

APPENDIX 10D-11

TERRESTRIAL ENVIRONMENT MANAGEMENT AND MONITORING PLAN



MARY RIVER PROJECT

TERRESTRIAL ENVIRONMENT MANAGEMENT AND MONITORING PLAN

Version 2.0, May 2013

| Rev. No. | Revision | Date | Revised by: |
|----------|--|-----------------|-------------|
| 1.0 | Version submitted in February 2012 FEIS | Feb. 2012 | Original |
| 1.1 | Additional comments as per QIA suggestions, May 2012 | 09 May, 2012 | EDI |
| 1.2 | Grammatical editing, minor formatting, add Revisions Summary Section 0.0. | 20 July, 2012 | EDI |
| 1.3 | Incorporate caribou mitigation from water licence EPP, include Monitoring Methods for some KIs, remove seabirds (moved to MEMMP) | 11 October 2012 | EDI |
| 2.0 | Addition of Project terms and conditions, compliance linking, updates to meet terms and conditions, some formatting. | 9–23 May 2013 | EDI |

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Table of Contents

| | |
|--|------------|
| TABLE OF CONTENTS..... | II |
| LIST OF TABLES | III |
| LIST OF FIGURES..... | IV |
| ABBREVIATIONS | V |
| 0.0 REVISIONS SUMMARY | 1 |
| 1.0 INTRODUCTION..... | 2 |
| 1.1 PURPOSE | 2 |
| 1.2 REGULATORY REQUIREMENTS..... | 2 |
| 1.3 PROJECT TERMS AND CONDITIONS | 2 |
| 1.4 RELATIONSHIP TO OTHER MANAGEMENT PLANS | 1 |
| 1.5 BAFFINLAND'S COMMITMENT | 1 |
| 1.6 ROLES AND RESPONSIBILITIES..... | 1 |
| 1.7 SPECIALISTS | 2 |
| 1.8 INCORPORATION OF INUIT QAUJIMAJATUQANGIT | 2 |
| 1.9 UPDATE OF THIS MANAGEMENT PLAN | 2 |
| 2.0 KEY INDICATORS FOR FOLLOW-UP MONITORING..... | 5 |
| 2.1 VEGETATION | 5 |
| 2.2 BIRDS..... | 5 |
| 2.3 TERRESTRIAL WILDLIFE | 6 |
| 3.0 MITIGATION MEASURES | 7 |
| 3.1 VEGETATION..... | 7 |
| 3.1.1 <i>General Mitigation for Vegetation</i> | 7 |
| 3.2 BIRDS..... | 7 |
| 3.2.1 <i>General Mitigation for Birds</i> | 8 |
| 3.2.2 <i>Nest Management Plan</i> | 9 |
| 3.2.3 <i>Cliff-nesting Raptor Mitigation</i> | 10 |
| 3.2.4 <i>Snow Geese Mitigation</i> | 11 |
| 3.2.5 <i>Mitigation for Eiders, Red-throated Loon, Common Murre and Lapland Longspur</i> | 11 |
| 3.2.6 <i>Species at Risk Mitigation</i> | 11 |
| 3.3 TERRESTRIAL WILDLIFE | 11 |
| 3.3.1 <i>Habitat Mitigation</i> | 13 |
| 3.3.2 <i>Movement Mitigation</i> | 13 |
| 3.3.3 <i>Mortality Mitigation</i> | 14 |
| 3.3.4 <i>Health Mitigation</i> | 15 |
| 3.3.5 <i>Other Mitigation</i> | 15 |
| 4.0 MONITORING FRAMEWORK..... | 15 |
| 4.1 MONITORING PRINCIPLES..... | 16 |
| 4.2 MONITORING FRAMEWORK OVERVIEW | 16 |

| | | |
|--------------------|---|--------------|
| 4.3 | VEGETATION MONITORING | 17 |
| 4.4 | BIRDS MONITORING | 19 |
| 4.5 | TERRESTRIAL WILDLIFE MONITORING | 21 |
| 4.5.1 | <i>Caribou Habitat Monitoring</i> | 21 |
| 4.5.2 | <i>Caribou Movement</i> | 22 |
| 4.5.3 | <i>Caribou Mortality</i> | 23 |
| 4.5.4 | <i>Caribou Health</i> | 24 |
| 4.6 | WOLF-SPECIFIC MONITORING | 25 |
| 4.7 | MONITORING FOR ALL WILDLIFE SPECIES | 26 |
| 5.0 | REPORTING | 26 |
| 6.0 | ADAPTIVE STRATEGIES | 27 |
| 7.0 | REFERENCES | 27 |
| APPENDIX A. | TERRESTRIAL WILDLIFE WORKING GROUP TERMS OF REFERENCE..... | 28 |
| APPENDIX B. | MONITORING DETAILS AND METHODS – CROSS-REFERENCED TO KEY INDICATOR TABLE | |
| NUMBERS | 34 | |
| 4-2 | VEGETATION MONITORING: INVASIVE SPECIES | 34 |
| 4-3 | VEGETATION MONITORING: VEGETATION HEALTH | 34 |
| 4-4 | VEGETATION MONITORING: DUSTFALL | 34 |
| 4-5 | MIGRATORY BIRD MONITORING: PEREGRINE FALCON AND GYRFALCON NESTING | 1 |
| 4-6 | MIGRATORY BIRD MONITORING: NESTING OF COMMON AND KING EIDER, AND RED KNOT | 1 |
| 4-6 | MIGRATORY BIRD MONITORING: SEABIRD MIGRATION AND OVERWINTERING | 1 |
| 4-7 | MIGRATORY BIRD MONITORING: SONGBIRDS AND SHOREBIRDS | 3 |
| 4-8 | CARIBOU MONITORING: INDIRECT HABITAT LOSS | 3 |
| 4-9 | CARIBOU MONITORING: HABITAT USE DURING CALVING | 4 |
| 4-10 | CARIBOU MONITORING: MOVEMENT | 4 |
| 4-11 | CARIBOU MONITORING: HARVEST-RELATED MORTALITY | 4 |
| 4-12 | CARIBOU MONITORING: HEALTH CONTAMINANTS AND BODY CONDITION | 4 |
| 4-13 | CARIBOU MONITORING: PRODUCTIVITY | 4 |
| 4-14 | WOLF MONITORING: DEN SITES | 4 |
| 4-15 | WILDLIFE MONITORING: DIRECT HABITAT LOSS | 4 |
| 4-15 | WILDLIFE MONITORING: INCIDENTAL OBSERVATIONS AND PROJECT MORTALITY | 4 |

List of Tables

| | | |
|------------|--|----|
| Table 1-1. | NIRB Project Certificate #005 Conditions Relevant to the Mary River Project's Terrestrial Ecosystem Mitigation and Monitoring Plan | 1 |
| Table 1-2 | Roles and Responsibilities | 4 |
| Table 2-1 | Key Indicators for Follow-up Monitoring | 5 |
| Table 3-1 | Recommended Setback Distances for Activity near Bird Nests | 10 |
| Table 3-2 | Terrestrial Wildlife- Project Specific Source Effects and their Impact on Caribou | 12 |
| Table 4-1 | Monitoring Framework — Overview and Definitions. | 17 |
| Table 4-2 | Vegetation Monitoring: Invasive Species | 18 |
| Table 4-3 | Vegetation Monitoring: Vegetation Health | 18 |

| | | |
|------------|---|----|
| Table 4-4 | Vegetation Monitoring: Dustfall | 19 |
| Table 4-5 | Migratory Bird Monitoring: Peregrine Falcon and Gyrfalcon Nesting..... | 20 |
| Table 4-6 | Migratory Bird Monitoring: Nesting of Common and King Eider, and Red Knot | 20 |
| Table 4-7 | Migratory Bird Monitoring: Songbirds and Shorebirds | 21 |
| Table 4-8 | Caribou Monitoring: Indirect Habitat Loss..... | 22 |
| Table 4-9 | Caribou Monitoring: Habitat Use during Calving | 22 |
| Table 4-10 | Caribou Monitoring: Movement | 23 |
| Table 4-11 | Caribou Monitoring: Harvest-related Mortality | 24 |
| Table 4-12 | Caribou Monitoring: Health Contaminants and Body Condition | 24 |
| Table 4-13 | Caribou Monitoring: Productivity | 25 |
| Table 4-14 | Wolf Monitoring: Den sites | 25 |
| Table 4-15 | Wildlife Monitoring: Direct Habitat Loss | 26 |
| Table 4-16 | Wildlife Monitoring: Incidental Observations and Project Mortality | 26 |

List of Figures

No table of figures entries found.

Abbreviations

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| BACI | Pairwise Before-After-Control-Impact |
| Baffinland | Baffinland Iron Mines Corporation |
| BIM | Baffinland Iron Mines Corporation |
| CITES | Convention on International Trade in Endangered Species |
| COSEWIC | Committee on the Status of Endangered Species in Canada |
| EHS | Environmental, Health, and Safety |
| EIS | Environmental Impact Statement |
| EPP | Environmental Protection Plan |
| GNDoe | Government of Nunavut Department of Environment |
| HTO | Hunter and Trapper Organization |
| IQ | Inuit Qaujimajatuqangit |
| KI | Key Indicator |
| LSA | Local Study Area |
| Project | Mary River Project |
| NIRB | Nunavut Impact Review Board |
| PDA | Project development area |
| RSA | Regional Study Area (see Volume 6) |
| SARA | <i>Species At Risk Act</i> |
| TEMMP | Terrestrial Environment Management and Monitoring Plan |
| VEC | Valued Ecosystem Component |
| ZOI | Zone of Influence (see Volume 6 for details) |

0.0 REVISIONS SUMMARY

| Version | Date | Summary of Changes |
|---------|---------------|---|
| 1.0 | February 2012 | Original version presented in the Final Environmental Impact Statement, February 2012 |
| -- | 08 May 2012 | TWWG Meeting: BIM and QIA contract biologist (Kim Poole) meet to discuss general layout of TEMMP. Meeting minutes recorded |
| 1.1 | May 2012 | Incorporation of Qikiqtani Inuit Association contract biologist (Kim Poole) comments. Included snow tracking survey to detect caribou deflections to movement. |
| -- | 23 May 2012 | TWWG Meeting: BIM, EC, GNDoe, QIA teleconference to discuss TEMMP and Terrestrial Working Group (TWG) |
| -- | | Draft Terrestrial Working Group Terms of Reference (ToR) distributed to TWG for comments. |
| 1.2 | July 2012 | Grammatical changes with no changes to content. Removed FEIS-type headers to make this a stand-alone document. This document now supersedes FEIS Appendix 10D-11 |
| 1.3 | October 2012 | <ul style="list-style-type: none"> • Include a description of the Terrestrial Wildlife Working Group in the Roles and Responsibilities Section • Incorporate caribou mitigation measures initially identified in the Mary River Water Licence Application Attachment 5: Environmental Protection Plan, Appendix 10B. Caribou mitigation identified in this TEMMP supersedes mitigation identified in the water licence Attachment 5: Environmental Protection Plan, Appendix 10B. • Include the May 2012 Draft ToR for the TWWG • Appendices providing more detailed description of some monitoring plans, including methods where currently available. • Included monitoring requirements from the September 2012 NIRB Project recommendation. • Seabird section deleted, moved to MEMMP. |
| 2.0 | May 2013 | Addition of Project terms and conditions table with cross-references to sections of TEMMP, compliance linking, updates to meet terms and conditions, some formatting. Formatting for submission as an appendix to the FEIS addendum (for the Early Revenue Program). |

1.0 INTRODUCTION

1.1 Purpose

The Terrestrial Environment Monitoring and Management Plan (TEMMP) describes mitigation and monitoring actions Baffinland Iron Mines Corporation (Baffinland) will use so the Mary River Project (the Project) has no net adverse impacts on the terrestrial environment. The TEMMP provides guidance to protect and limit disturbances to vegetation, birds and terrestrial wildlife from Project activities.

This document is intended to provide an overview of parameters that will be considered in a TEMMP. It does not provide detailed methods, cost estimates, or schedule. It is anticipated that further details will be developed in continued discussion with the management agencies, Qikiqtani Inuit Association, community Hunter and Trapper Organizations, the Terrestrial Environment Working Group and other interested parties.

1.2 Regulatory Requirements

The following legislation and regulations related to the protection of birds and terrestrial wildlife applies in the Project area:

Territorial Legislation:

- Nunavut Wildlife Act
- Nunavut Hunting Regulations

Federal Legislation:

- Nunavut Land Claims Agreement (Project Monitoring identified in Section 12.7.1 to 12.7.5; contribution to General Monitoring identified in Section 12.7.6)
- Species at Risk Act (Monitoring identified in Section 79 (2))
- Migratory Birds Convention Act (Section 5) International Conventions and Agreements:
- Convention on Biological Diversity
- International Agreement on Conservation of Polar Bears and their Habitat

Territorial Management Plans and Strategies:

- Draft Nunavut Caribou Strategy Framework (March 2010)

1.3 Project Terms and Conditions

In its final hearing report, the NIRB outlined 184 project-specific terms and conditions that must be integrated into mitigation and monitoring plans for the Mary River Project. Along with the General Terms and Conditions, actions or follow-up items were provided in component-specific categories, of which, terms and conditions within the Vegetation and Terrestrial Wildlife and Habitat categories apply to this TEMMP (Table 1-1).

