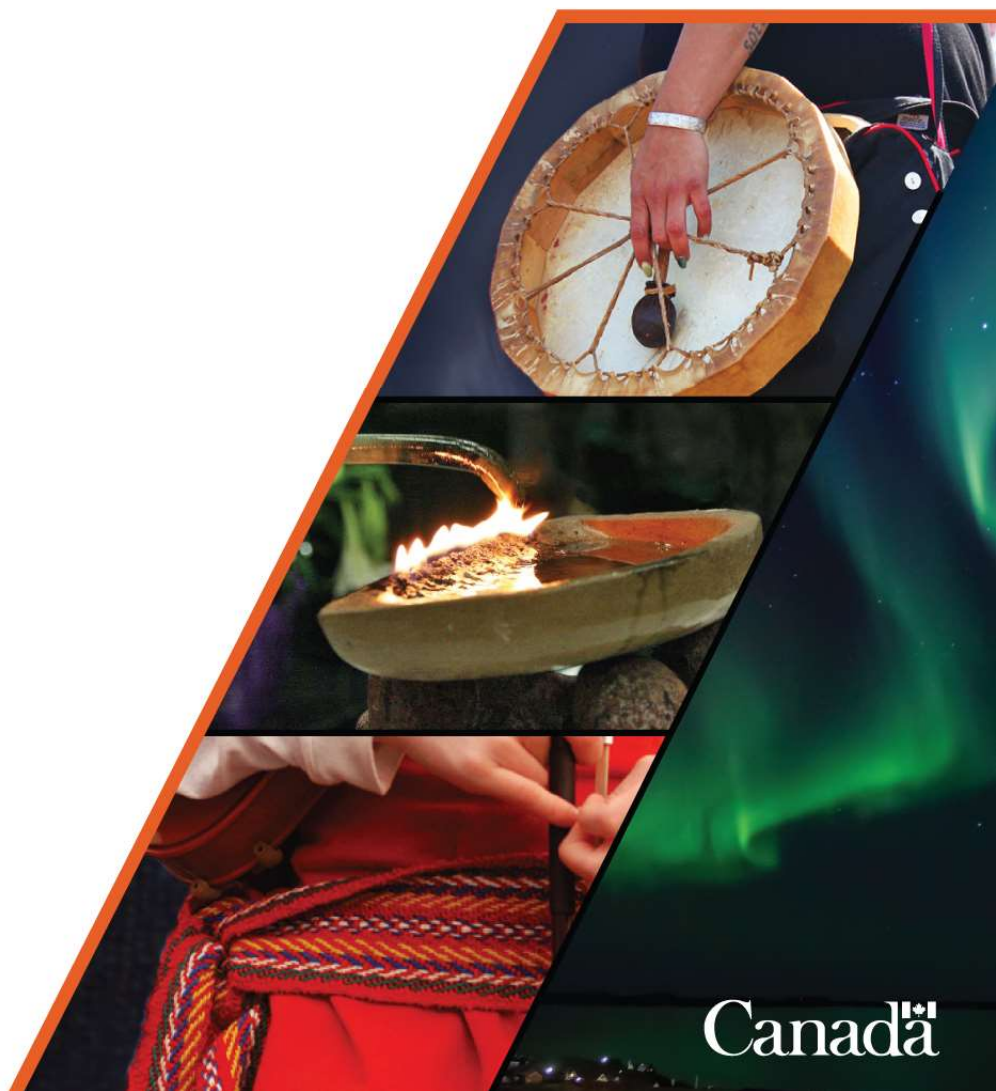




# **CIRNAC Comments to NIRB Re: Comment Request for Baffinland Iron Mine Corporation's 2021 Annual Report for the Mary River Project**



GCDOCS # 103793037



Nunavut Regional Office  
P.O. Box 100  
Iqaluit, NU, X0A 0H0

Your file - Votre référence  
08MN053  
Our file - Notre référence  
GCDOCS # 103793037

June 15, 2022

Cory Barker, M.Sc.  
Technical Advisor II,  
Nunavut Impact Review Board  
P.O. Box 1360  
Cambridge Bay, NU, X0B 0C0  
Via electronic mail to: [info@nirb.ca](mailto:info@nirb.ca)

Dear Cory Barker,

**Re: Comment Request for Baffinland Iron Mines Corporation's 2021 Annual Report for the Mary River Project**

On April 12, 2022, as per Section 12.7 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty The Queen in Right of Canada* (Nunavut Agreement), s. 135(4) of the *Nunavut Planning and Project Assessment Act*, S.C. 2013 c. 14 (NuPPAA), and the amended Mary River Project Certificate [No. 005], the Nunavut Impact Review Board (NIRB) requested parties to review Baffinland Iron Mines Corporation's (Baffinland's) 2021 Annual Report with respect to effects and compliance monitoring.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) has conducted a review of the 2021 Annual Report and related documents in areas under its mandate pertaining to effects and compliance monitoring. On this basis, CIRNAC would like to provide the comments attached for the NIRB's consideration.

CIRNAC appreciates the opportunity to review Baffinland's Mary River Project 2021 Annual Report and looks forward to working with the NIRB and Baffinland through future reviews for these projects. Should you have any questions, please do not hesitate to contact Alexandre Chaikine by email at [alexandre.chaikine@rcaanc-cirnac.gc.ca](mailto:alexandre.chaikine@rcaanc-cirnac.gc.ca), or David Abernethy at [david.abernethy@rcaanc-cirnac.gc.ca](mailto:david.abernethy@rcaanc-cirnac.gc.ca).

