source of the Marine Environment Working Group (MEWG) feedback received is provided by referencing either MEWG meeting date(s) (e.g., M-ddmmyyyy), when change(s) were requested and/or comments were raised (though may not necessarily include all meetings over which topic was discussed) or through comments received during the various marine monitoring program report review processes, including Annual Reports to the NIRB.

Table 2: Summary of Program Components and/or Program Design Modifications in Consideration of Marine Environment Working Group (MEWG) Feedback

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