Table 1-1. NIRB Project Certificate #005 Conditions Relevant to the Mary River Project's Terrestrial Ecosystem Mitigation and Monitoring Plan

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|---|--|--------------------------------------|
| | | Mitigation | Monitoring |
| Vegetation Category | | | |
| 31 | The Proponent shall ensure that Project activities are planned and conducted in such a way as to minimize the Project footprint. | Section 3.1.1 Section 3.3.1 | Operations monitoring, Table 4-15 |
| 32 | The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas. | Construction Environmental Protection Plan | |
| 33 | The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP). | | Section 4.0 |
| 34 | The Proponent shall conduct soil sampling to determine metal levels of soils in areas with berry-producing plants near any of the potential development areas, prior to commencing operations. | | Table 4-3 |
| 35 | The Proponent shall undertake monitoring of baseline metal levels in organ tissue from caribou harvested within the local study area, prior to commencing operations. The proponent is strongly encouraged to coordinate with local Hunters and Trappers Organizations regarding procurement of harvested caribou organs. | | Table 4-12 |
| 36 | The Proponent shall establish an on-going monitoring program for vegetation species used as caribou forage (such as lichens) near Project development areas, prior to commencing operations | | Table 4-3 |
| 37 | The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g. surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment. | | Table 4-2 |
| 38 | The Proponent shall review, on an annual basis, all monitoring information and the vegetation mitigation and management plans developed under its Environmental Management System, Terrestrial Environment and Monitoring Plan (TEMMP) and adjust such plans as may be required to effectively prevent or reduce the potential for significant adverse project effects on vegetation abundance, diversity and health. | | Section 6.0 |
| 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 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. | Mine Closure Plan | |
| 40 | The Proponent shall include revegetation strategies in its Site Reclamation Plan that support | Mine Closure | |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|--|--|--|------------|
| | | Mitigation | Monitoring |
| | progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment. | Plan | |
| Terrestrial Wildlife and Habitat Category | | | |
| 49 | The Proponent shall establish a Terrestrial Environment Working Group ("TEWG") which will act as an advisory group in connection with mitigation measures for the protection of the terrestrial environment and in connection with its Environmental Effects Monitoring Program, as it pertains to the terrestrial environment. Members may consider the draft terms of reference for the TEWG filed in the Final Hearing, but they are not bound by them. The role of the TEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments. | Appendix A | |
| 50 | The Proponent shall continue to develop and implement Project-specific monitoring for the terrestrial environment, and will demonstrate appropriate refinements to design, incorporation of analytical methods and elaboration of methodologies. The monitoring plan shall contain clear thresholds to allow for the assessment of long-term trends and cumulative effects where project interactions are identified. Coordination and cooperation will be required where data collection, analysis and interpretation, or responsibility for mitigation and management requires the efforts of multiple parties (e.g., government, Qikiqtani Inuit Association, communities). | Current version of the Terrestrial Environment Management and Monitoring Plan (this document) | |
| 51 | The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating project-induced impacts. | Agency/Partner Participation identified monitoring framework tables (Section 4.0) partnership opportunities discussed in Terrestrial Ecosystem Working Group (Appendix A) | |
| 52 | Within 3 months of issuance of the Project Certificate, the Proponent shall initiate design, and develop the timeline to test and implement means of deterring caribou from pits and other hazardous areas. A review of best practices and techniques will be undertaken at other Northern mines where interactions with caribou occur. Considerations should include temporary ribbon placement, inuksuks, or fencing and subsequent monitoring for effectiveness. These activities shall be reported back to the Terrestrial Environment Working Group. | Section 3.3.3 | Table 4-10 |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|--|--|---|
| | | Mitigation | Monitoring |
| 53 | <p>The Proponent shall demonstrate consideration for the following:</p> <ul style="list-style-type: none"> a. Steps taken to prevent caribou mortality and 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. 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. 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. 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. e. Protocols for documentation and reporting of all caribou collisions and mortalities, as well as mechanisms for adaptive management responses designed to prevent further such interactions. | <ul style="list-style-type: none"> a. Section 3.3.2 Section 3.3.3 b. Section 3.3.1 d. Section 3.3.3 | <ul style="list-style-type: none"> b. Table 4-9 c. Table 4-10 e. Table 4-16 Section 6.0 |
| 54 | <p>The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include, but not be limited to the following:</p> <ul style="list-style-type: none"> g. Details of the methods and rationale for conducting monitoring prior to the commencement of construction; h. Monitoring for caribou presence and behavior during railway construction; i. Description and justification of statistical design or other means of determining effect and proposed analyses to support the conclusions drawn from monitoring impacts of the mine and related infrastructure on wildlife; j. Details of monitoring and mitigation activities, including: <ul style="list-style-type: none"> i. Dust fall (fugitive and Total Suspended Particulates), that addresses methods to reduce risk to caribou forage from dust fall; ii. Snow track surveys during construction and the use of video-surveillance to improve the predictability of caribou exposure to the railway. Using the result of this information, an early warning system for caribou on the railway shall be developed for operation. k. Details of monitoring thresholds related to level of mitigation and management; l. Details of a comprehensive hunter harvest survey to determine the effect on caribou populations and potential effects on caribou behaviour resulting from increased human access caused by upgrades to the Milne Inlet tote road (and any other roads if they are shifted from private to public use) and increase local knowledge of the mine site, including establishing pre-construction baseline harvesting data. | | <ul style="list-style-type: none"> g. Available in each monitoring table h. Table 4-8 Table 4-10 i. Address? j. i) Table 4-4 ii) Table 4-10 Section 4.5.2 k. Available in each monitoring table l. Table 4-11 |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|--|-------------------|-----------------------------|
| | | Mitigation | Monitoring |
| 55 | <p>The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) to ensure compliance with the Nunavut Wildlife Act. Consideration must be given to the following:</p> <ul style="list-style-type: none"> e. Monitoring for active wolf dens within a 10 km radius from the mine site, under the direction and prior approval of the GN DOE, and reporting the results through NIRB's Annual Reports on terrestrial wildlife in the Potential Development Area (PDA); f. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive g. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; h. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development Area over time | | e. Table 4-14 |
| 56 | <p>The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the Nunavut Wildlife Act. Overall, this will require the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics.</p> | | Table 4-13 |
| 57 | <p>The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information:</p> <ul style="list-style-type: none"> a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; and h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program. | | Section 5.0 |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|--|--|-----------------------------|
| | | Mitigation | Monitoring |
| 58 | <p>Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes:</p> <ul style="list-style-type: none"> a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway; c. A description of the extent of dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets; d. A demonstration and description of how the monitoring results contribute to cumulative effects of the project; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available. | | Section 5.0 |
| 59 | The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point to point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Working Group) and use flight corridors to avoid areas of significant wildlife importance. | Section 3.2.1 | |
| 60 | Prior to construction, the Proponent shall develop a detailed blasting program to minimize the effects of blasting on terrestrial wildlife that includes, but is not limited to the restriction of blasting when migrating caribou, sensitive local carnivores or birds may be negatively affected. | Section 3.3.1 | |
| 61 | Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered by the work being carried out. An operational definition of 'endangered' shall be provided by the Terrestrial Environment Working Group. | Section 3.3.3 | |
| 62 | The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting. | Section 3.2.1 Section 3.3.3 | |
| 63 | The Proponent shall liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. At a minimum, The Proponent shall also meet annually in person with Hunters and Trappers Organizations to discuss wildlife monitoring and mitigation plans and address community concerns regarding wildlife interactions. The Proponent may be required to facilitate these meetings through payment of honoraria and meeting costs. | | |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|--|---|-----------------------------|
| | | Mitigation | Monitoring |
| 64 | 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: <ul style="list-style-type: none"> 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.); and 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). | Section 3.3.5 | |
| 65 | The Proponent shall ensure all employees working at project sites receive awareness training regarding the importance of avoiding known nests and nesting areas and large concentrations of foraging and moulting birds. | Section 3.2.1 | |
| 66 | If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan. | Section 3.2.2 Section 3.2.6 Table 3-1 | |
| 67 | The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the Project. | Section 1.9 | Section 1.9 |
| 68 | The Proponent shall ensure flashing red, red strobe or white strobe lights and guy-wire deterrents are used on communications towers established for the Project. Consideration should also be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife. | Section 3.2.1 | |
| 69 | Prior to bird migrations and commencement of nesting, the Proponent shall identify and install nesting deterrents (e.g. flagging) to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season. | Section 3.2.1 | |
| 70 | The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird's nests and their young are protected. | Section 3.2.2 Table 3-1 | |

| Term and Condition No. | Term or Condition | Area(s) addressed | |
|------------------------|--|-------------------------------|---|
| | | Mitigation | Monitoring |
| 71 | Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: a. 650 m during point to point travel when in areas likely to have migratory birds b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site. | Section 3.2.1 | |
| 72 | The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and made available for regulatory authorities such as Transport Canada to monitor adherence and to follow up on complaints. | Section 3.2.1 | Table 4-8 |
| 73 | The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the Qikiqtani Inuit Organization and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group. | Section 3.2 | Section 4.4 |
| 74 | The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include: peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity. | Section 3.2 | Table 2-1 Section 4.4 |
| 75 | The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project to verify impact predictions and provide updated estimates of the total project footprint. | Section 3.1.1 | Table 4-15 Section 5.0 |

1.4 Relationship to Other Management Plans

This Plan should be viewed in association with the following environmental management plans:

- Construction Environmental Protection Plan
- Environmental Design Guidelines
- Exploration Environmental Protection Plan (EPP)
- Air Quality and Noise Abatement Management Plan
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan
- Borrow Pit and Quarry Management Plan
- Roads Management Plan
- Railway Management Plan
- Waste Management Plan
- Emergency Response and Spill Contingency Plan
- Oil Pollution Emergencies Plan — Milne Port
- Oil Pollution Emergencies Plan — Steensby Port

1.5 Baffinland's Commitment

Baffinland will provide the necessary human, material and financial resources to implement and maintain the TEMPP. This is in concordance with Baffinland's Sustainable Development Policy (Figure 1-).

1.6 Roles and Responsibilities

Baffinland's Environmental Department is responsible for monitoring compliance with applicable regulations and permit requirements. The responsibility for implementation of mitigation measures rests with the VP Operation.

Compliance is achieved through ongoing monitoring, and development and implementation of operational standards, procedures, and employee training. Baffinland's roles and responsibilities for implementation of the Terrestrial Environment Management and Monitoring Plan and the companion Environmental Protection Plan (EPP) are identified in Table 1-2.

TERRESTRIAL WILDLIFE WORKING GROUP

The role of the Terrestrial Wildlife Working Group (TWWG) is to act as an advisory group to support ongoing cooperation and communication as well as to review and provide advice on all aspects of the TEMMP including reviewing:

- (a) the development and finalization of the TWEEM Program;
- (b) the implementation of the TWEEM Program;
- (c) monitoring reports and results;
- (d) the assessment of potential impacts of the Project on terrestrial wildlife;
- (e) the effectiveness of mitigation measures; and
- (f) action plans for the development and implementation of appropriate mitigation measures.

The TWWG may make recommendations to Baffinland on any aspects of the TWEEM program or for the adoption of mitigation measures which are technically and economically feasible.

As per the Terms of Reference (Appendix A), the TWWG consists of six members, including two members from the QIA, two members from Baffinland, one member from the GN, and one member from EC. Other members can be considered as appropriate or necessary.

1.7 Specialists

The monitoring program established by Baffinland requires the input of specialists to carry out some of the surveys and studies required for monitoring. Throughout the life of the Project, Baffinland will endeavor to hire qualified personnel to conduct these studies. As much as possible, Baffinland will insist on inclusion/participation of local experts/individuals in the execution of these surveys and studies.

1.8 Incorporation of Inuit Qaujimajatuqangit

The monitoring program established by Baffinland requires the input and knowledge of Inuit hunters, trappers and land users to design, conduct and review results of some of the surveys and studies required for monitoring. Throughout the life of the Project, Baffinland will endeavor to consult with knowledgeable individuals to conduct these studies. As much as possible, Baffinland will include participation of local experts/individuals in the execution of these surveys and studies.

1.9 Update of this Management Plan

The TEMMP will be updated periodically as required on the basis of management reviews, incident investigations, regulatory changes, or other Project related changes. The plan will be updated as new methods or technologies become available. Mitigation and monitoring strategies developed for Species at Risk will be updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans, and management plans that may become available during the duration of the Project.



SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation, we are committed to conducting all aspects of our business in accordance with the principles of sustainable corporate responsibility and always with the needs of future generations in mind. Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and to create authentic relationships. We expect each and every employee, contractor, and visitor to demonstrate a personal commitment to this policy through their actions. We will communicate the Sustainable Corporate Policy to the public, all employees and contractors and it will be reviewed and revised as necessary on an annual basis.

These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Investing in our Communities and People
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness from the very earliest of planning stages. Why? Because our people are our greatest asset. Nothing is as important as their health and safety.
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness. We allow our workers and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- We employ a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- We apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop pioneering new processes and more sustainable practices.
- We understand the importance of closure planning. We ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.

3.0 INVESTING IN OUR COMMUNITIES AND PEOPLE

- We respect human rights and the dignity of others. We honour and respect the unique culture, values and traditions of the Inuit people.
- We contribute to the social, cultural and economic development of sustainable communities adjacent to our operations.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

4.0 TRANSPARENT GOVERNANCE

- We will take steps to understand, evaluate and manage risks on a continuing basis, including those that impact the environment, employees, contractors, local communities, customers and shareholders.
- We ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our environmental, safety, health, socio-economic commitments and set annual targets and objectives.
- We conduct all activities in compliance with the highest applicable legal requirements and internal standards
- We strive to employ our shareholder's capital effectively and efficiently. We demonstrate honesty and integrity by applying the highest standards of ethical conduct.