Sincerely,



Felexce Ngwa  
Manager, Impact Assessment



## **1. Effects Monitoring**

The 2021 Annual Report has been evaluated to assess the measurable changes to the valued components/indicators under CIRNAC areas of interest, compared to the potential effects that were predicted to result from a proposed development of the Mary River Iron Mine Project, taking into account the Final Environmental Impact Statement (FEIS), previous years' monitoring reports and the requirements included in the Projects Certificates. The assessment considered the following:

- a. Whether the conclusions reached by Baffinland in the 2021 Annual Report are valid; and,***
- b. Any areas of significance requiring further supporting information or any changes to the monitoring program which may be required***

CIRNAC is providing Technical Review Comments (TRCs) for the NIRB's consideration. With respect to areas under its mandate, CIRNAC did not identify any information that would invalidate the conclusions reached by Baffinland in the 2021 Annual Report, and provides these comments with the following notes:

- TRCs #1 – 6 and 8 incorporate ongoing recommendations from the 2020 Annual Report which, in the opinion of CIRNAC, have yet to be addressed. This conclusion is based on our review of the 2021 Annual Report and its associated appendices as well as Baffinland's responses to review comments from CIRNAC and other parties on the 2020 Annual Report.
- In addition to ongoing recommendations from prior years, CIRNAC has identified three new TRCs (#7, 9, 10) for the 2021 reporting year.



<b>Comment Number:</b>	<b>CIRNAC #1</b>
<b>Subject:</b>	<b>Dust Management and Monitoring</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate No. 005 (Amendment 03) Terms and Conditions 10, 20, 21</li> <li>• Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board (March 31, 2022): <ul style="list-style-type: none"> <li>• Section 4.6.2 Air Quality, Table 4.6 – Air Quality Impact Evaluation</li> <li>• Section 4.6.5 Groundwater &amp; Surface Water,</li> <li>• Section 4.6.6 Vegetation and Self-assessed Performance on Project Conditions #10, 20, 21.</li> </ul> </li> <li>• Baffinland. Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021).</li> <li>• EDI. Terrestrial Environment 2021 Annual Monitoring Report (TEAMR 2021) (March 31, 2022).</li> </ul>
<b>Issue/Rationale:</b>	<p>In the past review of the 2020 Annual Report, CIRNAC recommended that Baffinland consider including the following measures to increase quality of monitoring activities to address ongoing concerns regarding the generation of dust by Project components and the potential effects of dustfall on land-based ecology and the aquatic receiving environments:</p> <ol style="list-style-type: none"> <li>a) Amend the current dustfall monitoring program to address Project Condition #21 (iii) to determine the chemical composition of dust entering aquatic systems along representative distance transects at right angles to the Tote Road and radiating outward from Milne Port and the Mine Site.</li> <li>b) Chemical composition testing of soil base sites for bioavailable metal loadings from the dust as a result of contact with surface water / soil moisture (for example, acidity, leachable metals, sulphate, nitrate).</li> </ol> <p>Baffinland has addressed item a) in their Terrestrial Environment Annual Monitoring Report (TEAMR) 2021 and clarified that the passive dustfall program does include the chemical composition of dust and the passive sampling system provides a proportion of each metal in the total dustfall sample expressed as a rate.</p> <p>CIRNAC recognizes that monthly (seasonal) dustfall rates are provided in the TEAMR 2021. There is also active sampling of the terrestrial biota to assess metals uptake in plants/lichen from dustfall. Bulk chemistry soil sampling is also ongoing to assess dustfall impacts across the site.</p> <p>While bulk chemistry soil sampling is a good measure of the spatial extent of dustfall related to the Project Development Area, it is not an indicator of mobility of contaminants within the receiving environment.</p> <p>To characterize contaminant mobility and potential impacts to aquatic environments CIRNAC suggests pairing bulk metal soil sampling with</p>



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	<p>leachability sampling to better understand the soluble constituents in the dustfall. Characterizing the leachability would help Baffinland understand the indirect transport pathways of dissolved soluble constituents to aquatic receptors. Dissolved soluble constituents are generally more bioavailable to aquatic receptors.</p> <p>In order to visualize and evaluate of the sources and extent of contamination within the Project Development Area, Baffinland should consider developing a dustfall impact Conceptual Site Model (CSM). The CSM should be a living document that is used to continually evaluate the sources of contamination, direct and indirect dustfall transport pathways and support identifying where impacts to aquatic receptors may be occurring.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland consider including the following measures to increase the quality of monitoring activities:</p> <ol style="list-style-type: none"> <li>Develop a dustfall impact Conceptual Site Model (CSM). The CSM should be a living document that is used to summarize and evaluate the sources and extent of contamination, transportation pathways and where impacts to receptors may be occurring within the Project Development Area.</li> <li>Clearly indicate how dustfall rate correlates with direct or indirect contaminant loading into the aquatic receiving environments.</li> <li>Undertake leachability and geochemical testing on the soil and sediment samples to assess the mobility and uptake of metals, from dustfall, in the environment.</li> </ol>



<b>Comment Number:</b>	<b>CIRNAC #2</b>
<b>Subject:</b>	<b>Dust Management and Monitoring Plan and Roads Management Plan</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate No. 005 (Amendment 03) Term and Condition #10</li> <li>• Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board (March 31, 2022) <ul style="list-style-type: none"> <li>○ Baffinland. Appendix G.3. <i>Air Quality and Noise Abatement Management Plan</i> (2021);</li> <li>○ Baffinland. <i>Roads Management Plan</i> (2020); and</li> <li>○ Self-assessed Performance on Project Conditions 10.</li> </ul> </li> <li>• EDI. TEAMR 2021 (March 31, 2022); and</li> <li>• Baffinland Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021).</li> </ul>
<b>Issue/Rationale:</b>	<p>In 2021, Baffinland used dust suppressants, including Dust Stop® (rebranded as Dust Blockr®) on roads in addition to other products described in its Roads Management Plan. The application was completed along the full length of the Tote Road in late June 2021, with maintenance applications when deemed necessary until July 10, 2021. Water was used as the primary dust suppressant, including periods when DustBlockr® could not be implemented due to suboptimal ambient air temperature.</p> <p>The application of DusTreat ® was also tried in 2019 and implemented in November 2020.</p> <p>In response to CIRNAC 2020 request to update the Dust Management and Monitoring Plan, Baffinland reported updates to the Dust Management Protocol in the Air Quality and Noise Abatement Management Plan, where the protocol specifies the use of Dust Stop® (now Dust Blockr®) on roads.</p> <p>CIRNAC notes the Air Quality and Noise Abatement Management Plan was updated in 2021 to include Dust Stop® and DusTreat ®, however, there are no procedures or application protocols included specifically for DusTreat® on the stockpiles. In addition, the correct dust suppressant product name- Dust Blockr® - should be referenced instead of Dust Stop®</p> <p>Both the Air Quality and Noise Abatement Management Plan and the Roads Management Plan meet the requirements outlined in Term and Condition 10.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland update the <i>Air Quality and Noise Abatement Management Plan</i> to include procedures and protocols surrounding the application of DusTreat ® on stockpiles. CIRNAC also recommends that Baffinland update the <i>Air Quality and Noise Abatement Management Plan</i> and <i>Roads Management Plan</i> to reflect the appropriate product used on site.</p>



<b>Comment Number:</b>	<b>CIRNAC #3</b>
<b>Subject:</b>	<b>Waste Rock Facility (WRF) – Identification and Management of Acid Rock Drainage / Metal Leaching (ARD/ML) waste rock materials and Permafrost</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate No. 005 (Amendment 03) Terms and Conditions 16, 17, 23, 24, 46</li> <li>• Baffinland. 2021 Annual Report to NIRB (March 31, 2022): <ul style="list-style-type: none"> <li>○ Section 4.6.4, 4.6.5 and 4.6.7; and</li> <li>○ Self-assessed Performance on Project Conditions 16, 17, 23, 24 and 46.</li> </ul> </li> <li>• Baffinland Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021);</li> <li>• Baffinland 2021 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations (March 31, 2022); and</li> <li>• Baffinland 2021 QIA and NWB Annual Report for Operations: Appendix E.6 Waste Rock Geochemistry Analytical Sampling Results. (March 31, 2022).</li> </ul>
<b>Issue/Rationale:</b>	<p>Baffinland is compliant in relation to the operation of the WRF. It appears that Baffinland is seeking to address the previous ARD/ML issues via updating their water quality model and the next update to the Phase 1 Waste Rock Management Plan in 2022.</p> <p>However, CIRNAC's recommendation for Baffinland to use additional instrumentation and monitoring, and update the thermal analysis, including heat balance and oxygen balance across the WRF, remains outstanding. There have been no further updates of the Waste Rock Management Plan after 2019. CIRNAC further notes that the expanded footprint and/or volume of the WRF is provided but there are no plans noted for additional thermal instrumentation.</p> <p>In response to Baffinland's request for available detail on regulatory criteria to be used to evaluate potential contaminants of concern (PCOC) in net acid generation (NAG) material at closure, CIRNAC notes the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, 2013 states "fuel, chemicals, tailings, ore-associated metals, and other substances can contaminate soils and groundwater through accident or failure of management systems."</p> <p>It is our interpretation that this includes native soils impacted by any mining activity (i.e., soils along Tote Road, in the Crusher Area, Run of Mine (ROM) ore storage, etc. The Interim Closure and Reclamation Plan (ICRP) (BAF-PH1-830-P16-0012) Rev 5, October 30, 2018, states that at closure "residual soils meet federal/territorial soil quality guidelines or site-specific risk-based criteria as required (CCME agricultural is assumed at this time). If soil exceeds the adopted criteria, it will be removed, or risk managed to the satisfaction of a qualified professional to achieve protection of ecological and</p>





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	<p>human health.”</p> <p>CIRNAC notes that best practice requires a human health and ecological risk assessment approach. This could include a comparison of soil bulk chemistry (including nickel and copper) to toxicological endpoints, various lines of evidence and background conditions specific to each area of the mine. The risk assessment will determine if the PCOCs are contaminants that require physical management (i.e., removal, covers, landfills, etc.) to reduce risks to acceptable levels and this would be based on the intended land use. The PCOCs in final cover over the WRF will need to be risk assessed if an open exposure pathway is present at mine closure.</p>
<p><b>Recommendation:</b></p>	<p>CIRNAC recommends that Baffinland:</p> <ol style="list-style-type: none"> <li>a. Continue with use of additional thermal instrumentation and monitoring to update the thermal analysis, including heat balance and oxygen balance across the WRF (aligned with the expanded footprint and/or volume of WRF).</li> <li>b. Adhere to the commitment that the water quality model is updated accordingly when the Phase 1 Waste Rock Management Plan is next updated in 2022 and that Plan acknowledges a clear link between water quality at MS- 08 diversion ditches and the nature of ARD/ML materials stored in the WRF.</li> <li>c. Adhere to the commitment that ‘Further evaluation of the geochemical monitoring dataset and screening criteria’ will be completed during the next update to the Phase 1 Waste Rock Management Plan. Additionally, the review of screening criteria needs to make direct linkage between NAG / potentially acid generating (PAG) materials and both laboratory leachate data sets [for example, Shake Flask Extraction (SFE)] and water quality at MS- 08 diversion ditches.</li> <li>d. Adhere to the commitment that ‘Further evaluation of the geochemical monitoring dataset and screening criteria’ will be completed during the next update to the Phase 1 Waste Rock Management Plan. Additionally, CIRNAC is requesting the following: <ul style="list-style-type: none"> <li>○ Review the 0.2% total sulphur threshold as an analogue for a Neutralization Potential Ratio (NPR) of 2, based on further geochemical test work and data review, to consider the implications of an absence of calcium or magnesium carbonate mineral content and the associated neutralization potential in the waste rock.</li> <li>○ Perform a sensitivity analysis around the effect of uncertainty in the 0.2% total sulphur threshold and expected tonnages of acidic soluble sulphate waste rock on projected volumes of PAG and NAG rock and implications in the design and operation of the WRF.</li> </ul> </li> </ol>