Tom Paddon
President and Chief Executive Officer
September 2011

Figure 1-1 Baffinland Iron Mines Corporation's Sustainable Development Policy

Table 1-2 Roles and Responsibilities

| Position | Responsibility |
|---|---|
| Vice-President of Sustainable Development | Provide corporate resources and overall direction to the implementation of the TEMMP |
| HSE Lead | Accountable for onsite environmental performance. |
| | Establishes goal and targets for environmental performance. |
| | Responsible for implementation of mitigation measures. |
| Environmental Lead | Responsible for compliance monitoring. |
| | Provides direction on environmental issues to the Environmental Site Monitoring Team. |
| | Staffing of Environmental Department. |
| | Supervise/conduct site inspection and audits. |
| | Initiate and manage environmental studies as required. |
| | Manage external environmental consultants/specialists. |
| | Environmental reporting as required by permits and authorizations. |
| | Liaison with regulatory agencies on all environmentally related issues. |
| Environmental Site Monitors | Provide specialist advice and input on environmental matters. |
| | Conduct environmental studies and monitoring programs. |
| | Conduct audits of operations, as requested. |
| | Prepare environmental reports. |
| Bear Monitors | Provide polar bear safety training. |
| | Accompany workers if working on the land, at a distance from camp facilities. |
| | Report any incidents or other events to the Environmental Lead. |
| | Record all observed wildlife mortality reported by personnel. |
| Safety Lead | Ensure that all personnel engaged in operations are aware of hazards related to work. |
| | Ensure that all personnel are provided with and shall wear the appropriate personal protection equipment (PPE) which shall be suitable for the task at hand under the existing weather conditions. |
| | Be the source of expertise and technical review in the development of the contingency and emergency response plans. |
| | Be informed of any incident on site. |
| | Report any incidents or other events to the Environmental Lead. |
| Contractors/Subcontractors | Contractors/subcontractors are considered equivalent to Baffinland staff in all aspects of environmental management and control and their responsibilities in this respect mirror those of Baffinland personnel. Contractor personnel will be included in the onsite induction process. |
| | Responsibilities of contractors/subcontractors include the following: |
| | Comply with requirements of the EPP and related EMMP. |
| | Responsibilities of the contractor/subcontractor supervisors include the following: |
| | Conduct regular site check/inspection to ensure regular maintenance is undertaken to minimize environmental impacts. |
| | Provide personnel with appropriate environmental toolbox/tailgate meetings and training. |

2.0 KEY INDICATORS FOR FOLLOW-UP MONITORING

The TEMMP focuses on the targeted valued ecosystem components (VECs) and their key indicators (KIs; see Table 2-1). Some of these were selected during the Terrestrial Environmental Impact Assessment (see various sections in the Environmental Impact Statement (EIS) Volume 6) based on criteria outlined in Volume 2 (Impact Assessment Methodology) and baseline information. KIs that were brought forward for follow-up monitoring were chosen based on confidence in the impact assessment prediction, practicality of monitoring, and mitigation potential. Note that not all of the KIs identified in the Impact Assessment (Volume 6) were selected as KIs for monitoring (see Table 2-1), although specific mitigation measures for these KIs may be included in this volume. In some instances where residual Project impacts to a KI were assessed as low and the confidence in the impact assessment prediction was high, follow-up monitoring was deemed not necessary.

Table 2-1 Key Indicators for Follow-up Monitoring

| VEC | Key Indicators for Impact Assessment (Volume 6) | Key Indicators for Follow-up Monitoring (this document) |
|----------------------|--|---|
| Vegetation | Vegetation abundance and diversity, vegetation health, culturally valued vegetation | Invasive species, vegetation health, and dustfall |
| Birds | Peregrine Falcon, Snow Goose, Common and King Eider, Red-throated Loon, Thick-billed Murre, Lapland Longspur, other bird species of conservation concern | Peregrine Falcon, Gyrfalcon, Common and King Eider, Red Knot, seabird migration and wintering, and songbird and shorebird diversity |
| Terrestrial Wildlife | Caribou | Caribou and wolf |

2.1 Vegetation

Vegetation abundance, diversity, and health within the RSA could be affected by project activities associated with construction, operation, and closure. However, overall effects on vegetation abundance and distribution were predicted to be not significant with a high level of confidence (Volume 6, Section 3.2.4). Project effects on vegetation health are expected to be limited, but assessment confidence was only moderate due to uncertainties on the effects of dust and other contaminants on local vegetation. Additionally, although the introduction of invasive plant species is unlikely, their introduction may pose a threat to the abundance and diversity of native plant species. There are control measures in place to limit the potential for introduction of invasive species, but the potential still exists. Therefore, vegetation monitoring will focus on detecting the presence of plant invasive species and any Project effects on vegetation health.

2.2 Birds

The Project has the potential to affect the abundance, diversity and health of birds within the RSA. In order to assess Project impacts on birds, the impact assessment (Volume 6, Section 4) selected several KIs: Peregrine Falcon, Snow Goose, Common and King Eider, Red-throated Loon, Thick-billed Murre, Lapland Longspur, and additional Species at Risk (Harlequin Duck, Ross's Gull, Ivory Gull, Red Knot and Short-eared Owl). The assessment determined with a high level of confidence that Project effects on most of these species would be low or nil. The exception to this was Red Knot; Project effects on Red Knot are expected to be limited but the assessment confidence was only moderate due to uncertainties in whether or not the species is breeding in the RSA.

Peregrine Falcon is wide-spread and abundant breeder within the RSA and is listed as a species of 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2011). It is the only bird Species at Risk which is expected to regularly occur in close proximity to the proposed Project; all of the remaining Species at Risk are expected to be encountered only rarely. In addition, eiders have been rated as sensitive by the Government of Nunavut (CESCC, 2006) and, although they are not listed by COSEWIC, they have recently been identified as a Species of Interest by the Canadian Wildlife Service because of an unexplained nationwide decline (Suydam, 2000). Migrating Common and King Eiders were seen in large numbers in the coastal waters of the RSA during their spring and fall migrations, and dozens of females were seen raising broods in Steensby Inlet around the proposed port location. IQ studies indicated that eiders are an important species to the local communities for harvesting and consumption, and that some Inuit still use eider feathers in clothes, pillows, and quilts. As a result, Peregrine Falcon, Common and King Eider and selected Species at Risk were selected as KIs for follow-up monitoring.

Although Baffinland is confident that Project effects will not have a significant impact on other bird species, they acknowledge that there are weaknesses present in the baseline, particularly regarding issues beyond the scope of what Baffinland was capable of assessing during baseline surveys. Therefore, at the request of government regulators, a couple of additional KIs were included in follow-up monitoring; these include:

- Gyrfalcon were added due to differences in ecology (Peregrine Falcon acts as a representative of most cliff-nesting raptors; however, in contrast to Peregrine Falcons, Gyrfalcons may be present in the study area year round, and the timing of nesting is much earlier);
- Seabird migration and overwintering — Baffinland will participate in a larger research project on seabird migration and overwintering; the project will provide input on the potential interactions of Project shipping with migrating and wintering seabirds; and
- Songbird and shorebird diversity — Baffinland will assist in regional-level monitoring by CWS looking at regional diversities of songbird and shorebirds.

2.3 Terrestrial Wildlife

Caribou were identified as the terrestrial wildlife KI because of their ecological and social importance, and they are in part representative of a north Baffin Island terrestrial wildlife response to the Project. Caribou appear to be a keystone species in the north Baffin Island ecosystem as the abundance of many other animals, particularly the island's carnivores, seem to be related to caribou abundance and distribution. Also, caribou were consistently identified as an important species to local communities. When present, caribou are harvested and consumed by local people, and hunters from nearby communities currently harvest caribou within the RSA. Caribou have historically been, and continue to be, a key component of Inuit diet and culture. Additionally, many studies have been conducted on caribou responses to industrial activities throughout the species range.

The impact assessment (Volume 6, Section 5) assessed Project effects on caribou habitat, movement, mortality and health. Project effects on caribou are not expected to be significant; however, confidence in the assessment prediction was moderate for some effects (particularly relating to Project effects on caribou habitat and movement). Therefore, caribou was selected as a KI for on-going monitoring and several monitoring programs for caribou were developed.

3.0 MITIGATION MEASURES

3.1 Vegetation

Vegetation will be impacted mostly by physical disturbance (footprint of facilities), exhaust emissions, dust deposition and surface water quality. Thus, mitigation measures for vegetation are mainly related to limiting the physical footprint of the facilities, and reducing gaseous emissions and dispersal of particulates. Mitigation measures are detailed below. Refer to the Air Quality and Noise Abatement Management Plan (Volume 10, Appendix 10D-1) and the Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5) for a description of mitigation measures related to air and surface water quality.

Additionally, the delivery of material, equipment and freight to Steensby and Milne also introduces the potential for the introduction of invasive plant species (e.g., via seeds in wheel tread or the undercarriage of vehicles) into the arctic environment. Although climatic conditions at Milne Port and Steensby Port are expected to be the major barrier to the survival of introduced species, equipment brought to the Project site will be cleaned of other soils to help prevent the introduction of invasive species. In the event that invasive species are found within the Project area, these will be removed and destroyed, and, if possible, efforts will be made to determine the path of entry and prevent further spread of invasive species.

3.1.1 General Mitigation for Vegetation

Mitigations to reduce project effects on vegetation abundance and diversity, and culturally valued vegetation include:

- Project activities will be planned and conducted to minimize the project footprint within the Project development area (PDA).
- Project vehicles will stay on the established roads within the PDA during operation, limiting new disturbance to the PDA.
- Disturbed terrestrial habitat will not be reseeded during construction, operation and closure. Re-vegetation of the terrestrial habitat will be allowed to occur naturally. The mitigation will reduce the likelihood of invasive plant species becoming established within the RSA due to project development activities.
- Equipment brought to the Project site will be cleaned of soils that could contain plant seeds that do not naturally occur in the RSA.
- Dust Control Program (Management Plan Reference XX)

Mitigations to reduce effects on vegetation health will be addressed by those measures used to mitigate effects on air quality.

3.2 Birds

There are several pathways through which the proposed Project could potentially affect bird populations within the RSA. These include direct loss of habitat within the Project footprint and indirect loss of habitat due to sensory disturbance adjacent to the footprint, increased mortality due to collisions with Project vehicles, ships, aircraft, and permanent structure, increased mortality due to increased hunter access to the area or increased predator abundance within the RSA, and increased mortality or effects to bird health resulting from contamination of the surrounding environments (through dust deposition or other

contamination within the terrestrial environment, or through chronic leakage or catastrophic release of oils or other chemicals within the marine environment).

A number of mitigation measures have been designed to limit the Project effects on bird species; these are detailed below. Several other management plans will contribute to the protection of bird species and habitats within the Project Area — refer to the Air Quality and Noise Abatement Management Plan (Volume 10, Appendix 10D-1), the Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5), the Waste Management Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5), and the Emergency Response and Spill Contingency Plan, the Oil Pollution Emergencies Plan – Milne Port, and the Oil Pollution Emergencies Plan – Steensby Port (Type A Water License Application, FEIS Appendix 3B, Attachment 5) for a description of mitigation measures related to each of these areas.

3.2.1 General Mitigation for Birds

General mitigation measures that will be applied to all bird species include:

- Minimizing the project footprint to the extent possible, thus minimizing the direct loss of habitat or the reduction of habitat effectiveness.
- Implementing no-hunting policies for Project employees (notwithstanding the accommodation provided for traditional Inuit activities [Human Resource Management Plan SD-SEMP-003]) and prohibiting Project employees from transporting firearms to site and from operating firearms in Project areas for the purpose of wildlife harvesting.
- Employees working at Project sites will receive awareness training regarding the importance of avoiding known nests, nesting areas, and large concentrations of foraging and moulting birds.
- Ensure that orientation for Project personnel includes best practices with regard to waste management and avoiding wildlife (workers should not disturb, harass, or feed wildlife).
- Avoiding areas of large concentrations of foraging or molting birds by Project personnel and equipment to the extent possible.
- Prior to bird migrations and commencement of nesting, deterrents (e.g. flagging) to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season will be identified and installed [Baffinland prepared a bird deterrence review that was reviewed at the TEWG May 21, 2013].
- Conducting nest searches for all birds in areas to be disturbed during the nesting season, prior to any clearing of land.
- Implementing a nest management plan which will apply to any nest sites located within 750 m of Project activity (Section 3.2.2).
- Subject to safety requirements, BIM shall require all Project-related aircraft to maintain a cruising altitude of at least:
 - a. 650 m during point to point travel when in areas likely to have migratory birds
 - b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds
 - c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site.

- Pilots will be informed of minimum cruising altitude guidelines.
- Developing appropriate aircraft approach and departure flight paths, to the extent possible, for the airstrips at the Milne and Steensby Inlet port sites to reduce the likelihood of bird strikes.
- Maintain a minimum flying altitude of 610 m when in the air space over the National Park except for approach to land, take-off or for safety reasons.
- Ensuring that any temporary communication towers using guy wires will be fitted with bird diverters to help minimize the risk of bird collisions (all permanent communication towers will be free standing) and installing flashing red, red strobe, or white strobe lights on communications towers. Lighting will be reduced when possible in areas where it may serve as an attractant to birds or other wildlife.
- Routing ships to maximize distances between the ships and shorelines, and to remain at least 2 km from seabird colonies, and, to the extent possible, avoid Key Marine Habitat Sites (see Figure 6-4.5 in Volume 6).
- Handling ship discharges in a way that conforms with the Canada Shipping Act and the Arctic Waters Pollution Prevention Act.
- Developing effective oil spill emergency response plans in accordance with the Arctic Waters Pollution Prevention Act.
- Minimizing dust dispersal through dust suppression methods, and thereby minimizing the Project's zone of influence.

Baffinland acknowledges the potential for an increase in the number of predators as a result of human activity in the area. To minimize the potential for increasing densities of bird nest predators (e.g., foxes, gulls, jaegers), Baffinland will:

- Implement strict waste management procedures as outlined in the Waste Management Plan. As required by Baffinland EHS Management System, audits will be carried out periodically to assess the effectiveness of waste management practices. Buildings will be designed to avoid/eliminate denning, roosting and nesting sites (e.g., bird spikes will be installed on horizontal surfaces, particularly near heat sources, and buildings will reduce the number of sheltered surfaces where nests could be established).
- Baffinland will also conduct regular surveillance of project facilities and waste disposal sites to ensure that predator control measures are effective.

Additionally, Baffinland will communicate with Parks Canada on a regular basis to inform Parks Canada about expected shipping schedule and air traffic into Milne Port.

3.2.2 Nest Management Plan

If nests are found within 750 m of a work area during the nesting season (31 May to 4 August), environmental staff will be contacted and mitigation plans such as closure of the area within a specific buffer of the nest until fledging occurs will be implemented. Table 3-1 outlines the setback distances recommended by Environment Canada for tundra-nesting species that will be applied within the Mary River Project area. If any Species at Risk nests are encountered within 2 km of project activities, appropriate setback buffers will be applied, and the nests will be monitored by environmental staff to confirm that project activities are not affecting the nest.