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	<p>e. Confirm whether potentially problematic source materials will be disturbed towards end of mine life (for example, final materials in the WRF and the final exposed open pit shell are PAG) and clarify whether post closure contingencies need to be in place, or do not need to be in place, at least as suggested by the current geological understanding of the project and the mining schedule.</p>



<b>Comment Number:</b>	<b>CIRNAC #4</b>
<b>Subject:</b>	<b>Groundwater Monitoring and Management Plan</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate No. 005 (Amendment 03) Term and Condition 23</li> <li>• Baffinland 2021 Annual Report to NIRB (March 31, 2022): <ul style="list-style-type: none"> <li>◦ Section 4.6.5 Groundwater &amp; Surface Water (Project Certificate Condition No. 23); and</li> <li>◦ Appendix G.8 2021 Groundwater 2021 Monitoring Program Report.</li> </ul> </li> <li>• Baffinland 2021 QIA and NWB Annual Report for Operations (March 31, 2022); and</li> <li>• Baffinland Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021).</li> </ul>
<b>Issue/Rationale:</b>	<p>Baffinland continues to implement a Groundwater Monitoring and Management Plan to monitor, prevent and/or mitigate the potential effects of the Project on groundwater within the Project area.</p> <p>In 2021, Baffinland continued the groundwater monitoring program around the landfill area. A third-party consultant specializing in groundwater within permafrost environments completed this program, with the objectives of continuing to monitor, prevent, and/or mitigate any potential effects on groundwater within the landfill facility, as well as evaluating the program's effectiveness and making recommendations for updates.</p> <p>There are no non-compliance issues with respect to the 2021 groundwater monitoring results of the Landfill Facility and Mine Site Hazardous Waste Berm; however, CIRNAC notes that Baffinland did not expand the program to include the Waste Rock Facility (WRF) as was recommended in 2021.</p> <p>Baffinland has acknowledged they continue to investigate other areas of the Project where groundwater assessment may be warranted outside of the currently assessed area of the Landfill Facility.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland expand the groundwater monitoring program to include the WRF area and other potentially significant sources of groundwater contamination at the mine in 2022 and future years to gain a better understanding of the groundwater levels, stratigraphy characterization, permeability, groundwater quality and groundwater flow direction.</p>



<b>Comment Number:</b>	<b>CIRNAC #5</b>
<b>Subject:</b>	<b>Borrow Pit / Quarry / Source Management</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate No. 005 (Amendment 03) Terms and Conditions 25, 26, 28, 30, 41, 42, 43, 44, 46 and 60</li> <li>• Baffinland 2021 Annual Report to NIRB (March 31, 2022): <ul style="list-style-type: none"> <li>• Sections 3.1 and 3.3 – quarrying activities; and</li> <li>• Section 4 - 4.6.5, 4.6.7 and 4.6.8 Self-assessed Performance on Project Conditions 25, 26, 28, 30, 41, 42, 43, 44, 46 and 60.</li> </ul> </li> <li>• Baffinland Appendix G.28 <i>Quarry Management Plan</i> (March 31, 2022);</li> <li>• Baffinland 2021 QIA and NWB Annual Report for Operations (March 31, 2022);</li> <li>• Section 5, Section 6, Appendix D, E Nunavut Water Board Water Licence No. 2AM-MRY1325, Part F, Section 3; and</li> <li>• Baffinland Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021).</li> </ul>
<b>Issue/Rationale:</b>	<p>Baffinland has updated the Quarry Management Plan to identify PAG sources on quarry walls as well as monitoring and mitigation for operation and closure. The 2021 Annual Report includes specific follow-up on 2017 geochemistry test work results. Concerns with respect to the Quarry Management Plan have been addressed.</p> <p>There are no non-compliance issues in relation to the operation of the borrow and quarry pit sites; however, CIRNAC maintains that there is a significant benefit to the addition of markers of Acid Rock Drainage/Metal Leaching (ARD/ML) beyond pH (for example, sulphate) to the set of measured parameters and data evaluation in quarry water license monitoring. Additionally, Baffinland should compare monitoring results to FEIS Addendum predictions and present these in future annual reports. This will assist in the identification of ARD/ML problematic materials that may be inappropriate for construction purposes.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland consider:</p> <ol style="list-style-type: none"> <li>a. Addition of markers of ARD/ML beyond pH (for example, sulphate) to the set of measured parameters and data evaluation in quarry water license monitoring.</li> <li>b. Compare monitoring results to FEIS Addendum predictions and present these in future annual reports.</li> </ol>



<b>Comment Number:</b>	<b>CIRNAC #6</b>
<b>Subject:</b>	<b>Freshwater Aquatic Environment – Watercourses</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate 005 (Amendment 03) Term and Conditions 19, 47</li> <li>• Baffinland. 2021 Annual Report to NIRB (March 31, 2022): <ul style="list-style-type: none"> <li>○ Section 4.6.7 Freshwater Environment: Performance on PC Conditions, Project Certificate Condition No. 47;</li> <li>○ Appendix G.7 Lake Sedimentation Monitoring Report;</li> <li>○ Appendix G.20 Review of 2020 Dust Suppression Water Withdrawals;</li> <li>○ Appendix G.24 2021 Freshet Monitoring Report;</li> <li>○ Appendix G.27 Tote Road Priority Item Action Schedule;</li> <li>○ Appendix G.30 <i>Hazardous Materials and Hazardous Waste Management Plan</i>;</li> <li>○ Appendix G.31 <i>Snow Management Plan</i>; and</li> <li>○ Appendix G.33 <i>Freshwater Supply, Sewage and Wastewater Management Plan</i>.</li> </ul> </li> <li>• Surface Water and Aquatic Ecosystem Management Plan;</li> <li>• 2021 QIA and NWB Annual Report for Operations (March 31, 2022); and</li> <li>• Baffinland Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005. (August 11, 2021).</li> </ul>
<b>Issue/Rationale:</b>	<p>Term and Condition 47 of the Project Certificate requires Baffinland to ensure “that all Project infrastructure in watercourses are designed and constructed in such a manner that they do not unduly prevent and limit the movement of water in fish bearing streams and rivers.”</p> <p>As noted in the Annual report, perches at several culverts (CV-129, CV-114, CV-111, BG-50, CV-106 and CV-216) and recurring sedimentation issues (culvert CV-057, BG-01 and CV-186) were identified during the 2021 surveys. It is understood that appropriate remedial measures are being identified and will be discussed with Fisheries and Oceans Canada (DFO) and implemented to address these issues.</p>
<b>Recommendation:</b>	CIRNAC recommends that Baffinland update the <i>Surface Water and Aquatic Ecosystem Management Plan</i> to include the remedial measures, determined in consultation with DFO, to address the perching and sediment concerns at the remaining crossings.



<b>Comment Number:</b>	<b>CIRNAC #7 New</b>
<b>Subject:</b>	<b>Aquatic Effects Monitoring Plan and Dustfall Monitoring</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Project Certificate 005 (Amendment 03) Term and Condition 21</li> <li>• Baffinland. 2021 Annual Report to NIRB (March 31, 2022): <ul style="list-style-type: none"> <li>○ Section 4.6.5 Groundwater &amp; Surface Water (Project Certificate Condition No. 21);</li> <li>○ Appendix G.5 <i>Aquatics Effects Monitoring Plan</i> (March 31, 2022);</li> <li>○ Appendix G.6 Minnow Environmental Core Receiving Environment Monitoring Program Report (March 31, 2022); and</li> <li>○ Appendix G.7 Minnow Environmental Mary River Project Lake Sedimentation Monitoring: 2020 to 2021 (March 31, 2022).</li> </ul> </li> <li>• EDI. TEAMR 2021 (March 31, 2022).</li> </ul>
<b>Issue/Rationale:</b>	<p>CIRNAC anticipates that dustfall monitoring results reported in the TEAMR 2021 would support validating the effectiveness of Baffinland's approved Aquatics Effects Monitoring Plan.</p> <p>Baffinland should consider adapting the TEAMR 2021 dustfall monitoring results or emerging dustfall trends into the reporting for the Core Receiving Environment Monitoring Program (CREMP) and Lake Sedimentation Monitoring Program. Linking dustfall results from TEAMR 2021 to the results from these programs would support validating the effectiveness of the respective monitoring activities, taking an adaptive management approach to identify the need for added protection measures, adaptations to the monitoring programs and updates to the Aquatics Effects Monitoring Plan.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland consider adapting TEAMR dustfall monitoring results or any reported emerging dustfall trend into the reporting for the CREMP and Lake Sedimentation Monitoring Program to facilitate adaptive management of these activities, and to identify added measures to mitigate for dustfall from operations.</p>



<b>Comment Number:</b>	<b>CIRNAC #8</b>
<b>Subject:</b>	<b>FEIS Predictions included in the 2021 Socio-Economic Monitoring Report</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Baffinland. Response to Reviewer Comments on the 2020 NIRB Annual Report Mary River Project, Project Certificate No. 005 (August 11, 2021)</li> <li>• Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board (March 31, 2022) <ul style="list-style-type: none"> <li>• Appendix G.13: 2021 Socio-Economic Monitoring Report</li> </ul> </li> </ul>
<b>Issue/Rationale:</b>	<p>Consistent with CIRNAC's review of the 2020 Annual Report, Baffinland's 2021 Socio-Economic Monitoring Report does not provide detailed references to predictions included in the original Final Environmental Impact Statement (FEIS) and subsequent addendums when presenting monitoring results. CIRNAC notes that the 2021 Socio-Economic Monitoring Report quotes selected FEIS predictions for each Valued Socio-Economic Component and summarizes FEIS predictions for the residual effects of selected indicators. No mention is made to where this information can be located in the original FEIS and subsequent addendums that have been filed with the NIRB, including the applicable sections. As communicated in CIRNAC's review of the 2020 Annual Report, providing complete references to FEIS predictions, including anticipated residual effects, would improve the Socio-Economic Monitoring Report. Reviewers would have greater ease of cross-referencing FEIS predictions with monitoring results.</p> <p>In response to CIRNAC's 2020 Annual Report review, Baffinland agreed to "supplement references to the FEIS in future Socio-Economic Monitoring Reports with clear references to applicable sections of the original FEIS and subsequent addendums (p. 119)." This action has not yet been completed.</p>
<b>Recommendation:</b>	CIRNAC recommends that Baffinland ensure future Socio-Economic Monitoring Report submissions include clear references to applicable sections of the original FEIS and subsequent addendums where predictions are made.



<b>Comment Number:</b>	<b>CIRNAC #9 NEW</b>
<b>Subject:</b>	<b>Level of Education of Hired Nunavummiut</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>• Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board (March 31, 2022)</li> <li>• Project Certificate No. 005 (Amendment 03) Term and Condition 140</li> </ul>
<b>Issue/Rationale:</b>	<p>Pursuant to Project Certificate No. 005 (Amendment 03) Term and Condition 140, Baffinland is "...encouraged to survey Nunavummiut employees as they are hired and specifically note the level of education obtained and whether the incoming employee resigned from a previous job placement or education institution in order to take up employment with the Project."</p> <p>Baffinland's 2021 Annual Report and 2021 Socio-Economic Monitoring Report provide results obtained from the most recent 2020 Inuit Employee Survey to address this Term and Condition. The survey questions relating to education and employment status prior to project employment (Questions 15 and 16 presented in Appendix D of the 2021 Socio-Economic Monitoring Report: 2020 Mary River Project Inuit Employee Survey Report) do not distinguish between individuals (Nunavummiut employees and contractors) as they are hired (i.e., 2020) with those who have worked at the project in prior years. Without providing information on surveyed individuals as they are hired it is impossible to compare results from year to year in support of effectively implementing Term and Condition 140.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland revise its Inuit Employee Survey, to collection information from Nunavummiut employees and contractors that started working at the Mary River project within the year being reported, on their level of education obtained and whether they resigned from previous job placements or education institutions in order to take up employment with the Project, to better reflect the intent of Project Certificate No. 005 (Amendment 03) Term and Condition 140.</p>