Table 3-1 Recommended Setback Distances for Activity near Bird Nests

| Species Group | Recommended Setback Distances (m) | |
|--|-----------------------------------|--|
| | Pedestrians/ATVs | Roads/Construction/Industrial Activities |
| Songbirds | 30 | 100 |
| Shorebirds | 50a | 100 ^a |
| Terns/Gulls | 200b | 300 ^b |
| Ducks | 100 | 150 |
| Geese | 300 | 500 |
| Swans/Loons/Cranes | 500 | 750 |
| <p>^a For nests of American Golden Plover or Ruddy Turnstone, these setbacks should be increased to 150 m for Pedestrians/ATVs and 300 m for Roads/Construction /Industrial Activities respectively. For nests of Black-bellied Plover, Whimbrel or Red Knot, these setbacks should be increased to 300m for Pedestrians/ATVs and 500m for Roads/Construction/Industrial Activities. If field crew are untrained in the identification of these species, then the higher setbacks should be applied for all shorebird species. In areas where several species are nesting in proximity, setbacks for the most sensitive species should be used if they are present.</p> <p>^b For project activities are in proximity to nests of Ross's Gull these setbacks should be increased to 500 m Pedestrians/ATVs and 750 m for Roads/Construction/Industrial Activities. The draft Recovery Strategy for Ivory Gull currently identifies the area within a 2-km radius around colonies where at least one individual was observed nesting any time between 2002 and 2009 as Critical Habitat. As a precautionary approach, a 2 km setback should also be applied to any Ivory Gull nest that is encountered in an area that is not currently identified as Critical Habitat in the Recovery Strategy.</p> <p>[Baffinland believes these set-backs apply when introducing new disturbance to an area. For example, if while construction activities are ongoing, a duck establishes a nest 50 m from the construction activity, we don't need to then halt all construction activities within 150 m of the nest; we just need to make sure that they don't encroach any closer to the nest. TEWG discussion.]</p> | | |

In some cases it may not be feasible to maintain the recommended buffer between known nests and Project activities. In such cases, nest-specific guidelines and procedures will be developed and issued to all employees to ensure the duration of the activity and the magnitude of the disturbance to that nest is minimized. Project biologists will monitor each individual case as often as possible and in a manner that does not cause added disturbance to the nest, to assess the effectiveness of the nest-specific management plans. To prevent thermoregulatory stress to eggs, incubating adults should not be disturbed/flushed from their nests during inclement weather (rain, snow, cold temperatures) in June and July.

3.2.3 Cliff-nesting Raptor Mitigation

The Project area has a number of breeding Peregrine Falcons and although the assessment concluded that the Project will have no population-level impacts, the potential to disturb and disrupt individuals is possible and proper mitigation procedures must still be implemented to minimize unforeseen effects. General mitigation measures applied in all areas of the Project footprint will mitigate effects to Peregrine Falcons and other cliff nesting raptors. Additionally, nest-specific management plans will be developed for any Peregrine Falcon nests identified within the Potential Development Area (PDA, figures available in Volume 6). Where possible, a site-specific no-disturbance buffer (of approximately 500 m) will be implemented for both project personnel and equipment around the nests during the nesting period.

3.2.4 Snow Geese Mitigation

Thousands of Snow Geese use portions of the Project area as a migratory stop-over site (spring and fall) and as a moulting area in the fall. A relatively small number of Snow Geese nest within the Project area, although a breeding colony of over 5,000 Snow Geese is located on the southwest shore of Steensby Inlet. Project activities have the potential to disturb Snow Geese during migration, moulting and breeding; however, effects are expected to be localized to areas directly adjacent to the Project footprint. With the implementation of the general mitigation measures described above, Project effects are not expected to have any population-level effect.

Additionally, CWS has proposed a Special Management Area for moulting Snow Geese; this area is located to the west of the proposed rail alignment and south of the proposed mine site (see Figure 6-4.6 in Volume 6). Air traffic between the mine site and Steensby port will likely pass over the eastern portion of this area; however, to the extent possible, air traffic in this area will stay a minimum of 1110 m above ground during the moulting period, and 650 m above ground during the remainder of the migration and breeding season. Excessive hovering or circling over this area will be avoided. Other than environmental monitoring and research surveys, no other Project activities will occur in this area during the moulting period.

3.2.5 Mitigation for Eiders, Red-throated Loon, Common Murre and Lapland Longspur

The potential impacts on eiders, Red-throated Loons, Common Murres and Lapland Longspurs are expected to be low. Therefore, no specific additional mitigation measures are proposed for these species.

3.2.6 Species at Risk Mitigation

In addition to Peregrine Falcon (discussed above), there are five other Species at Risk which could be found within the Mary River Project Area: Harlequin Duck, Ivory Gull, Ross's Gull, Red Knot, and Short-eared Owl. Project interactions with these species are expected to be very rare and with the implementation of the general mitigation measures described above, the Project is not expected to have a residual effect on these species.

If a nest from one of these species is located within the Project area, it will be dealt with as per the Nest Management Plan (Section 3.2.2). Set-back distances for Harlequin Duck, Ivory Gull, Ross's Gull and Red Knot are included in Table 3-1 (see footnotes). If a Short-eared Owl nest is located, a 400 m no-disturbance buffer is recommended.

Baffinland will consult with the Government of Nunavut and Environment Canada to identify other appropriate mitigation measures to minimize effects to these species from the project.

3.3 Terrestrial Wildlife

Caribou distribution, abundance, and health within the RSA could be affected by Project activities associated with construction, operation, and closure. Assessment of Project effects on caribou looked at four measurable parameters; these include habitat, movement, mortality, and health. Table 5.5 describes project-specific sources of effects that may affect caribou.

Table 3-2 Terrestrial Wildlife- Project Specific Source Effects and their Impact on Caribou

| Project Related Sources | Impacts on Caribou | Possible effects |
|--|--|--|
| Human Presence | Increment of noise levels | Displacement of caribou; May disturb calving and post-calving areas; Increment of stress. |
| | Increased hunting access to caribou | Decrease number of animals; Increment of stress. |
| | Habitat alteration | May disturb calving and post-calving areas. |
| Vehicle and air traffic during construction, operation and decommissioning phase | Visual disturbance | Displacement of caribou; |
| | Increment of noise levels | May disturb calving and post-calving areas; |
| | Increment of vibration levels | Increment of stress. |
| Surface disturbance | Physical barrier | Interference with Caribou movements along migration corridors; Displacement of caribou; Increment of stress. |
| | Habitat alteration | Displacement of caribou; Increment of stress; May disturb calving and post-calving areas. |
| | Loss of habitat or habitat availability | |
| | Visual disturbance. | |
| Infrastructure such as roads, railway, barge landings, camps, fuel storage areas, airstrip, equipment storage and stockpiling areas | Physical barrier | Interference with Caribou movements along migration corridors; Displacement of caribou; Increment of stress. |
| | Habitat Alteration | Displacement of caribou; Increment of stress; May disturb calving and post-calving areas. |
| | Loss of habitat or habitat availability | |
| Camps and waste disposal facilities (incinerator, landfarm, etc) | Attraction of Caribou to facilities | Increment human and Caribou interactions; Increased stress. |
| | Ingestion of chemicals and wastes | Could affect the health of individual Caribou or result in food chain contamination. |
| Road and railway | Better access to Caribou Habitat | Increment of hunting activities; Increment human and Caribou interactions; May disturb calving and post-calving areas. |
| | Increased hunting access to caribou | Increased hunting activities. Decrease on number of animals; Increment of stress. |
| General Operation Activities | Contamination of water and/or soils/snow/ice | Reduced health of individual Caribou or result in food chain contamination; May disturb calving and post-calving areas; Displacement of caribou; Increment of stress. |
| | Increment of noise levels | Displacement of caribou; |
| | Increment of vibration levels | Interference with Caribou movements along migration corridors; Increment of stress. |
| Blasting Activities | Habitat Alteration | Displacement of caribou; Interference with Caribou movements along migration corridors; Increment of stress. |
| Access to mine pits and other hazardous areas | Physical barrier | Interference with Caribou movements along migration corridors; Displacement of caribou; |

| Project Related Sources | Impacts on Caribou | Possible effects |
|-------------------------|---------------------------------------|---|
| | | Increment of stress. |
| | Increased risk of injury or mortality | Injury; Decrease on number of animals; Increment of stress. |

Mitigation measures for caribou are described for each of the parameters identified as potentially affected by Project activities. In general, caribou management within the Mary River RSA will be characterized by the application of the precautionary principle and employing an adaptive management strategy to minimize and/or mitigate any negative impacts of the Project to caribou. Some mitigation measures are general to all wildlife.

3.3.1 Habitat Mitigation

Sensory disturbances that affect habitat effectiveness within a Zone of Influence (ZOI) can only be partially mitigated. Caribou, wolves and other terrestrial wildlife will find some Project activities disturbing, and the degree to which animals will adapt to those disturbances is not known. Mitigation measures that will reduce the likelihood of reduced habitat effectiveness for caribou include:

- Minimizing the Project footprint to the extent possible, thus minimizing the direct loss of habitat or the reduction of habitat effectiveness (indirect habitat loss).
- Limit sensory disturbances where possible throughout the year. This will be realized by developing a blasting program to minimize the effects of blasting on terrestrial wildlife that includes, but is not limited to the restriction of blasting when migrating caribou, sensitive local carnivores, or birds may be negatively affected.
- Dust suppression on mine roads during the growing season.
- Reclamation of disturbed areas.
- Minimize construction activities during the calving season, particularly during the first 3 weeks after peak calving and at Cockburn Lake. This could include cessation of all non-essential activities in the Cockburn Lake area (the location of most caribou calving sites) between 15 May – 15 July (e.g., planning construction activities to avoid this area during the calving season).
- No increase in mine construction or operational activity 15 May – 15 July and where possible, planning maintenance shut-downs to correlate with calving season.

3.3.2 Movement Mitigation

The effect of the Project on caribou movement is expected to be not significant. Mitigation measures that will reduce the likelihood of a barrier effect on caribou movement include:

- Snow management that will grade snow banks along the Railway and roadways so that caribou can easily cross the transportation corridor without being blocked by steep snow banks.
- The Railway embankment will be constructed of finer fill material and graded at the five trails that might result in a barrier to caribou movement across the Railway embankment. Finer fill will replicate natural trail conditions, preventing leg entrapment, and gentler gradients will reduce the visual barrier of the embankments. Railway operators will be made aware of the crossing areas, and will be required to report any caribou sighting along the railway.
- A large railway bridge will be constructed at the Cockburn Lake caribou water crossing; the bridge will be tall enough (10 m agl) to allow caribou to pass underneath.
- Using IQ knowledge provided by hunters and elders, if migratory caribou start to move through the RSA again, then the leading caribou will be allowed to cross over the railway undisturbed so that others will follow.
- An on-site review of caribou trail crossings will be conducted and adjustments implemented to the structure of embankments with QIA-identified elders and hunters.
- New trail crossings can be modified with gentler slopes to facilitate caribou movement when caribou deflections are detected.
- If caribou mortality were to increase as a direct result of the project, the effects can be readily mitigated by increasing traffic controls including seasonal traffic limitations of both the tote road (during years of equipment mobilization) and rail. Timing and duration of limitations will be determined by repeated on-site observations of caribou behaviour along the transportation corridors as the project proceeds through construction and operation.
- Use of Railway with consistent trainset passes to which caribou are expected to adapt.

3.3.3 Mortality Mitigation

There are no expected residual effects of the project on caribou mortality. Mortality, if it occurs, will be limited to individuals, within the PDA, and occur rarely. The effect of the Project on caribou mortality is not expected to be significant. Mitigation measures that will reduce the likelihood of the Project having an effect on caribou mortality include:

- Use of railway with consistent trainset passes to which caribou are expected to adapt.
- Wildlife right-of-way policy on Project roads.
- Signage of known caribou crossings through Project infrastructure.
- Radio communication between train operators to bring attention to presence of animals on or near Railway.
- Adjusting speed limits for trucks and trains that will allow caribou time to get off the road or rail, and will increase the chance of a truck being able to stop before colliding with a caribou.
- The train is expected to operate 300 days per year, so seasonal stoppages are possible if large groups of migratory caribou return to the area.
- Removal of carcasses from transportation corridors to discourage further collisions (e.g., scavengers on Railway).

- Implementing no-hunting policies for Project employees (notwithstanding the accommodation provided for traditional Inuit activities [Human Resource Management Plan SD-SEMP-003]) and prohibiting Project employees from transporting firearms to site and from operating firearms in Project areas for the purpose of wildlife harvesting.
- Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered (i.e., risk of physical injury or death) by the work being carried out.
- Design and implement means of deterring caribou from the pits and other hazardous areas, such as installing poles with fluorescent flagging, creating physical barriers (berms or fences), installing auditory deterrents, and/or using wildlife monitors to survey for wildlife in hazardous areas [Baffinland prepared a caribou deterrence review and presented at the TEWG 21 May, 2013].

3.3.4 Health Mitigation

The primary pathway of Project-related health effects on caribou is expected to be dust fall. Dust suppression and other mitigation measures related to air quality are detailed in the Air Quality and Noise Abatement Management Plan (Volume 10, Appendix 10D-1). No additional mitigation measures for caribou health were identified.

3.3.5 Other Mitigation

Baffinland maintains an active employee induction program. This induction program is designed to increase awareness of employees to health, safety and environmental issues at the site. The program addresses wildlife encounters, behavior to discourage wildlife habituation, waste management and other practices likely to impact wildlife and birds. During site orientation, employees will be provided with the best practices for waste management on site, and will be instructed on the purpose and benefits of avoiding wildlife, where possible.

As with vegetation and birds, several other management plans will contribute to the protection of wildlife species and habitats within the Project Area - refer to the Air Quality and Noise Abatement Management Plan, the Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5), and the Waste Management Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5) for a description of mitigation measures related to each of these areas.

Wolves and foxes are the dominant predators within the RSA, occurring at low densities. The project is not expected to cause an increase in predator abundance as Project effects will likely be undetectable compared to the main effect of carnivore response to caribou abundance; however, garbage management and mitigations are addressed in the Environmental Protection Plan (Type A Water License Application, FEIS Appendix 3B, Attachment 5) and Waste Management Plan. Within Baffinland's Waste Management Plan, waste is segregated and food waste and combustible waste are incinerated. Waste collection bins will be located in all major facilities. Only inert and non-combustible waste is put into the landfill. Audits are an integral part of the Waste Management Plan. For further details, refer to the Waste Management Plan.