<b>Comment Number:</b>	<b>CIRNAC #10 NEW</b>
<b>Subject:</b>	<b>Project-related pressures to community health centres</b>
<b>Reference:</b>	<ul style="list-style-type: none"> <li>Baffinland Iron Mines 2021 Annual Report to the Nunavut Impact Review Board (March 31, 2022) <ul style="list-style-type: none"> <li>Appendix G.13: 2021 Socio-Economic Monitoring Report</li> </ul> </li> <li>Project Certificate No. 005 (Amendment 03) Term and Condition 159</li> </ul>
<b>Issue/Rationale:</b>	<p>Pursuant to Project Certificate No. 005 (Amendment 03) Term and Condition 159, Baffinland is: "...encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increased Project- related pressures to community infrastructure in the Local Study Area communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit."</p> <p>Section 6.1 of the 2021 Socio-Economic Monitoring Report provides information on the use of community health centres as an indicator for the project's potential effects on community public services. The number of health centre visits by community within the Local Study Area (LSA) is presented on a per capita basis using 2016 data (most recent) sourced from the Nunavut Bureau of Statistics. The number of community health centre visits is much greater in the North Baffin LSA communities relative to Iqaluit in the three time periods for which data is available (i.e., 2003-2007, 2008-2012 pre-development period, and 2013-2016 post-development period). For example, the average number of community health care visits for North Baffin communities in the 2013-2016 post-development period was 9.7 whereas Iqaluit had an average of 2.0. It would be helpful for Baffinland to clarify how community health care visits are calculated in future Socio-Economic Monitoring Reports. Consideration should be directed toward whether visits to the Qikiqtani Regional Health Centre by Iqaluit residents, in addition to the local public health centre, are included in the available data.</p>
<b>Recommendation:</b>	<p>CIRNAC recommends that Baffinland describe how health centre visits per capita in the North Baffin LSA and Iqaluit are calculated. Attention should be directed toward determining whether values provided for Iqaluit include visits to the Qikiqtani Regional Health Centre in addition to the local public health centre.</p>



## **2. Compliance Monitoring**

### ***a. Provide a summary of any compliance monitoring and/or site inspections undertaken in association with the project, including specifically:***

#### ***i. Identify the terms and conditions from the Project Certificate which have been incorporated into any permits, certificates, licenses or other approvals issued for the Project, where applicable***

CIRNAC has a broad mandate for the co-management of water resources and the management of Crown land in Nunavut under the following applicable acts and regulations:

- The *Department of Crown-Indigenous Relations and Northern Affairs Act*;
- The *Nunavut Land Claims Agreement Act* and the *Nunavut Agreement*;
- The *Arctic Waters Pollution Prevention Act* and *Regulations*;
- The *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and *Regulations*; and
- The *Territorial Lands Act* and *Regulations*.

In terms of water management in Nunavut, CIRNAC has a number of different responsibilities. The Minister of Northern Affairs has a decision-making role with regards to the Nunavut Water Board's (NWB) issuance of Water Licences associated with a project. Furthermore, CIRNAC participates as an intervenor in the water licensing process, providing advice and expertise.

When a proposed project is approved to proceed, CIRNAC is responsible for inspecting and enforcing any Terms and Conditions contained within any Water Licence associated with the project. The NWB ensures that Project Certificate Terms and Conditions are incorporated in Water Licences.

CIRNAC issued the following authorizations for BIMC's Mary River Project:

- Land use permit N2019Q0011
- Land use permit N2019J0010
- Land use permit N2019C0009
- Surface lease O47H16001

CIRNAC has reviewed the Type 'A' Water Licence associated with the Mary River Project with respect to Project Certificate [No. 005] and has included a concordance table (Appendix A) that outlines how these T&Cs have been incorporated in the Water Licence.

In 2021, the project activities and monitoring were conducted under the following Water Licences:

- Type 'A' Water Licence 2AM-MRY1325
- Type 'B' Water Licence 2BE-MRY1421



**ii. A summary of any inspections conducted during the 2021 reporting period, and the results of these inspections;**

Due to COVID travel restrictions, CIRNAC's Water Resource Officers (Inspectors) conducted only one inspection of the Mary River Mine from September 16-17, 2021. Project components inspected included the Tote Road, Milne Port, and Mine site. A summary of the concerns identified in the inspection report is presented below for NIRB's consideration.

**Tote Road**

There were multiple spills noted near the parking areas, visible erosion was noted beside three culverts, with one culvert noted as damaged. Additionally, two ditches were identified as potentially not engineered to site standards.

**Milne Inlet Port**

The MP-05 and MP-06 collection ponds appeared to be appropriately pumped down; MP-05 had a rip in the liner, and MP-06 had some erosion noted. Pond 3 was found to be unable to passively drain into MP-06 but had hoses to pump water into MP-06. Surface water on one corner also seemed unable to drain into Pond 3.

There were no defined berms visible at either the hazardous waste site HWB 03, hazardous waste site HWB 04, or Western Globe Fuel Module pumping station; indicating a potential for spills or wastes to escape the respective containment areas.

**Mine Site**

The Inspector noted that there were no water management structures to manage surface water from the runway and surrounding areas, which is eroding the sandy hills north of the camp lake intake. Erosion was also noted outside the Aircraft Fuel Berm.

Food waste, fuel filters break fluid and an automotive fuel tank were found in the landfill. Further, the Mine site snow dump had been found to contain significant quantities of waste.

Seepage issues were found in the MS-07, Crusher Pad and Crusher Pond locations. Potential causes for the seepage of the MS-07/spill21268 locations was identified to be the gradient of the ditch and fill type. The Crusher Pad and Pond diversion ditch was found to be inoperative due to seepage, with a sump and pump installed to move water from the diversion ditch into the containment pond.

The Inspector noted concerns for waste and hazardous waste management at KM 104, including lubricants and hazardous material stored outside the containment area, open containers of used absorbent rags, and heavy equipment actively leaking on the ground with no drip tray.

The Inspector requested that Baffinland ensure waste and water management structures are operating as intended, and consistent with the design in the plans approved by the Nunavut Water Board.

**Baffinland Response to Inspection**

Baffinland provided responses to the Inspector's recommendations on November 25, 2021, with clarification for the timelines associated with the responses on November 30, 2021 and a follow up response with more detail on May 2, 2022. In these responses, Baffinland provided the information requested and actioned items, or provided a timeline for action, as required.

Detailed inspection reports can be accessed through the NWB Public Registry:



[ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MRY1325%20BIMC/3%20TECH/0%20SCOPE%20ENFORCE%20\(A\)/1%20INSPECTION/](ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MRY1325%20BIMC/3%20TECH/0%20SCOPE%20ENFORCE%20(A)/1%20INSPECTION/)

**iii. A summary of Baffinland's compliance status with regard to authorizations that have been issued for the project.**

Although some issues were identified in 2021, CIRNAC is generally satisfied with Baffinland's response to the concerns raised by the Inspectors in 2021. CIRNAC will continue to work with Baffinland to ensure compliance with all water licence requirements associated with Mary River project.

**3. Other**

CIRNAC is a participant in two forums that focus on socio-economic outcomes in the Qikiqtani Region which have interests in Baffinland's Mary River project:

- a) Baffinland's Mary River Socio-Economic Monitoring Working Group which is project specific to the Mary River Mine. This working group is chaired by Baffinland. In addition to CIRNAC, it includes participation from the Qikiqtani Inuit Association and the Government of Nunavut's Department of Economic Development and Transportation (GN-EDT). The working group met by teleconference and video-conference on various occasions throughout the year to discuss Baffinland's implementation of the Mary River Socio-Economic Monitoring Program and preparation of a Temporary Socio-Economic Closure Analysis Report.
- b) The Qikiqtaaluk Socio-Economic Monitoring Committee which has a broader scope of interest in the region's socio-economic environment. This committee is chaired by the GN-EDT. In addition to CIRNAC, it includes the participation of the Qikiqtani Inuit Association, other GN departments, community representatives, community organizations, and mining proponents. No committee meeting occurred in 2021 due to the implementation of public health measures aimed at limiting the spread of COVID-19.



**Appendix A: Mary River Project Certificate Terms and Conditions incorporated into any permits, certificates, licenses or other approvals issued for the Project**

<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
10	<p>The Proponent shall update its Dust Management and Monitoring Plan to address and/or include the following additional items:</p> <ul style="list-style-type: none"> <li>a. Outline the specific plans for monitoring dust along the first few kilometres of the rail corridor leaving the Mary River mine site.</li> <li>b. Identify the specific adaptive management measures to be considered should monitoring indicate that dust deposition from trains transporting along the rail route is greater than initially predicted.</li> <li>c. Outline specific plans for monitoring dustfall at intervals along and in the vicinity of the Milne Inlet Tote Road to determine the amount and extent of dustfall.</li> <li>d. Identify the specific adaptive management measures to be considered if monitoring indicates that dust deposition from traffic on the Milne Inlet Tote Road is greater than initially predicted.</li> </ul>		<b>N2019Q0011</b> , Part 31(1) (m) 48
11	The Proponent shall develop and implement an <i>Incineration Management Plan</i> that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (2010).	Part F, Item 7 (requirement to test and dispose bottom ash and record analysis results and volumes of ash)	
14	<p>The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development.</p> <p>(b) The Proponent, through coordination</p>		<b>N2019Q0011</b> , Part 31 (1) (m) 49



<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
	with the TEWG as may be appropriate, shall demonstrate appropriate adaptive management for project activities during operations which have the potential to produce noise and sensory disturbance to wildlife and other users of project areas.		
16	The Proponent shall ensure that the water related infrastructure or facilities that are designed and constructed, including the modification of culverts, diversion of watercourses, and diversion of runoff into watercourses along the railway, access roads, the Milne Tote Road, and other areas of the Project site, are consistent with those proposed in the FEIS in terms of type, location, and scope and that the requirements of all relevant regulatory authorities are satisfied advance of constructing those facilities.	Part D	
17	The Proponent shall develop and implement effective measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment.	Parts F and I	
18	The Proponent shall carry out continued analyses over time to confirm and update, accordingly, the approximate fill time for the mine pit lake identified in the FEIS	Part F, Item 3	
19	The Proponent shall ensure that it develops and implement adequate monitoring and maintenance procedures to ensure that the culverts and other conduits that may be prone to blockage do not significantly hinder or alter the natural flow of water from areas associated with the proposed mine. In addition, the Proponent shall monitor, document and report the withdrawal rates for water removed and utilized for all	Parts B, D, Item 23, E Item 23, and I	