4.0 MONITORING FRAMEWORK

Monitoring of Project effects must be relevant to the Project and to the possible effects which the Project will have on the environment. The monitoring framework will inform adaptive management measures that

can be effectively applied. The following framework is not a comprehensive Environmental Effects Monitoring (EEM) plan; instead it presents a simplified structure to capture the most important details that will be necessary for a comprehensive EEM, if required once the assessment process is complete.

The objectives of the monitoring framework are to:

- develop a comprehensive and integrated environmental monitoring program;
- incorporate an ecosystem-based approach for monitoring and management of Project related environmental effects;
- integrate IQ knowledge into the development and implementation of the environmental monitoring programs;
- include the meaningful participation of QIA in all aspects of the environmental monitoring program in all phases of the development, including the decommissioning and reclamation;
- coordinate aspects of the environmental monitoring program; and
- report in an effective and timely manner on the environmental monitoring program and its results in ways that are meaningful to stakeholders.

4.1 Monitoring Principles

The framework's objectives provide guidance for the development of specific Project monitoring principles:

- Monitor and verify potential effects related to the Project;
- Monitor and evaluate the effectiveness of mitigation measures;
- Identify unanticipated effects;
- Monitor effects where predictions were based on weak data;
- Provide an early warning of undesirable change in the environment; and
- Inform adaptive management measures.

4.2 Monitoring Framework Overview

There are three categories of study related to monitoring and follow-up of Project-related effects (adapted from Voisy's Bay EEM 2006):

1. **Baseline Research** — background studies intended to establish need for, or parameters of, an EEM program. Research studies could address issues such as natural variability of a measurable parameter or monitoring target, or examine the nature, extent, or duration of a potential Project – Valued Ecosystem Component (VEC) interaction.
2. **Surveillance** — programs to produce information about the pattern of occurrence of key indicators.
3. **Monitoring** — programs to address and quantify cause and effect linkages between Project activities and components of the receiving environment.

Table 4-1 defines the key considerations for each monitoring plan component outlines the monitoring approach taken for a number of Valued Ecosystem Components (VECs) as identified by the Nunavut Impact Review Board (NIRB). Monitoring is focused on measureable parameters of Key Indicators.

Table 4-1 Monitoring Framework — Overview and Definitions.

| | |
|-------------------------------------|--|
| VEC | Valued Component (e.g., Terrestrial Wildlife) — identified by NIRB, addressed in Mary River Project EIS |
| Key Indicator | The species or relevant feature selected to represent the VEC (e.g., caribou) |
| Monitoring Category | One of three categories – Research, Surveillance, full EEM |
| Design | e.g., Before-After-Control-Impact (BACI), opportunistic, etc. |
| Measurable Parameter | A quantifiable feature used to assess potential effects on an indicator (e.g., movement) |
| Key Project Interactions | Identification of key project features that result in residual effects on the Indicator and Measurable Parameter (e.g., Railway as a filter to caribou (Indicator) movement (Measurable Parameter)). |
| Goal | Statement of the expected residual effect of the Project (e.g., the Project will have a not significant effect on caribou movements across Project infrastructure). |
| Objective | Evaluate a potential response specific to the mine and operations (e.g., evaluate movement patterns of caribou as they approach or cross the railway). |
| Threshold | Early warning indicator (note: usually about an order of magnitude lower than the significance criteria used in the EIS) |
| Scope of Monitoring Work | Brief overview of key components of a monitoring program including note of temporal and spatial scale, frequency, duration. |
| Agency/Partner Participation | Identification of agencies or key partners in the monitoring programs (e.g., Qikiqtani Inuit Association). |
| Mitigation Measures | A list of measures used to reduce or remove project related effects (e.g., project design elements, adjustments to operations) |
| Project Terms and Conditions | Indicates the Project Terms and Conditions (NIRB Project Certificate No. 005) that are being addressed by this monitoring plan component |

4.3 Vegetation Monitoring

Vegetation will be monitored during project construction, operation, and closure. Monitoring will occur every five years and will focus on invasive species and vegetation health in the vicinity of the Project and at control sites within the RSA for comparison.

Invasive species monitoring will occur within the Project footprint and adjacent habitats to ensure that no invasive species are introduced to the arctic environment by the Project. Surveys for invasive plants will be conducted every five years, and additional surveys may be triggered by observations of plant invasive species. If any invasive species are found, these will be destroyed and, if the pathway of entry can be determined, changes will be made to reduce the possibility of further introduction of invasive species. See Table 4-2 for more details on invasive species monitoring.

Vegetation health monitoring will be conducted through permanent monitoring plots in a variety of habitat types (minimum two plots per habitat type) near project infrastructure and in control areas within the RSA. Plots in the vicinity of the Project infrastructure will be situated at varying distances from infrastructure to determine the extent of air quality impacts (the exact distance will be determined by the air quality monitoring program). Within each of the plots, species composition will be documented, and the percent cover of each species will be estimated. Lichen samples will be collected adjacent to the plots and sent to accredited laboratories for chemical analysis (Table 4-3).

Dust fall monitoring will also be conducted via year-round monthly sampling at a number of infrastructure and control areas within the RSA to determine the impact of dust fall in the palatability of caribou forage (Table 4-4). Sampling locations will be situated at varying distances from infrastructure to determine the areal extent of dust fall on vegetation. At each sampling location a sample will be collected and analyzed by an accredited laboratory for total suspended particulate (TSP), as well as fixed and volatile components of TSP (mg/m²/day).

Table 4-2 Vegetation Monitoring: Invasive Species

| | |
|-------------------------------------|---|
| Indicator | Plant invasive species |
| Monitoring Category | Surveillance |
| Design Type | Footprint and adjacent habitat surveys |
| Measurable Parameter | Occurrence of plant invasive species |
| Key Project Interactions | Introduction of plant invasive species |
| Goal | The Project will not introduce invasive plant species to the RSA |
| Objective | To quantify the occurrence of plant invasive species |
| Threshold | No introduction of plant invasive species as a result of Project activities |
| Scope of Monitoring Work | <u>Local monitoring:</u> Surveillance of Project footprint and adjacent habitat, at minimum, surveys to be conducted every 5 years or triggered by observations of plant invasive species |
| Agency/Partner Participation | None required |
| Project Terms and Conditions | 37 |

Table 4-3 Vegetation Monitoring: Vegetation Health

| | |
|-------------------------------------|---|
| Indicator | Vegetation Health |
| Monitoring Category | Surveillance and Monitoring |
| Design Type | Before-After-Control-Impact (BACI) |
| Measurable Parameter | Vegetation class composition, biomass, and contaminant levels in lichen and berry-producing plants |
| Key Project Interactions | Effluent, dust, and air emissions released into the environment have the potential to impact vegetation health. Dust and other contaminants may affect the survival of plant species (leading to changes in plant composition and biomass) and if contaminants are absorbed by plants then they may be ingested by wildlife or humans, which may have an effect on the health of individuals. |
| Goal | The Project will have a not significant effect on contaminant uptake in vegetation |
| Objective | Quantify: vegetation class composition (vegetation health) vegetation biomass (vegetation health) metals levels in lichen (caribou forage) baseline metals levels in berry-producing plants (traditional use) through continued monitoring throughout the duration of the Project |
| Threshold | Project activities resulting in >10% change in vegetation composition, biomass, and/or accumulation of contaminants in lichen and berry-producing plants beyond acceptable threshold levels for caribou and human health |
| Scope of Monitoring Work | <u>Regional monitoring:</u> Assess baseline vegetation class composition and contaminant levels in lichen and berry-producing plants and re-assess every 5 years. Air quality monitoring program led by Baffinland. |
| Agency/Partner Participation | None required |
| Project Terms and Conditions | 34, 36 |

Table 4-4 Vegetation Monitoring: Dust fall

| | |
|-------------------------------------|---|
| Indicator | Dust fall |
| Monitoring Category | Surveillance and Monitoring |
| Design Type | Before-After-Control-Impact (BACI) |
| Measurable Parameter | Dust fall concentration (mg/dm ² /day) as sampled by dust collection vessels, and analysed by ALS Environmental |
| Key Project Interactions | Dust fall has the potential to affect vegetation health, as well as forage palatability for caribou |
| Goal | The project will not have a significant effect on palatability of vegetation for caribou |
| Objective | Quantify: magnitude of dust fall on vegetation surrounding mine site, Milne and Tote Road distance from point sources and roadway at which increased dustfall is measured seasonal variation in dust fall through continued monitoring throughout duration of project. |
| Threshold | Low: 1–4.6 g/m ² /a; Moderate: 4.6–50 g/m ² /a; and High: > 50 g/m ² /a. |
| Scope of Monitoring Work | Regional monitoring: dust fall concentrations to be recorded at 26 locations on a monthly basis throughout calendar year. |
| Agency/Partner Participation | None required |
| Project Terms and Conditions | 36 |

4.4 Birds Monitoring

Four monitoring programs for birds will be implemented by Baffinland over the course of the construction, operation, closure, and post-closure phases to increase the available baseline data, to detect possible changes to KI birds in the RSA, to assess the magnitude of these changes, and to determine whether these changes are naturally occurring variations or project-related impacts.

Monitoring of Peregrine Falcon and Gyrfalcon nesting will occur on an annual basis within the RSA to quantify occupancy and productivity and ensure that the Project is not having a significant effect on cliff-nesting raptors. This will involve four aerial surveys – one early in the nesting period, and one just before fledging for each species. Survey results for nests in close proximity to the Project footprint will be compared with results from other portions of the RSA and with baseline findings to determine whether the Project is impacting cliff-nesting species (Table 4-5).

The density of Common Eider, King Eider, and Red Knot nests along the port sites and appropriate control shorelines will be surveyed over three consecutive years to ensure that sensory disturbance from Project activities and wake effects from shipping do not have a significant detrimental effect on shoreline nesting birds (Table 4-6).

Although Baffinland is confident that Project effects will have a not significant impact on migratory songbirds and shorebirds within the RSA, they have committed to assisting the Canadian Wildlife Service in regional baseline research and monitoring for these species. The monitoring program will involve 20 PRISM plots conducted within the RSA every five years (Table 4-7).

Table 4-5 Migratory Bird Monitoring: Peregrine Falcon and Gyrfalcon Nesting

| | |
|-------------------------------------|--|
| Indicator | Peregrine Falcon and Gyrfalcon |
| Monitoring Category | Baseline Research and Surveillance |
| Design Type | Before-After-Control-Impact (BACI) |
| Measurable Parameter | Occupancy and productivity |
| Key Project Interactions | Sensory disturbances generated from various Project activities |
| Goal | The Project will have a not significant effect on Peregrine Falcon and Gyrfalcon occupancy and productivity |
| Objective | To quantify Peregrine Falcon and Gyrfalcon occupancy and productivity within the RSA |
| Threshold | Less than a 10% difference in near-site and far-site occupancy and productivity averaged over three consecutive years |
| Scope of Monitoring Work | <u>Local monitoring:</u> Annual territory surveys to determine occupancy and productivity of Peregrine Falcons and Gyrfalcons (total of four surveys – Peregrine Falcon occupancy and productivity, and Gyrfalcon occupancy and productivity). |
| Agency/Partner Participation | <u>Local monitoring:</u> Government of Nunavut, Department of Environment, Arctic Raptors Inc. |
| Project Terms and Conditions | 73 |

Table 4-6 Migratory Bird Monitoring: Nesting of Common and King Eider, and Red Knot

| | |
|-------------------------------------|--|
| Indicator | Common and King Eider, and Red Knot |
| Monitoring Category | Baseline Research and Monitoring |
| Design Type | Before-After-Control-Impact (BACI) |
| Measurable Parameter | Habitat- nesting |
| Key Project Interactions | Sensory disturbance and wake effects on shoreline nesting birds |
| Goal | The Project will have a not significant effect on eider and Red Knot nesting density |
| Objective | Quantify number of eider and Red Knot nests at the port sites, and appropriate control shorelines |
| Threshold | Less than a 20% decrease in nesting within the Steensby Port ZOI relative to control areas over three consecutive years of monitoring. |
| Scope of Monitoring Work | <u>Local:</u> Pre and post-disturbance surveys of eider and Red Knot nesting densities within and adjacent to the port site and control areas. |
| Agency/Partner Participation | Environment Canada - Canadian Wildlife Service |
| Project Terms and Conditions | 73 |

Table 4-7 Migratory Bird Monitoring: Songbirds and Shorebirds

| | |
|-------------------------------------|---|
| Indicator | Shorebirds and Songbirds |
| Monitoring Category | Baseline research |
| Design Type | PRISM plots |
| Measurable Parameter | Abundance and density |
| Key Project Interactions | Habitat loss and sensory disturbance due to Project activities |
| Goal | The Project will have a not significant effect on songbird and shorebird abundance and density within the RSA. There is high confidence in this prediction. Follow-up monitoring is not required. |
| Objective | Contribute to baseline knowledge of songbird and shorebird distribution and abundance in the Eastern Arctic. |
| Threshold | No thresholds identified – this is a contribution to regional baseline research and monitoring |
| Scope of Monitoring Work | <u>Regional</u> : 20 PRISM plots every 5 years |
| Agency/Partner Participation | Canadian Wildlife Service |
| Project Terms and Conditions | 73 |

4.5 Terrestrial Wildlife Monitoring

The impact assessment did not identify any significant impacts on caribou, but there is only moderate confidence in the predictions of effects on habitat and movement. The current low abundance of caribou in the RSA makes it difficult to predict and document effects because negative interactions between mine activities and caribou are unlikely to occur due to the low density of caribou. To ensure that the Project does not have a significant detrimental effect on local caribou, several monitoring programs have been developed. These programs are focused within the Zone of Influence (ZOI) assessed for caribou, as identified in Volume 6, Section 5 for a description of the ZOI. Although there are varying levels of disturbance relative to distance from activities, the ZOI is expected to be no further than 14 km.