<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
	domestic and industrial purposes.		
20	The Proponent shall monitor the effects of explosives residue and related by-products from project-related blasting activities as well as develop and implement effective preventative and mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the Project and surrounding areas.	Part E, Item 24, Part I, Item 23, and Part D, Item 18, g	
21	The Proponent shall ensure that the scope of the <i>Aquatic Effects Monitoring Plan</i> (AEMP) includes, at a minimum, monitoring of nonpoint sources of discharge, selection of appropriate reference sites, measures to ensure the collection of adequate baseline data and the mechanisms proposed to monitor and treat runoff, and sample sediments.	Part I	
22	The Proponent shall develop a detailed <i>Sediment and Erosion Management Plan</i> to prevent and/or mitigate sediment loading into surface water within the Project area.	Part D	
23	The Proponent shall develop and implement a <i>Groundwater Monitoring and Management Plan</i> to monitor, prevent and mitigate the potential effects of the Project on groundwater within the Project area.	Part I, Item 14 (requirement to conduct opportunistic monitoring on any observed seepage)	
24	The Proponent shall monitor as required the relevant parameters of the effluent generated from Project activities and facilities and shall carryout treatment if necessary to ensure that discharge conditions are met at all times.	Part E and F.	
25	The Proponent shall undertake the additional geotechnical investigations to identify sensitive landforms, modify engineering design for Project infrastructure and develop mitigation and	Part D, Item 19 and Part I, Item 12 (for water infrastructure)	





<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
	monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms.		
26	The Proponent shall develop and implement a comprehensive erosion management plan to prevent or minimize the effects of destabilization and erosion that may occur due to the Project's construction and operation.	Parts D, E, and F (requirement to prevent or minimize erosion)	N2019Q0011, part 31 (1) (m) 50
28	The Proponent shall monitor the effects of the Project on the permafrost along the railway and all other Project affected areas and must implement effective preventative measures to ensure that the integrity of the permafrost is maintained.	Part D, Item 10 (requirement to minimize disturbance to permafrost around the site, including railway corridor)	
29	The Proponent shall provide to the respective regulatory authorities, for review and acceptance, for-construction engineering design and drawings, specifications and engineering analysis to support design in advance for constructing those facilities. Once project facilities are constructed, the Proponent shall provide copies of the as-built drawings and design to the appropriate regulatory authorities	Part D, Item 2 and Part E, Item 23	
30	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit.	Part D, Item 5	<b>N2019Q0011</b> , Part 31 (1) (m) 51
31	The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint.	A general requirement	
33	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP)	Part J, Item 2	
39	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such program to incorporate measures for the use of test	Part J, Item 11 (requirement to implement progressive reclamation	



<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
	plots, reseeding and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.	including revegetation)	
40	The Proponent shall include revegetation strategies in its Site Reclamation Plan that support progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.	Part J, Items 10 and 11	
41	Unless otherwise approved by regulatory authorities, the Proponent shall maintain a minimum 100-metre naturally-vegetated buffer between the high-water mark of any fishbearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching.	Part D, Items 13 and 14	
42	The Proponent shall maintain minimum a 30- metre naturally-vegetated buffer between the mining operation and adjacent water bodies.	Parts D, E, F, and H	
43	Prior to the start of construction, the Proponent must submit a Site Drainage and Silt Control Plan to the appropriate regulatory authorities for approval.	Part D, Item 2	
44	The Proponent shall meet or exceed the guidelines set by Fisheries and Oceans Canada for blasting thresholds and implement practical and effective measures to ensure that residue and by-products of blasting do not negatively affect fish and fish habitat.	Part E, Item 24	
46	The Proponent shall ensure that runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities responsible for generating liquid effluent and runoff meet discharge requirements	Part F	
47	The Proponent shall ensure that all Project infrastructures in watercourses are designed and constructed in such a manner that they do not unduly prevent	Part E, Item 23	<b>N2019Q0011</b> , Part 31 (1)(f) 16.



<b>Project Certificate 005 Term &amp; Condition</b>		<b>Implemented in NWB water licence 2AM-MRY1325 Amendment #1</b>	<b>Implemented in CIRNAC's land use permit</b>
	and limit the movement of water in fish bearing streams and rivers		
48	The Proponent shall engage with Fisheries and Oceans Canada and Qikiqtani Inuit Association in exploring possible Project specific thresholds for blasting that would exceed the requirements of Fisheries and Oceans Canada's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (D.G. Wright and G.E. Hopky, 1998).	Part E, Item 24 (requirement to submit Blasting Management Plans)	
53	<p>The Proponent shall demonstrate consideration for the following:</p> <ul style="list-style-type: none"> <li>a. Steps taken to prevent caribou mortality an injury as a result of train and vehicular traffic, including operational measures meant to maximize the potential for safe traffic relative to operations on the railway, Milne Inlet tote road and associated access roads.</li> <li>b. Monitoring and mitigation measures at points where the railway, roads, trails and flight paths pass through caribou calving areas, particularly during caribou calving times.</li> <li>c. Evaluation of the effectiveness of proposed caribou crossings over the railway, Milne Inlet tote road and access roads as well as the appropriate number.</li> <li>d. Development of a surveillance system along the railway corridor to identify the presence of caribou in proximity to the train tracks and operational protocols for the train to avoid collisions and enable caribou to cross the train tracks unimpeded.</li> <li>e. Protocols for documentation and reporting of all caribou collisions and mortalities, as well as mechanisms for adaptive management responses</li> </ul>		<p><b>N2019Q0011</b>, Parts 31 (1) (h) 36-38, and 31 (1) (m) 52</p>



Project Certificate 005 Term & Condition		Implemented in NWB water licence 2AM-MRY1325 Amendment #1	Implemented in CIRNAC's land use permit
	designed to prevent further such interactions.		
64	<p>The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures:</p> <ul style="list-style-type: none"> <li>a. installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.).</li> <li>b. installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).</li> </ul>	Part F, Item 7	<b>N2019Q0011</b> , Part 31 (1) (g) 27
92	The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self-sufficient manner.	Part H, Item 5	<b>N2019Q0011</b> , Part 31 (1) (g) 30, 31