4.5.1 Caribou Habitat Monitoring

Monitoring of caribou habitat use will involve two monitoring programs: the first assessing indirect habitat loss (resulting from sensory disturbances) and the second looking at caribou calving within the RSA. Monitoring of indirect habitat loss will occur at both the local level by tracking incidental observations of caribou by Project employees, and at the regional level through aerial surveys (when caribou numbers are sufficient enough for robust statistical analysis). Long-term distribution patterns will also be identified by a GN-sponsored caribou satellite collaring program(s), but collared caribou do not represent the distribution of the entire North Baffin caribou population. See Table 4-8 for further details on the monitoring of indirect habitat loss. Monitoring of habitat use during the calving season will focus on aerial surveys of known calving sites within the ZOI during construction and initial years of operation to document occurrence. Collar data from the GN-sponsored caribou satellite collaring program will inform regional calving distribution patterns (see Table 4-9). Additionally, periodic consultation will be conducted with local HTOs to provide information on the relative abundance of caribou in and around the RSA.

Table 4-8 Caribou Monitoring: Indirect Habitat Loss

| | |
|-------------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Surveillance |
| Design Type | Observational (aerial surveys, collar data) and opportunistic |
| Measurable Parameter | Distribution |
| Key Project Interactions | Indirect habitat loss from Project activities that create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint (e.g., dust deposition reducing palatability of vegetation), resulting in changed distribution |
| Goal | The Project will have a not significant effect on distribution of the North Baffin Island caribou |
| Objective | Evaluate trends in caribou distribution in the ZOI |
| Threshold | Caribou occurrence within the ZOI equivalent to the prediction made in the Project impact assessment. |
| Scope of Monitoring Work | Addressing this target requires regional-level surveys. <u>Local monitoring:</u> Continuous log of caribou observations from staff to document occurrence and maintain a record of flight paths and cruising altitudes of aircraft within ZOI. <u>Regional monitoring:</u> When caribou numbers are sufficient to provide robust statistical analysis of distribution within the ZOI, an annual aerial survey program will be implemented to document abundance and distribution of caribou in the RSA. Long-term distribution patterns as identified by a GN-sponsored caribou satellite collaring program. |
| Agency/Partner Participation | <u>Local monitoring:</u> Baffinland employees, Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs <u>Regional monitoring:</u> Government of Nunavut, Department of Environment |
| Project Terms and Conditions | 54h, 72 |

Table 4-9 Caribou Monitoring: Habitat Use during Calving

| | |
|-------------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Baseline research and Surveillance |
| Design Type | Observational (aerial surveys, collar data) and opportunistic |
| Measurable Parameter | Calving habitat use |
| Key Project Interactions | Project footprint in known calving habitats and sensory disturbances to caribou during the calving season |
| Goal | The Project will have a not significant effect on caribou calving habitat use |
| Objective | Allow caribou to calve undisturbed within the ZOI |
| Threshold | Not a quantifiable threshold |
| Scope of Monitoring Work | <u>Local monitoring:</u> Aerial surveys of known calving sites within the ZOI prior to construction, opportunistic documentation of other calving sites, and height of land surveys in appropriate areas during construction. Monitoring during construction and post-construction to document occurrence, particularly in the vicinity of Cockburn Lake. <u>Regional monitoring:</u> Long-term calving distribution patterns as identified by a GN-sponsored caribou satellite collaring program. Collar data will inform regional calving distribution. |
| Agency/Partner Participation | <u>Local monitoring:</u> Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs, Government of Nunavut, Department of Environment <u>Regional monitoring:</u> Government of Nunavut, Department of Environment |
| Project Terms and Conditions | 53b |

4.5.2 Caribou Movement

Caribou monitoring will include a program looking at Project effects on caribou movement within the Zone of Influence (ZOI). Specifically, the program will monitor the effects of railway infrastructure and

operations on caribou movements through seasonal track surveys for the first 3–5 years of operation in key movement areas, and remote motion-sensing cameras set up at select trails that cross or approach the railway. See Table 4-10 for further details. If it is deemed necessary, additional monitoring of caribou movements could involve having wildlife monitors visit the 52 identified trails once annually to document recent use (the focus of this work would be to determine if caribou are crossing the transportation infrastructure), and/or having wildlife monitors ride the trail and drive project roads once a month (when daylight allows sufficient visibility) to count the number of caribou in the area.

Table 4-10 Caribou Monitoring: Movement

| | |
|-------------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Baseline research and Surveillance |
| Design Type | Observational |
| Measurable Parameter | Movement in the ZOI |
| Key Project Interactions | Railway structure and operations may be a filter of or barrier to movement of caribou through the Regional Study Area |
| Goal | The Project will have a not significant effect on caribou movements across Project infrastructure |
| Objective | Evaluate movement patterns of caribou as they approach or cross the Railway and other Project infrastructure |
| Threshold | Less than 10% deflection of approaches to Railway and infrastructure |
| Scope of Monitoring Work | <u>Local monitoring:</u> Seasonal caribou track surveys in key movement areas where existing trails were detected within the ZOI. These can be ground-based (snow machine) to observe movement during early winter and spring seasons. These surveys will be conducted during the first 3–5 years of railway operation. Trail monitoring using remote motion-sensing cameras and documenting fresh tracks at select trails that cross or approach the Railway. Monitor response of caribou to railway bridge and tunnels. <u>Regional monitoring:</u> Long-term movement patterns as identified by a GN-sponsored caribou satellite collaring program. This is a longer-term approach that requires analyses at a regional scale. These analyses are expected to be conducted by the Government of Nunavut. |
| Agency/Partner Participation | <u>Local monitoring:</u> Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs, Baffinland employees <u>Regional monitoring:</u> Government of Nunavut, Department of Environment |
| Project Terms and Conditions | 54 h, j ii) |

4.5.3 Caribou Mortality

Project-related mortality on caribou will be tracked along with other wildlife species as part of the general wildlife monitoring (see Section 4.7). Additionally, Baffinland will monitor the potential for increased caribou mortality as an indirect result of the Project through increased harvester knowledge. This will be accomplished through tracking the number of hunters passing through and using the camp, and through a multi-year hunter harvest study which will include a summary of annual caribou harvest in the region. This hunter harvest study will be sponsored by Baffinland and done in coordination with local HTOs and the Government of Nunavut Department of Environment (GNDoE).

Table 4-11 Caribou Monitoring: Harvest-related Mortality

| | |
|-------------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Surveillance |
| Design Type | N/A |
| Measurable Parameter | Mortality risk |
| Key Project Interactions | Caribou mortality risk may increase as an indirect result of the Project through increased harvester knowledge |
| Goal | The Project will have a not significant increase on caribou mortality risk |
| Objective | Quantify caribou mortality risk in the RSA caused by increased harvesting knowledge |
| Threshold | Exceeding the herd's Total Allowable Harvest |
| Scope of Monitoring Work | Local monitoring: Log of hunters passing through and using the camp. Regional monitoring: Baffinland-sponsored multi-year hunter harvest study, which includes a summary of annual caribou harvest and, if possible, harvest locations. |
| Agency/Partner Participation | <u>Local monitoring:</u> Qikiqtani Inuit Association, Pond Inlet, Igloodik, Arctic Bay HTOs, Baffinland employees (e.g., train conductor) <u>Regional monitoring:</u> Government of Nunavut, Department of Environment, Nunavut Wildlife Management Board |
| Project Terms and Conditions | 54I |

4.5.4 Caribou Health

Changes in the health of caribou because of project activities are unlikely. However, there is not enough baseline knowledge to predict how caribou health might be affected by consumption of vegetation with heavy dust deposition. Therefore, several programs have been developed to monitor caribou health in response to the Project. The Vegetation Health monitoring will be a key component of this monitoring. Additional monitoring programs will look at contaminants in caribou tissues and body condition measurements as a part of the hunter-harvest study (see Table 4-12), and at caribou productivity within the RSA (see Table 4-13). The Government of Nunavut Department of Environment recently initiated a regional caribou health monitoring program; the Baffinland-sponsored hunter-harvest study should standardize methods so that results are comparable. The data will be used to help monitor potential effects that have a time component (i.e., length of exposure to disturbance). Hunter-harvest data can be collected immediately to acquire pre-development information and the study can be reassessed after five years to determine efficiency and efficacy of the data.

Table 4-12 Caribou Monitoring: Health Contaminants and Body Condition

| | |
|---------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Monitoring |
| Design Type | |
| Measurable Parameter | Health- contaminants in caribou tissues and body condition measurements |
| Key Project Interactions | Sensory disturbances related to Project construction and operation |
| Goal | The Project will have a not significant effect on North Baffin Island caribou population-level condition |
| Objective | Quantify indices of caribou body condition from individuals harvested within the RSA, as an index of population health. |
| Threshold | No detectable change in caribou health as a result of Project activities |
| Scope of Monitoring Work | <u>Regional monitoring:</u> Tissue samples and body measurements collected through the Baffinland-sponsored multi-year hunter harvest study; and opportunistic collection of fresh fecal samples |

| | |
|-------------------------------------|--|
| Agency/Partner Participation | Regional monitoring: Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs, Government of Nunavut, Department of Environment, Nunavut Wildlife Management Board |
| Project Terms and Conditions | 35 |

Table 4-13 Caribou Monitoring: Productivity

| | |
|-------------------------------------|--|
| Indicator | Caribou |
| Monitoring Category | Baseline Research and Surveillance |
| Design Type | Control –impact |
| Measurable Parameter | Productivity |
| Key Project Interactions | Sensory disturbances related to Project construction and operation |
| Goal | The Project will have a not significant effect on North Baffin Island caribou activity budgets such that productivity is negatively affected in the RSA |
| Objective | Quantify productivity of North Baffin caribou within the RSA |
| Threshold | No detectable change in caribou productivity as a result of Project activities |
| Scope of Monitoring Work | Regional monitoring: Productivity surveys in the RSA |
| Agency/Partner Participation | Regional monitoring: Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs, Government of Nunavut, Department of Environment, Nunavut Wildlife Management Board |
| Project Terms and Conditions | 56 |

4.6 Wolf-specific Monitoring

Although not identified as a KI during the impact assessment, wolves were identified as a KI for follow-up monitoring.

Table 4-14 Wolf Monitoring: Den sites

| | |
|-------------------------------------|--|
| Indicator | Wolf |
| Monitoring Category | Baseline research and Surveillance |
| Design Type | Observational (aerial surveys) and opportunistic |
| Measurable Parameter | Dens within 10 km of mine site |
| Key Project Interactions | Project footprint in known denning habitats. |
| Goal | The Project will have a not significant effect on wolf den sites |
| Objective | Allow wolves to den undisturbed within the ZOI |
| Threshold | Not a quantifiable threshold |
| Scope of Monitoring Work | Local monitoring: Aerial surveys of known den sites within a 10 km radius of the mine site, opportunistic documentation of other den sites. Monitoring during construction and post-construction to document occurrence. Regional monitoring: Maintain/add to long-term regional den site database in cooperation with GN-DOE and support any regional programs targeting wolves. |
| Agency/Partner Participation | Local monitoring: Qikiqtani Inuit Association, Pond Inlet, Igloolik, Arctic Bay HTOs, Government of Nunavut, Department of Environment Regional monitoring: Government of Nunavut, Department of Environment |
| Project Terms and Conditions | 55e |

4.7 Monitoring for all Wildlife Species

To ensure that Project effects on all wildlife species are minimized, Baffinland will monitor and annually review the amount of direct habitat loss resulting from the Project footprint (see Table 4-14). They will also track incidental observations of wildlife made by truck drivers and all Project employees within and adjacent to the Project footprint, as well as all Project-related mortalities (see Table 4-15).

Table 4-15 Wildlife Monitoring: Direct Habitat Loss

| | |
|-------------------------------------|---|
| Indicator | All species |
| Monitoring Category | Surveillance |
| Design Type | Footprint survey |
| Measurable Parameter | Project footprint |
| Key Project Interactions | Direct habitat loss within the footprint of the Project (either temporary or permanent) |
| Objective | Quantify direct habitat loss in the Project footprint |
| Threshold | Habitat loss limited to the amount identified in the Project description |
| Scope of Monitoring Work | <u>Local monitoring</u> : Measure area of Project disturbance on an annual basis |
| Agency/Partner Participation | None required |
| Project Terms and Conditions | 75 |

Table 4-16 Wildlife Monitoring: Incidental Observations and Project Mortality

| | |
|-------------------------------------|---|
| Indicator | All species |
| Monitoring Category | Surveillance |
| Design Type | Opportunistic |
| Measurable Parameter | Wildlife mortality |
| Key Project Interactions | Wildlife mortality due to Project activities and indirect habitat loss associated with the Project. |
| Objective | Track wildlife observations and Project-related mortality within and adjacent to the Project footprint |
| Threshold | Every Project-related mortality of caribou will be reviewed to determine if further action is needed. Other species dealt with on a species-by-species basis. |
| Scope of Monitoring Work | <u>Local monitoring</u> : Log of wildlife observations within the RSA. Record of collisions and all other observed wildlife mortalities within the RSA. |
| Agency/Partner Participation | None required |
| Project Terms and Conditions | 53e |

5.0 REPORTING

Baffinland's Environment Department will prepare an annual summary report on the status of the terrestrial environment. A detailed report illustrating trends of measurable parameters will be prepared every 5 years or as deemed necessary between all agencies and partners. Project terms and conditions regarding reporting requirements will be complied with and appropriately integrated into the annual report.

6.0 ADAPTIVE STRATEGIES

Adaptive strategies are implemented when unexpected impacts are observed or if impacts are larger than predicted and exceed the predefined thresholds. The management and mitigation of unanticipated effects will be most effective with collaboration between Baffinland and other local stakeholders. If impacts to vegetation, birds, or terrestrial wildlife exceed identified thresholds, then local HTOs, regulators, Baffinland's specialists, Baffinland's EHS Superintendent and other stakeholders will meet to discuss mitigation options that will remove or reduce the impact in question. If necessary, further monitoring options and details that are acceptable to all parties can be discussed during these meetings. The collaborative approach among stakeholders to mitigating unforeseen impacts will lead to more acceptable mitigation measures and results for all parties involved.

7.0 REFERENCES

- CESCC (Canadian Endangered Species Conservation Council). 2006. *Wild Species 2005: The General Status of Species in Canada*. <www.wildspecies.ca>.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2011. Canadian Wildlife Species at Risk. Committee on the Status of Endangered Wildlife in Canada. Web site: http://www.cosewic.gc.ca/eng/sct0/rpt/rpt_csar_e.cfm.
- Suydam, R.S. 2000. *King Eider (Somateria spectabilis)*, The Birds of North America Online (A. Poole, Editor). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online (<http://bna.birds.cornell.edu/bna/species/491>).
- Underwood, A.J. 1994. On beyond BACI: sample designs that might reliably detect environmental disturbances. *Ecological Applications* 4:3–15.

APPENDIX A. TERRESTRIAL WILDLIFE WORKING GROUP TERMS OF REFERENCE

Terms of Reference - February 20, 2013

Terrestrial Environment Working Group (TEWG)

This Terms of Reference (TOR) is intended to be the framework under which the Terrestrial Environment Working Group (TEWG) and its members will operate. Additionally, the TOR outlines the main objectives that the TEWG will fulfill. More detailed work plans will be developed from meetings held by the TEWG.

These draft terms are subject to the terms and conditions of a project certificate issued by Nunavut Impact Review Board (NIRB). A chronology for the drafting of these Terms of Reference is provided in Annex A.

1. Purpose

- 1.1 The purpose of the Terrestrial Environment Working Group ("TEWG") is to act as an advisory group to provide for ongoing cooperation, communication, reporting, review and consideration of environmental effects monitoring, mitigation measures and fulfillment of the Project Certificate Conditions as appropriate relating to the interaction between the Mary River Project (the "Project") and the terrestrial environment.
- 1.2 The "Parties" to these Terms of Reference are the Qikiqtani Inuit Association, Baffinland Iron Mines, Environment Canada, and the Government of Nunavut's Department of Environment.
- 1.3 In alignment with the Nunavut Impact Review Board (NIRB) Final Hearing Report recommendation number 49, these TOR provide the framework for the TEWG and the objectives it will fulfill. It is the intention of Baffinland to establish cooperative environmental arrangements between the company, members of the TEWG and the Inuit of the Qikiqtaaluk region to protect both the environment as well as the traditional relationship of the Inuit with the natural environment. The objectives of these arrangements are to:
 - Develop sufficient baseline from which the Project can be effectively monitored and managed;
 - Develop a comprehensive and integrated environmental monitoring program as required in the Project Certificate;
 - Incorporate an ecosystem-based approach for monitoring and management of Project-related environmental effects;

- Include the meaningful participation of members of the TEWG and local Inuit in all aspects of the environmental monitoring program in all phases of the development, including decommissioning and reclamation;
- Integrate traditional knowledge into the development and implementation of the environmental monitoring programs;
- Coordinate all aspects of the environmental monitoring program; and
- Where deemed necessary by the working group, report in an effective and timely manner on the environmental monitoring program and its results in ways that are meaningful to Inuit.

2. Composition

2.1 The TEWG shall consist of an appointed member from each of the Parties.

The Parties of the TEWG will be the following:

- (a) the Qikiqtani Inuit Association ("QIA") shall appoint one member;
- (b) Baffinland Iron Mines ("Baffinland") shall appoint one member;
- (c) the Government of Nunavut's Department of Environment shall appoint one member;
- (d) Environment Canada shall appoint one member;

2.2 All Parties must consent to the addition or removal of a Party to the TEWG. In the event of an addition or removal of a Party, these Terms of Reference will be amended accordingly.

2.3 Each Party will appoint an alternate member and may send other experts, staff, their legal counsel, or observers to any meeting of the TEWG.

2.4 The TEWG may grant observer status to other organizations from time to time.

2.5 In year one, Baffinland will appoint a chair and alternate member for the TEWG meetings. In year two and subsequent years, the Parties or members of the TEWG will nominate and appoint a chair on consensus.

2.6 When the chair is absent for any reason, the alternate member from the organization serving as chair will act as chair.

2.7 Quorum, unless otherwise agreed to by all appointed members, requires the participation of a member or an alternate member from the Parties or organizations identified in section 2.1. For example, participation of all members may not be required at meetings of the TEWG where the agenda may not include topics covered under an agency's mandate.

3. Meetings of the Terrestrial Environment Working Group

3.1 The first official meeting of the TEWG will be held within three (3) months of NIRB's issuance of a Final Project Certificate, unless otherwise agreed to by the Parties to these Terms of Reference.

3.2 During the first year, the TEWG will meet at least quarterly for the purpose of establishing the functions of the working group and developing a work plan. One of the four (4) meetings could be done in conjunction with the Marine Environment Working Group so

as to coordinate the efforts, especially for species using both land and sea (e.g. seabirds, ducks, polar bears).

- 3.3 After the first year, it is expected that the TEWG will normally meet two times a year but may determine the schedule of meetings based on need and consensus of members of the TEWG. One meeting may be held jointly with the Marine Environment Working Group if deemed necessary to coordinate the efforts.
- 3.4 Meeting locations and meeting dates will be determined by the working group on an annual basis and will be held face to face or members can participate by conference call.
- 3.5 The operations of the TEWG including correspondence, documentation and meetings will be in English. It is recognized that on a case by case basis meetings related to the TEWG will require simultaneous translation for the purpose of understanding traditional knowledge and ensuring that traditional knowledge can be incorporated into applicable programs to be reviewed by the TEWG.

4. Project Monitoring

- 4.1 Project monitoring program will comply with the requirements as set out in
 - (a) the NLCA, specifically Articles 12.7.2 and 12.7.3;
 - (b) applicable Federal and Territorial legislation and regulations; and
 - (c) the terms and conditions of the Project Certificate.
- 4.2 As part of Baffinland's Environmental Management System, an Environmental Effects Monitoring Program (EEMP) will be undertaken. The purpose of the EEMP is to select and design full environmental effects monitoring studies that are capable of meeting all of the relevant criteria and thereby able to detect and measure project-induced changes in the environment. The environmental effects monitoring studies will also provide a context under which the results from EEMP can be evaluated, and enable continuous improvement.
- 4.3 The specific purposes for conducting the EEMP are to:
 - (a) Verify effects predictions;
 - (b) Identify and select appropriate target species, indicators and linkages for monitoring;
 - (c) Evaluate the effectiveness of mitigation and to support any required improvement of those measures;
 - (d) Identify any unforeseen environmental effects caused by the Project;
 - (e) Provide an early warning mechanism to identify any environmental effects caused by the Project;
 - (f) Conform with relevant Project Certificate conditions; and
 - (g) Determine and identify any cause-and-effect interactions between the Project and the environment.
- 4.4 Parties of the TEWG may consider collaborating on research programs, activities, or initiatives relating to the terrestrial environment.

- 4.5 Baffinland will be responsible for the establishment and implementation of the Environmental Effects Monitoring Program (the "EEMP") as specified by NIRB, pursuant to Part 7 of Article 12 of the Nunavut Land Claims Agreement ("NLCA"), under any terms and conditions of a Project Certificate, including monitoring programs:
- (a) to measure the relevant effects of the Project on terrestrial wildlife;
 - (b) to confirm that the Project is being carried out within the pre-determined terms and conditions relating to the protection of terrestrial wildlife; and
 - (c) to assess the accuracy of the predictions contained in the FEIS for the Project.
- 4.6 In accordance with Article 12.7.4 of the NLCA, and Federal and Territorial Government Mandates, responsible government agencies and departments shall fulfil their responsibilities for monitoring and data collection.

5. Role of the Terrestrial Environment Working Group

Baffinland has an obligation to fulfill requirements contained within the Project Certificate. As such, Baffinland will seek advice from members of the TEWG with respect to field programs that will be designed and drafted by Baffinland and its experts to collect baseline data, monitor potential effects of the Project and determine any adaptive management measures that may be required during the construction, operation and closure of the Project.

- 5.1 The role of the TEWG is to act as an advisory group to support ongoing cooperation and communication as well as to review and provide advice on all aspects of the Environmental Effects Monitoring Program (EEMP) in relation to the terrestrial environment. Thus, the TEWG and any members and their appointed experts will be required for the following:
- (a) Review the development and finalization of the EEMP in relation to the terrestrial environment;
 - (b) Review the implementation of the EEMP in relation to the terrestrial environment;
 - (c) Review monitoring reports and results;
 - (d) Review the assessment of potential impacts of the Project on terrestrial wildlife;
 - (e) Review the effectiveness of mitigation measures; and
 - (f) Review action plans for the development and implementation of appropriate mitigation measures.

Baffinland will be required to review comments from members of the TEWG and finalize field programs and or documents taking into consideration input from the members.

- 5.2 The TOR does not preclude other members of the TEWG from completing and soliciting input for proposals, protocols or field programs within their mandate for the review from TEWG members.
- 5.3 The TEWG may make recommendations to Baffinland on any aspects of the EEMP for the adoption of mitigation measures in order to comply with applicable regulatory requirement or that may help to mitigate adverse Project effects.

- 5.4 As per General Term and Condition #1 in Section 4.1 of NIRB Project Certificate (No: 005), the NIRB Monitoring Officers may be consulted by the members of the Working Group to consider and provide advice regarding the adequacy of the monitoring programs as they relate to the requirements under the monitoring program established in accordance with the Project Certificate and/or the achievement of specific objectives associated with particular Project Certificate Terms and Conditions. If the Working Group consults with and receives advice from the NIRB Monitoring Officers, this activity does not limit or otherwise affect the responsibilities and oversight respecting the mandates of the authorities participating in the Working Group. Nor does the Working Group's consultation with the NIRB Monitoring Officers prevent Baffinland and agencies from working together to resolve monitoring and adaptive management challenges in a preventative and precautionary manner.

6. Materials Supporting the Terrestrial Environment Working Group

- 6.1 When required Baffinland will make reasonable efforts to provide the TEWG with:
- (a) Copies of all EEMP documentation in relation to the terrestrial environment;
 - (b) Copies of all operational plans relating to the mine operations and railway operations of the Project;
 - (c) Copies of all monitoring reports relating to the EEMP in relation to the terrestrial environment;
 - (d) Copies of all reports relating to interactions between the Project and terrestrial wildlife; and
 - (e) Any other documentation reasonably required by the TEWG relating to the interaction between the Project and terrestrial wildlife.
- 6.2 A summary of the TEWG work and activities will be included in the NIRB Annual Report prepared by Baffinland.

7. Costs

- 7.1 Each party will be responsible for its own costs, including travel costs, relating to participation in the TEWG, but Baffinland will be responsible for the costs incidental to meetings such as venue costs, translation services (if required, as per Section 3.5) and notices.
- 7.2 Baffinland will be responsible for the costs of the EEM Program related to the Project. Government and regulatory agencies will continue to be responsible for the costs of research and regional resource management studies in accordance to their legislative mandates. Baffinland may provide in-kind and financial support on a project-basis manner, as has been done in the past.

8. Community Participation

- 8.1 Baffinland and the QIA will seek to coordinate the work of the TEWG with programs for community participation and traditional knowledge.
- 8.2 The QIA shall work with Baffinland to ensure that affected communities receive reports on the EEMP in an effective and timely manner and that the results of the EEMP are communicated in ways meaningful to the Inuit people.

9. Regulatory Requirements Prevail

- 9.1 Nothing in these Terms of Reference will have the effect of altering the requirements of any legislative or regulatory requirements applicable to the Project.
- 9.2 These Terms of Reference will not cause any duplication in adhering to requirements of any legislative or regulatory requirements applicable to the Project.
- 9.3 The participation of Qikiqtani Inuit Association, Baffinland Iron Mines Corporation, Environment Canada, and the Government of Nunavut's Department of Environment or any other appointed Parties of the TEWG does not affect or change their obligations for consultations.

Annex A

The wording in this draft TOR was first developed by Baffinland Iron Mines Corporation (Baffinland) based on the Draft TOR for the Marine Environment Working Group jointly drafted between Baffinland Iron Mines Corporation (Baffinland) and the Qikiqtani Inuit Association (QIA) on May 30th 2012.

Since that time comments were provided by Environment Canada in June 2012. Comments from the Government of Nunavut on this TOR were received on September 11, 2012. On September 14, 2012, the NIRB forwarded a positive decision report to the AANDC Minister for consideration (which referred to this working group). Baffinland then scheduled and chaired three meetings on November 7th, 2012, December 6th, 2012 and February 6th, 2013 in order to reach consensus and finalize the TOR for the TEWG. All agencies agreed to and participated in the scheduled meetings and or had the opportunity to submit comments on the Draft TOR leading up to or following the calls. On February XX, 2013, these TOR were finalized and agreed to by all parties described in Section 2.0.

APPENDIX B. MONITORING DETAILS AND METHODS – CROSS-REFERENCED TO KEY INDICATOR TABLE NUMBERS

4-2 VEGETATION MONITORING: INVASIVE SPECIES

Details and schedule to be developed in collaboration primarily with the Government of Nunavut.

4-3 VEGETATION MONITORING: VEGETATION HEALTH

Details and schedule to be developed in collaboration with the Government of Nunavut.

4-4 VEGETATION MONITORING: DUST FALL

As part of the project conditions, Baffinland committed to address dust fall with respect to its impact on caribou forage. Monitoring of dust fall is addressed in the Terrestrial Environment Management and Monitoring Plan. Dust fall on caribou forage has been suggested as a potential mechanism causing caribou to avoid habitat at a distance of up to 14 km (Boulager et al. 2012). The largest amount of dust fall generated by the project is expected to be associated with use of the existing Tote Road linking the mine site with the port at Milne Inlet. However, there will also be dust fall generation from point source locations at both the mine site and the port at Milne Inlet.

The proposed dust fall monitoring program was developed using knowledge gathered from other similar air monitoring programs (Ekati Mine, Rescan 2006), as well as applicable caribou research. The program considers all potential dust fall sources, including the mine and Milne port point sources as well as the road linking the two sites.

Objectives

There are two main objectives of the dustfall monitoring program:

1. To determine the extent and magnitude of dustfall at sampling locations associated with the mine site, Milne port site, and road; and
2. To determine seasonal variations in dustfall at all sampling locations.

Methods

Passive dustfall monitoring methods can be used to determine the deposition of fugitive dust from point sources and haul roads. The proposed monitoring program has a total of 26 sampling sites (Figure 1):

- Two background sites located southeast (upwind) of the Baffinland mine site;
- Three sample sites located in dust generating areas of the Baffinland mine site (identified via modeled isopleths);
- Three sample sites in the Milne Port area (two within the port area itself, and one northeast (upwind) of the port);
- Two road stations, each composed of eight sites located 30 m, 100 m, 1 km and 5 km on either side the centreline of the road (prevalent wind direction roughly parallel to the roadway as opposed to perpendicular, therefore no 'upwind' and 'downwind' directions from the road are identified); and
- Two sample sites located 14 km south and west of the road centreline

Caribou present in the area of the Baffinland mine site are sedentary; therefore, sampling of these monitoring stations should occur on a year round basis, but this sampling technique is only suitable for warmer months. The sampling is to proceed in accordance with methods outlined in ASTM D1739-98 (Re-approved 2010). Each sample station will consist of a laboratory-provided canister containing a liquid solution (de-ionized water [thus summer sampling only] with algaecide) that is open to the air for one month (between 28 and 31 days, one calendar month). Each canister is placed two metres above the ground surface and topped with bird spikes to prevent contamination by bird fecal matter (Photo 1). The dustfall sample canisters are to be collected and replaced at the end of the one month period, capped, and shipped to ALS Environmental Laboratory (ALS) in Vancouver for analysis of total, fixed and volatile insoluble particulate matter.



Photo 1. Dustfall collector sampling apparatus (from Rescan 2012).

The resulting data can be compared with the British Columbia (BC) dustfall objectives, as there are no specific guidelines for dustfall in Nunavut. Additionally, results will be reviewed to determine the concentrations present at point sources in comparison to background sites, as well as concentrations changes with distance from the road centerline. Finally, using wind directions and strength data available through the climate monitoring program, the effect of wind on dustfall deposition can be investigated.

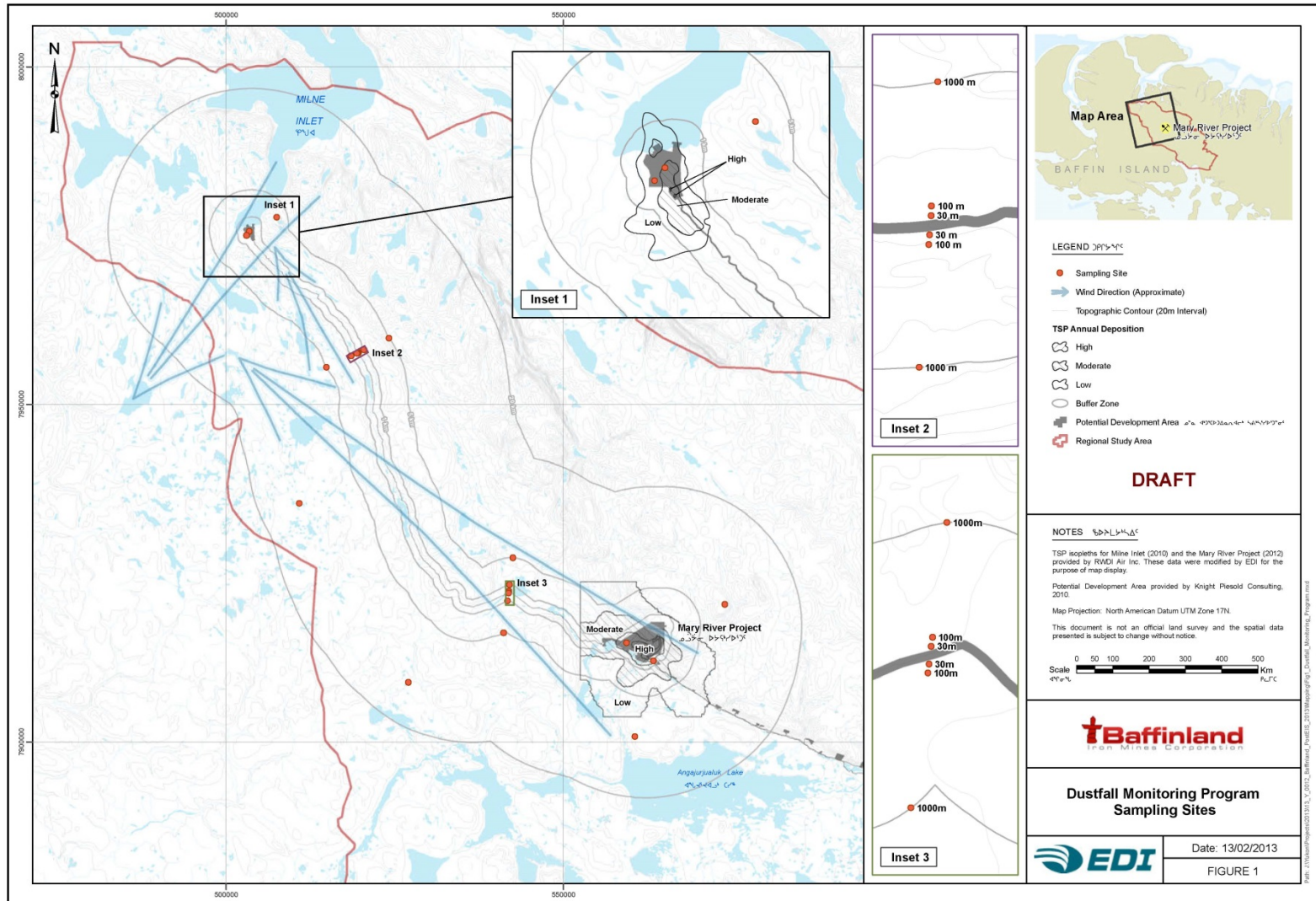
Previous to this study, dustfall monitoring in northern Canada has been conducted during the summer months. Results from this monitoring program will allow the collection of seasonal dustfall data.

Appropriate mitigation measures for the protection of caribou habitat can be determined through increased knowledge of the extent and magnitude of dustfall throughout the project area. In additional data concerning the seasonal fluctuations of dustfall can allow for the application of seasonal-specific mitigation measures.

References

Boulanger J., Poole K.G., Gunn A., and J. Wierzchowski. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou *Rangifer tarandus groenlandicus* and diamond mine case study. *Wildlife Biology* 18:2.

Rescan Environmental Services Ltd. 2012. Ekati Mine 2011 Air Quality Monitoring Program. Produced for: BHP Billiton Canada Inc.



4-5 MIGRATORY BIRD MONITORING: PEREGRINE FALCON AND GYRFALCON NESTING

To be developed in collaboration with Arctic Raptors Inc. (Alastair Franke), QIA (Kim Poole) and the Government of Nunavut.

4-6 MIGRATORY BIRD MONITORING: NESTING OF COMMON AND KING EIDER, AND RED KNOT

To be developed in collaboration with Environment Canada. Preliminary details available from Baffinland 2012 field program.

4-6 ~~MIGRATORY BIRD MONITORING: SEABIRD MIGRATION AND OVERWINTERING~~

~~This program is led by Environment Canada (EC). EC submitted the following draft workplan to Baffinland in 2011 (Author: Grant Gilchrist).~~

~~Development of a Marine Environment Baseline Collection Program – Mary River Iron Mine Project~~

~~Outline of a potential program to address baseline data gaps for seabird distribution along the southern shipping route~~

~~Note – This plan is contingent upon obtaining approvals within EC, and on commitment/agreement from Baffinland to move forward with this approach~~

CONTEXT

~~Lack of baseline data on offshore seabird distribution, particularly within Hudson Strait during winter and spring make it difficult to identify mitigation measures or adjustments to the nominal ore shipping route that could reduce potential impacts to birds.~~

~~The current lack of baseline data reflects the fact that it is difficult to fly aerial surveys in fall, winter and spring due to bad weather and high costs, and that there has rarely been access to ships large enough to travel these areas that could serve as an observation platform for at sea ship-based surveys.~~

~~Recent studies based on birds affixed with instruments such as satellite transmitters on eider ducks and geolocator on thick-billed murre have shown that many seabirds spend much longer periods of time in Arctic waters than previously thought. Thus the interaction between shipping and marine birds along the southern shipping route will not just be limited to June to September.~~

~~Given that year-round shipping will not start for another 4-5 years there is an opportunity to embark on further baseline data collection to identify hotspots of seabird distribution along the southern shipping route, and should they occur to adjust shipping routes to avoid these areas to the extent feasible.~~

~~Such work would also provide a baseline of bird distribution along the southern shipping route against which to compare the results of ship-based monitoring once year-round shipping begins.~~

~~This program would fit under Phases 1 and 2 of QIA's proposed framework for the Baseline Data Collection Program.~~

OBJECTIVE/TARGET

Establish baseline distribution of birds in Hudson Strait year-round and identify hotspots for seabirds if they occur.

INDICATORS

- ~~Satellite transmitters and geolocators can provide year-round data on bird distribution and movements that cannot be obtained from expensive and logistically challenging aerial or boat-based surveys~~
- ~~Location data from individual birds equipped with transmitters can be used to identify hot-spots of concentrated use, and this information can then be used to follow-up with focused aerial surveys to provide population estimates for these hot-spots~~
- ~~Target species would be Common Eider, King Eider, Thick-billed Murre, Ivory Gull and Glaucous Gull~~
- ~~Thick-billed Murre — geolocators — target individuals from colonies on Coats Island and Digges Island~~
- ~~Glaucous Gull — satellite transmitters — target individuals from colonies near Cape Dorset, Markham Bay, Nottingham and Salsbury Island~~
- ~~Ivory Gull — satellite transmitters — continue studies of individuals equipped with satellite transmitters to refine identification of overwintering areas in Davis Strait, target breeding colonies TBD~~
- ~~King Eider / Common Eider — satellite transmitters — target individuals from East Bay, Cape Dorset, Markham Bay, Nottingham and Salsbury Island~~

PROPOSED TIMELINE

- ~~Deploy tags next summer (2012), collection of data for 1 year including winter — will provide information on habitat use and distribution in Arctic during winter~~
- ~~Continue tagging and collecting data for 3 years and write-up the data in the 4th year~~

DELIVERABLES

- ~~Mapping of bird hotspots within Hudson Strait, Davis Strait and potentially Foxe Basin~~
- ~~Greater understanding of the timing and location of bird movements to anticipate potential interactions with shipping~~
- ~~Link bird distribution to oceanographic features and ice conditions to build predictive models of bird distribution~~
- ~~Refinements of the nominal shipping route to avoid key areas for birds at different times of year~~
- ~~Baseline description of seabird distribution against which to compare monitoring results during operational phase~~

OPPORTUNITY FOR BAFFINLAND AND EC TO WORK TOGETHER

- ~~Baffinland could provide financing to purchase instruments and support field logistics~~
- ~~EC would carry out the field work necessary to equip birds with transmitters — this requires specialized surgical equipment and a qualified veterinarian — we have several years of experience doing this kind of work~~
- ~~EC would write-up the results of the study and share data and deliverables with Baffinland~~
- ~~Incidental observations of seabirds made during marine mammal baseline data collection programs could be used to supplement results from tagged individuals~~

- Once hotspots identified from tagged individuals, follow-up with aerial surveys to provide population estimates in these areas

LINKAGE TO PROJECT MONITORING

- This work would provide essential linkages to Baffinland's monitoring program and emergency response planning by determining baseline bird distribution and identifying areas of greater sensitivity to shipping disturbance and accidental spills
- Spatial data can be integrated into response plans and with data collected during operational phase monitoring programs
- Greater understanding of link between bird distribution and oceanographic features and ice conditions could facilitate adaptive management to make adjustments to shipping based on current ice conditions
- Ship-based monitoring during the operational phase can determine to what extent bird distribution is altered by vessel traffic — thresholds of change could be established to determine when adaptive management should be triggered

NEXT STEPS

- Grant Gilchrist of EC's Science and Technology Branch would be the lead scientist working on this
- He is currently seeking approval from his managers to work with Baffinland on addressing data gaps
- Once approval is in place he will draft a research and monitoring plan for establishing baseline bird distribution in Hudson's Strait — this detailed draft will be shared with Baffinland
- EC could provide Baffinland with cost estimates of the proposed work in the coming months
- Commitment from Baffinland to move forward with this approach to be shared with NIRB at PHC?
- Data sharing agreement?

COMMUNITY PARTICIPATION

- EC is also involved in community-based monitoring programs with communities along southern Baffin Island and northern Quebec
- This program involves coastal boat surveys in summer to look at nesting locations of eiders and gulls and the presence of polar bears at the nesting colonies
- This program could provide an opportunity to better describe areas that might be vulnerable to ship wakes and to monitor impact of wakes during operational phase (e.g. low-lying eider colonies on outer islands of Markham Bay)
- Baffinland could provide financing to support logistics for this work, and results would be directly applicable to Baffinland's shipping management and monitoring plan

4-7 MIGRATORY BIRD MONITORING: SONGBIRDS AND SHOREBIRDS

Methods used in 2012 available in the 2012 Annual report. This program (at least in 2012) linked with the lichen collection for practicality — distribute sampling near and far site, maximize time on the ground, minimize helicopter requirements.

4-8 CARIBOU MONITORING: INDIRECT HABITAT LOSS

Methods to be determined by Baffinland in consultation with TWWG.

4-9 CARIBOU MONITORING: HABITAT USE DURING CALVING

- GN-led caribou collaring program
- Baffinland led on-site observations – road-based surveys (Height of Land) during peak week of calving in 2013
- No aerial surveys are suggested at this time.

4-10 CARIBOU MONITORING: MOVEMENT

- Snow tracking, investigating diversion of caribou tracks (QIA Suggestion).

4-11 CARIBOU MONITORING: HARVEST-RELATED MORTALITY

- Cross-reference hunter harvest study plan (QIA).

4-12 CARIBOU MONITORING: HEALTH CONTAMINANTS AND BODY CONDITION

- To be developed in collaboration with GN-DOE, QIA.

4-13 CARIBOU MONITORING: PRODUCTIVITY

- To be developed with the Government of Nunavut.

4-14 WOLF MONITORING: DEN SITES

Methods to be determined by Baffinland in consultation with the GN.

4-15 WILDLIFE MONITORING: DIRECT HABITAT LOSS

- Footprint assessment.

4-15 WILDLIFE MONITORING: INCIDENTAL OBSERVATIONS AND PROJECT MORTALITY

- Baffinland's wildlife sightings log.